The London School of Economics and Political Science

Framing Elite Policy Discourse: Science and the Stockholm Convention on Persistent Organic Pollutants

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A thesis submitted to the Department of Government of the London School of Economics and Political Science for the degree of Doctor of Philosophy

London
July 2011

Declaration

I certify that the thesis I have presented for examination for the MPhil/PhD degree of the London School of Economics and Political Science is solely my own work other than where I have clearly indicated that it is the work of others (in which case the extent of any work carried out jointly by me and any other person is clearly identified in it).

I warrant that this authorization does not, to the best of my knowledge, infringe the rights of any third party.

Acknowledgements

I wish to express my gratitude to the many people who contributed to the development of this thesis.

The expert guidance offered by my supervisors, Dr. Cheryl Schonhardt-Bailey and Dr. Michael Mason, was instrumental to my completion of this work. I am indebted to Farimah Daftary, whose thoughtful suggestions and willingness to talk through some of the methodological challenges were invaluable; and to Dr. Loren Cass, who served as a discussant of my work at an International Studies Association conference and whose comments I referred to repeatedly as I developed this thesis.

I am grateful to all of the interviewees for this project, both anonymous and named. I offer special thanks to Professor Ian Rae and Mr. Mark Trewhitt, both of whom repeatedly shared their insights into the chemical review process and provided vital explanations of the complicated technical characteristics of and issues associated with the chemicals under review.

Thanks to Langston James "Kimo" Goree, Chris Spence, Dr. Pamela Chasek and Dr. Lynn Wagner, of IISD's Earth Negotiations Bulletin, for giving me the opportunity to participate in UNEP negotiations in a way that dramatically improved my understanding of the decision-making process. Many thanks to my colleagues on the ENB chemicals team, and especially POPs expert Dr. Pia Kohler, for many enlightening conversations about POPRC and the Stockholm Convention.

Very special thanks to my family for all of their encouragement, and especially to my husband, Akhil Patel, who read chapters, listened, critiqued, and provided far more support than anyone has a right to expect; to my father, Doug Templeton, for his confidence and, with his "atta boy, girl" encouragement, teaching me to strive for whatever goal I wanted to achieve; and to my mother, Marcia Fuson, for being a such an inspiring role model.

This doctoral thesis is dedicated to the memory of Mrs. Helen Peterson, who wanted me to do this.

Abstract

Rising levels of persistent organic pollutants (POPs) in the environment have spurred governments around the world to engage in cooperative action on a global scale to control those chemicals that pose significant threats to human health and the environment. Political efforts to mitigate the risks posed by these chemicals are impeded by the technical complexity associated with POPs pollution, and are thus predicated on the scientific assessments of experts in fields such as chemistry and toxicology. Policymakers' reliance on scientific expertise for guidance on risk assessment and management has reduced their control over policy and has given scientists authority to determine socially acceptable levels of risk, thus blurring the boundaries between science and politics. Conversely, the implications of science-based decision-making have increased the interest and involvement of political actors in a phase of evaluation that is often seen as objective, fact-based, and free of political interest. This thesis analyzes the ways in which various actors with scientific expertise – representatives of governments, industry, and environmental/public health NGOs – working under the auspices of the Stockholm Convention on Persistent Organic Pollutants have used strategic issue framing tactics to promote predetermined policy agendas during the scientific review of chemicals proposed for regulation. This research breaks new ground by analyzing the ways elite decision-makers strategically frame issues in order to influence the policy preferences of other elites, and by evaluating the role of issue framing in the context of live policy negotiations. Key findings include the following: 1) the formation of epistemic communities of technical experts is precluded by political pressure on scientists to represent government/organizational interests, and 2) scientists strategically frame issues in ways that support the social, economic or political interests of the governments or organizations with which they are affiliated, thus contributing to the politicization of science-based decision-making.

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List of Acronyms

ACC	Alaska Community Action on Toxics
BDE	Bromodiphenyl ether
BMF	Biomagnification Factor
BSEF	Bromine Science and Environmental Forum
CLI	CropLife International
CLRTAP	Convention on Long-Range Transboundary Air Pollution
COP	Conference of Parties
EHF	Environmental Health Fund
ENB	Earth Negotiations Bulletin
ESIA	European Semiconductor Industry Association
HBB	Hexabromobiphenyl
HBCD	Hexabromocyclododecane
HCB	Hexachlorobenzene
HCH	Hexachlorocyclohexane
ICC	Indian Chemical Council
IPEN	International POPs Elimination Network
IPNC	Indigenous Peoples and Nations Coalition
LRET	long-range environmental transport
NGO	non-governmental organization
PAN	Pesticide Action Network
PCBs	Polychlorinated biphenyls
PCDD	Polychlorinated dibenzo-p-dioxins
PCDF	Polychlorinated dibenzofurans

PeCB	Pentachlorobenzene
PFOS	Perfluorooctane sulfonic acid
PFOSF	Perfluorooctane sulfonyl fluoride
POPRC	POPs Review Committee
POPs	persistent organic pollutants
RME	risk management evaluation
SCCPs	Short-chained chlorinated paraffins
UNECE	United Nations Economic Commission for Europe
UNEP	United Nations Environment Programme
US EPA	United States Environmental Protection Agency
WCC	World Chlorine Council

Chapter 1: Introduction

In May 2004, the Stockholm Convention on Persistent Organic Pollutants (Stockholm Convention) entered into force as a legally-binding global agreement designed to reduce or eliminate a category of transboundary chemical pollutants deemed to pose a significant threat to human health and the environment. The Stockholm Convention is the culmination of a series of international efforts to establish global regulations for the production, use and disposal of these toxic substances. While thirty chemicals were initially proposed for regulation, a subcommittee of representatives from industrialized nations unilaterally whittled the list down to twelve, informally known as "the dirty dozen" (Vanden Bilcke 2003). Eliminated from the initial list of substances were a few chemicals that are nearly identical to those within the dirty dozen, both structurally and in their effects on human health and the environment. This regulatory anomaly is puzzling, given that the stated goal of the Convention is to protect human health and the environment from the dangers associated with exposure to persistent organic pollutants (POPs). If Parties believe that the risks posed by one chemical are serious enough to warrant global action, why do they balk at taking the same action to eliminate a chemical that has been shown to pose nearly identical risks?

Several answers to this question have been proposed by researchers. These tend to fall into one of three categories: 1) a lack of scientific consensus on the risks posed by particular chemicals (Damstra et al. 2002; Selin and Hjelm 1999; Selin and Eckley 2003); 2) a lack of available substitutes (Janssen 2005; Santillo and Johnston 2003); and 3) potential financial gains or losses for nations or influential stakeholders (Vogel 1997; Sprinz and Vaahtoranta 1994; Jaffe et al. 1995). While each of these answers can be substantiated by evidence, they stop short of considering the ways that these arguments may be deliberately and strategically employed by actors seeking to support specific policy preferences. In other words, they do not provide a complete explanation of the decision-making process, because they ignore a key element in many political negotiations: heresthetical use of information by actors involved in the policymaking process. These explanations may not fully account for discrepancies in regulatory decisions because they overlook the potential for strategic manipulation of the information used to define a problem, its social, economic and political implications, and the range of possible solutions.

In particular, such explanations fail to account for the role of science and science advisors in policymaking, an oversight which is presumably based on the assumptions that 1) scientists serve as disinterested sources of factual, unbiased knowledge about the physical world, and 2) science can be separated from politics during the policymaking process. While several academics have challenged these assumptions (Jasanoff 1990 and 2004; Forsyth 2003; Bernstein 2001; Haas 1992a), this view of the role of science in policymaking persists in policy research (as cited above) and in institutional design. For example, both the institutional structure and the language of the Stockholm Convention reinforce the notions that technical evaluation of scientific data can be cleanly separated from policymaking, and that the relationship between technical advice and policy decisions is unidirectional. In this context, science is presented as a form of input that can be taken at face value; it is an explicit premise of the Stockholm Convention's decision-making process that science advice is not imbued with political, economic or social interests.

In order to more fully understand the decision-making process that leads to regulatory anomalies such as that described above, it is necessary to critically evaluate the role of those actors responsible for the initial stages of decision-making in the Stockholm Convention, as well as the ways in which these actors use scientific data to inform decision-making. An epistemic communities approach is well-suited to this type of analysis, as these approaches account for the role of technical expertise in the formation of the preferences of decision-makers. The focus of the approach, particularly as conceived by Peter Haas, on common policy goals derived from "shared beliefs in cause-and-effect relations, validity tests, and underlying principled values" calls into question the commonly-held perception of scientists as apolitical actors who are detached from policymaking (Haas 1992, p. 187). This approach suggests that many scientists are both interested and active in the policymaking process, and have preferences derived from their technical expertise. Motivated by shared understandings of a problem and normative beliefs about appropriate policy responses, these transnational networks of experts deliberately promote their values-based agendas as they provide policy advice to non-experts (Haas 1992a).

Furthermore, given that scientists participating in the policy process are responsible for translating complex technical knowledge into usable information for policymaking, these experts are in a unique position to use strategic issue framing as a tool for defining issues and directing discourse about these problems in ways that will support their policy preferences. Strategic issue framing is a tactic used by individuals to build support for their preferences by emphasizing certain aspects of an issue while deemphasizing or ignoring others (Druckman and Nelson 2003; Chong and Druckman 2007a). While all scientists participating in the policymaking process could use their technical expertise to support their individual policy preferences, the coordinated action of epistemic communities may carry particular weight, as such communities can use the strength of numbers to support their policy goals. This thesis does not suggest that all scientists participating in the work of the Stockholm Convention's POPs Review Committee (POPRC) are part of an epistemic community, or that the POPRC itself constitutes such a community. Rather, a key aim of this research is to explore the possibility that one or more epistemic communities of scientists and technical experts have formed within the context of the Stockholm Convention. The strengths and limitations of using an epistemic communities approach are explored at length in Chapter 3.

Given the prominent role given to science in the decision-making process of the Stockholm Convention, in which scientific data are presented as objective, neutral information and scientists are identified as politically independent, objective and disinterested technical advisors, this study is designed to explore two interrelated issues: the role of strategic issue framing in policy discourse, and the ways in which scientists may use this tool as they take advantage of their asymmetric control of technical knowledge to promote political goals. Using the Stockholm Convention as a case study, this thesis will evaluate the distinct roles of science and scientists in global POPS-related policymaking, with a particular focus on the way scientific information may be used to influence: 1) actors' perceptions of the risks posed by specific chemicals, 2) the course of debate arising from deliberate, conscious framing of problems, and 3) regulatory outcomes within the context of the Stockholm Convention on Persistent Organic Pollutants. These aims will be discussed in more detail in the following section.

1.1 Science and Global Governance of POPs

Rising levels of persistent organic pollutants in the global environment have spurred governments around the world to engage in multilateral action to regulate production and use of those chemical compounds that pose the greatest dangers to human health and the environment. However, efforts to mitigate the risks posed by these substances have been impeded by the technical complexity of the problem, and policymakers have called upon scientists with expertise in fields such as chemistry and toxicology for guidance on risk assessment and management. As with many other environmental policy problems, the inability of policymakers without scientific backgrounds to independently assess the risks to human health and the environment has changed the traditional division of labor between scientists and policymakers. In the case of the Stockholm Convention, scientists with relevant technical expertise are asked to make predictions about the potential risks associated with continued use of particular chemicals. In this context, scientists are needed to assist policymakers with the formulation of regulatory policies intended to reduce the potential for harm to human health and the environment. The geographic scope and environmental degree of POPS pollution are often highly uncertain, which can lead to disagreement among actors about the appropriateness of proposed regulatory actions. When environmental regulation is likely to affect economic or social interests of stakeholders, such conflicts can be especially difficult to resolve, and scientific recommendations may come under intense scrutiny. Such conflict is evident not only in discussions related to global POPs regulation, but in issues such as climate change, biodiversity, and mercury pollution, to highlight just a few examples. When economic, social, and political interests in regulatory action are significant, the policymaking table can be a hostile, conflict-ridden environment, and the boundaries between science and politics may become blurred.

While both scientists and policymakers may seek to maintain control over their respective spheres of expertise, the technical complexity of environmental hazards is changing the functions of both science and scientists within the policymaking process. Scientists not only act as interpreters of technical data as they assess the risks posed by various chemicals, but also as risk managers who advise decision-makers how to reduce ongoing exposure to these chemicals that occurs as a result of processes such as waste disposal and recycling. These two roles are substantively different and can require scientists to move from traditional scientific analysis of the properties of chemicals to evaluation of the social and economic issues associated with continued use or elimination of these substances. In the context of the Stockholm Convention, such work involves assessing the short- and long-term risks to human health and the environment, the availability and affordability of possible substitutes, and the feasibility of implementing phased elimination or bans, as well as identifying and managing the specific and often conflicting interests each Party to the Convention may have in continuing or discontinuing production and/or use of a substance. Given that scientists are involved in the earliest stages of policymaking, these actors have a unique opportunity to shape the way issues are understood and debated, particularly by those without the technical expertise needed to arrive at independent understandings of a particular phenomenon. The hybrid role of science advisor and policymaker, which is being played by many scientific experts in POPRC, gives rise to two of the key questions guiding this research: 1) do scientists engage in coordinated action to promote their values-based agendas, and 2) does strategic issue framing influence the technical, science-based evaluations of chemicals nominated for listing in the Stockholm Convention?

Initially, the Stockholm Convention covered only twelve pollutants, although many more were proposed for listing (Vanden Bilcke 2002). Analysis of the process of chemical review provides a fascinating look at the complex web of relationships among politicians, bureaucrats, industry officials, and civil society activists, particularly in this era of increasing globalism. Actors within each of these categories have had unprecedented involvement in and influence over the international negotiations which prioritize economic, political and health concerns of the world's populations, and their increasing ability to influence international policy is critical to the future of chemical regulation under the Stockholm Convention. Thus, the primary goal of this research is to explore the process by which chemicals are evaluated and recommended for listing in the Annexes of the Stockholm Convention, with particular emphasis on the way that scientists may use strategic issue framing to support their policy preferences in the course of technical evaluations of chemicals nominated for listing.

To achieve this goal, this thesis analyzes the interests of key participants in the work of the Stockholm Convention, the strategies they employ to influence regulatory outcomes, and the relationships among these actors. Of particular interest is the work of the POPs Review Committee, which is responsible for evaluating chemicals proposed for listing. This committee acts as a gatekeeper to the Convention, as proposals to list chemicals are only considered by the Conference of Parties (COP) after extensive scientific review by the scientists participating in the work of POPRC. This research combines a constructivist perspective on the role of scientists in policymaking with a rational choice analysis of the ways in which participants will attempt to manipulate the decision-making process and associated discourse in order to support their policy preferences. Specifically, this research first considers the way that scientists work as interpreters of technical knowledge to define problems and possible solutions, and then builds on this analysis by considering the extent to which scientists may use their unique expertise and position within the policy process to promote a political agenda. This theoretical approach and the bridge between the constructivist and rational choice perspectives which guide this analysis are detailed in Chapter 4. The following sections will contextualize this research with an overview of persistent organic pollutants and the global agreement which has been established to mitigate the risks they pose to human health and the environment.

1.2 Persistent Organic Pollutants: An Overview

POPs can be divided into three principal categories: industrial chemicals, pesticides, and unintentionally-created by-products of thermal processes or waste disposal. While many scientists believe that POPs are most likely to enter the body via ingestion of contaminated foods, such as fish, the exact paths POPs travel from industrial products to humans remain unclear (Resource Futures International 2001). One scientist has recently linked the spread of POPs to dryer lint; she suggests that PBDEs and other flame retardants are released from textiles when they encounter the heat of the dryer, and are transmitted to humans when they handle the lint and later touch their eyes, mouths, or noses (Schecter et al. 2009). This study is illustrative of both the pervasive nature of POPs and the extensive knowledge gaps that prevent people from effectively reducing their levels of exposure.

While many chemicals can be harmful to the environment and human health, POPs have several characteristics that distinguish them from other toxic chemicals. By definition, POPs are persistent, which means they do not break down upon release into the environment, and bioaccumulative, which means that they increase in concentration as they are passed through the food web. Thus, the fatty tissues of top predators tend to contain the highest levels of POPs, which can be problematic for humans who rely on these animals for food (Dewailly and Furgal 2003). POPs have low water-solubility and high mobility: they are able to travel thousands of kilometers from their sources of emission via both water and air currents. This crucial characteristic, referred to as long-range environmental transport (LRET), means that addressing POPs pollution requires global cooperation, as unilateral domestic or regional efforts to reduce or eliminate these substances will not prevent further contamination. POPs are particularly attracted to colder climates, where freezing temperatures cause them to condense and fall to the earth or sink to the ocean floor. Although few POPs are produced or used in the northernmost regions of the globe, some of the world's highest concentrations of POPs can be found in countries bordering the Arctic Circle. The impact on humans in this region has been dramatic: in recent tests of the umbilical cord blood of newborn infants, the blood of infants from areas near the Arctic were found to contain between two and ten times the amount of POPs found in the blood of babies born in more southern regions (Hillman 1999).

Once absorbed into living creatures, POPs are passed upward through the food chain in a process called biomagnification. The concentrations of chemicals increase as they move through the food chain, and naturally can be found in the greatest concentrations in humans and other predators at the top of the food chain (Hillman 1999). POPs are lipophilic, meaning that they are both attracted to and absorbed by fatty tissues of humans and other animals. One researcher has described POPs as "fat-loving," which explains why they can be found in such high concentrations in lipid-rich breast milk (Schecter 2003). Consequently, the risks to infants are particularly high. As one study notes:

> Ironically, it is the fetus and the nursing infant that receive significant exposures or the greatest body burdens of environmental POPs….Breast-fed infants are effectively at the top of the food chain. Their daily intake of TCDD, for example, is typically 50-fold higher than that of adults, on a body weight basis, and they absorb 90% of the ingested TCDD (Hooper and McDonald 2000, p. 388).

TCDD (tetrachlorodibenzo-*p*-dioxin) is created unintentionally as a by-product of incomplete combustion of wood and other fossil fuels, and may also be created during incineration of industrial and municipal wastes. TCDD and other POPs can also be transferred transplacentally from mother to fetus.

The physical characteristics of chemical pollutants largely determine the type of political problem they pose. For example, chemical pollutants that are not subject to long-range environmental transport may be dealt with effectively on a local or regional level. The high mobility associated with POPs, however, makes them a global problem that requires a unified international response. Abatement in one region will not prevent that region from experiencing the literal fallout created by continued production and use of these pollutants in other areas. Recognition of the need for a comprehensive treaty to coordinate international action arose from scientific assessments conducted for the United Nations Economic Commission for Europe (UNECE) Convention on Long-Range Transboundary Air Pollution (CLRTAP) POPs Protocol, a regional POPs agreement among 29 Northern countries (including non-European countries like the US and Canada), which led to calls for a broader global agreement devoted specifically to persistent organic pollutants (Selin 2010). While the Stockholm Convention has been hailed as an unprecedented global effort to tackle chemical pollution, to date it lists only 22 of the many chemicals which could potentially be categorized as POPs. A number of chemicals with similar properties to those addressed by the Stockholm Convention have been left unregulated, in spite of growing evidence of the risks they pose to the environment. As POPRC shifts its focus from chemicals that have been phased out of production ("dead" chemicals) to those that are still widely produced and used ("live" chemicals), reaching consensus on listing new POPs is likely to become increasingly difficult.

1.3 The Stockholm Convention on POPS: An Overview

The Stockholm Convention on Persistent Organic Pollutants entered into force on 17 May 2004, when France submitted the fiftieth instrument of ratification, acceptance, approval or accession to become a party to the convention. As of 17 March 2011, 172 states or regional economic integration organizations have become parties to the Convention (http://chm.pops.int, 17 March 2011).

While thirteen groups of substances were considered for inclusion in the Stockholm Convention, in May 1995 the United Nations Environment Programme (UNEP) Governing Council adopted Decision 18/32, which suggested that the initial assessment should begin with a shortlist of twelve individual chemicals, the names of which were specified in a footnote (Vanden Bilcke 2002). This footnote gave the impression of a consensus on the shortlist of chemicals that would be subject to initial review, but the selection of these particular substances was not based on open, inclusive negotiations among interested parties, or on any official decision by the governing authorities (the Executive Body of the CLRTAP was overseeing the process at this time). Rather, the choice of chemicals listed in this footnote "reflects the political judgment of only a small group of industrialized countries that wanted to limit the number of substances included in the Convention," according to Christian Vanden Bilcke (2002, p. 329). Nevertheless, the shortlist of chemicals in the footnote of Decision 18/32 rapidly became the generally accepted focus of further proceedings. In the Washington Declaration, adopted in November 1995, participating States agreed to:

> Develop a global legally binding instrument for the reduction and/or elimination of emissions and discharges, and, where appropriate, the elimination of the manufacture and use of the POPS identified in Decision 18/32 (Vanden Bilcke 2002, p. 329).

The final mandate for the next round of negotiations, adopted in 1997 by the UNEP Governing Council, stated that "immediate international action should be initiated…which will reduce and/or eliminate…the twelve POPs specified in GC Decision 18/32," thereby officially limiting the focus of the talks to the shortlist of chemicals defined according to the interests of a small subgroup of nations. Thus, the initial targets of the Stockholm Convention were established, with provisos for the future addition of other persistent organic pollutants (Vanden Bilcke 2002, p. 329).

1.3.1 Listing substances as POPs

POPs regulated by the Stockholm Convention are divided into three Annexes, and may be listed in more than one (e.g., PCBs are listed in Annex A, because they were produced intentionally for industrial purposes, and in Annex C, because PCBs are created unintentionally as a by-product of landfill fires and other forms of combustion). Annex A requires Parties to the Convention to "prohibit and/or take all legal and administrative measures necessary to eliminate…production and use" of the substances listed therein (Article 3.1(a)). Import and export of these chemicals is restricted, with exemptions for transport when necessary for "environmentally sound disposal" (Article 3.2(a)). Individual countries may request time-limited exemptions for continued use of substances listed in Annex A, when alternatives for specific needs are unavailable. Exemptions will expire upon the date indicated by the Party to which the exemption applies, or, if no date is given, five years after the date upon which the Convention entered into force for that particular chemical. The Conference of Parties (COP), which controls the register of exemptions and oversees implementation of the Convention, may grant an extension of up to five additional years. During the periods of exemption, Parties are expected to develop plans to reduce dependency on chemicals or, as in the case of unintentionally created by-products, find alternative means of waste disposal which will eliminate the production of hazardous chemicals specified in the Convention.

Annex B was designed to include substances that may be exempted for specific uses which are not time-limited. For example, DDT can still be used for the purpose of disease control when "locally safe, effective and affordable alternatives are not available to the Party in question" (Annex B, Part

II, paragraph 2). The only other chemical currently listed in Annex B is PFOS, which is used in a number of medical devices (e.g., intravenous tubes used in hospitals).

Finally, Annex C includes those POPs that are unintentionally-created by-products of common manufacturing and waste disposal practices. Three of the most common by-products are polychlorinated dibenzo-*p*-dioxins and dibenzofurans (PCDD/PCDF), HCB, and PCBs, all of which are listed with exemptions in the Stockholm Convention. These by-products are usually created through the incineration of waste (including both the residential burning of trash and the incineration of entire landfills), chlorine bleaching of pulp, production of chlorine itself, and thermal processes used in metallurgy (Annex C, Part II).

The Stockholm Convention contains provisions for adding new chemicals to its Annexes. The POPs Review Committee (POPRC), which is the focus of this research, has been established to conduct scientific reviews of chemicals which have been nominated by Parties for listing (Decision COP.1/SC-1.7, pursuant to Article 19.6 of the Stockholm Convention). This Committee plays a key role in setting the agenda for the Stockholm Convention, as its recommendations form the basis of COP's decisions to list new substances in the Annexes of the Convention. If POPRC is satisfied that a chemical meets the criteria for listing, it will forward to the COP a risk management evaluation and recommendation for listing. Theoretically, the divisions between COP and PORC are clearly defined: POPRC is responsible for conducting scientific analysis of chemicals, and COP is responsible for discussing the socioeconomic issues associated with listing. In practice, however, the distinction between these two spheres of responsibility can be blurred, as countries opposed to regulation frequently introduce socioeconomic issues during POPRC's discussions, and raise questions about the scientific validity of POPRC's recommendations during meetings of the COP. These issues, and their implications for decision-making, will be analyzed in greater detail in subsequent chapters of this thesis.

1.3.2 Enforcement of parties' obligations

Parties are required to submit detailed plans for compliance with the regulations of the Stockholm Convention within two years of accession to the Convention. No additional enforcement mechanisms have been established at this point, although the Conference of Parties (COP) is charged with developing procedures and mechanisms to judge non-compliance and for subsequent action (Article 17). The non-compliance issue is highly controversial, as many developing countries believe that they will be disproportionately affected by any measures which would allow developed countries to monitor their actions. While regulation of chemicals is often compatible with the economic interests of developed countries, which produce patented substitutes and alternatives, transitioning to production and use of alternative substances may create economic hardship for countries that manufacture the older chemicals. This issue was hotly debated in May 2009 at the fourth meeting of the Conference of Parties to the Stockholm Convention, with developed and developing countries competing to frame the issue. Developed countries argued that establishment of a non-compliance mechanism was (and continues to be) essential for the "legitimization" of the Convention, emphasizing that "a world free of POPs would not be achieved unless Parties were held accountable for their commitments under the Convention" (Ashton et al., 2009, p. 16). Developing countries, led by China, India, and Iran (all of which have significant economic stakes in chemical manufacturing) "adamantly opposed what they considered an imbalanced system punishing developing countries without the capacity to comply" (Ashton et al. 2009, p. 16). Countries took virtually the same positions at the fifth meeting of the COP, held in May 2011; despite extensive debate, little progress has been made toward agreement.

1.4 Conclusion

The Stockholm Convention is a living treaty designed to identify and regulate new POPs, and to provide financial and technical assistance to Parties as they seek to implement their obligations under the Convention. Its initial success in banning 12 chemicals was bolstered by COP-4's 2009 decision to list nine additional substances in its Annexes. The Stockholm Convention is now moving into difficult territory, however, as its bodies have begun to consider steps to reduce or eliminate a number of "live" substances that are of significant economic importance to a number of countries. In stark contrast to the closed decision-making process that led to regulation of the first twelve substances, decisions are now made in a series of steps which are transparent and open to all parties and observers. The increasing importance of the socioeconomic implications of regulation increase the likelihood that both parties and observers will use a variety of political tactics to promote policy decisions which support their political agendas.

The subtle ways in which political actors may attempt to manipulate the process are sometimes the most powerful, as they can go unnoticed and unchecked by other participants. Strategic issue framing is one such way of exerting influence over the course of political discussion and decision-making, but its role in global chemicals policymaking has been unexplored by previous research. The goal of this thesis is to provide a systematic analysis of the way strategic issue framing tactics are used by participants seeking to influence the agenda and decisions of the Stockholm Convention. Unlike previous studies of issue framing, which have predominantly explored the ways in which elite actors have framed issues for less knowledgeable listeners by exploring media coverage, political campaign speeches, and other forms one-way communication (Callaghan and Schnell 2001; Druckman et al. 2004; Jerit 2008), this study will focus on the ways in which elites frame issues for other elites in the context of live policy negotiations. The role of science and scientists in the Stockholm Convention is of particular interest, as these actors have asymmetric control over the technical information which is the foundation of the policymaking agenda. In their positions as advisors to bureaucrats, scientists have the opportunity to strategically frame information to support or oppose regulation of substances. If these actors are influenced or driven by political motivations, they may be able to employ strategic issue framing tactics in ways that are more influential than any other actors working in this policy sphere.

This thesis will analyze the use of strategic issue framing during technical evaluations of substances nominated for listing, considering in particular the motives of scientists, the ways in which issue framing is used to influence the course of debate, the sources of scientists' policy preferences, and the implications of issue framing for decision-making under the auspices of the Stockholm Convention. The next two chapters will establish the theoretical foundation for this analysis. Chapter 2 will outline the mechanics, uses and previous studies of strategic issue framing, and Chapter 3 will explore the epistemic communities approach, which provides a theoretical foundation for analysis of coordinated political action among scientists. Chapter 4 will outline the methodological goals of this research and the means by which the analysis will be conducted. Chapters 5 through 7 will present the findings of this research, discussing the role of scientists in the Convention and the ways in which various participants utilize issue framing tactics to support their agendas. Chapter 8 will conclude the thesis with a discussion of the findings and their practical and theoretical implications.

Chapter 2: Framing Theory

In the introduction to their study of media framing, Karen Callaghan and Frauke Schnell write, "In the world of public policy debate, as in the world of politics, elites win only at the expense of their opponents. And rhetoric is the key to winning the policy war" (2001, p. 185). While some scholars would contest the use of the term "rhetoric" to describe framing, this statement underscores the importance of the strategic use of frames in policy discourse. As a tactic used by political actors seeking to garner support for those policies or decisions that will be most favorable to their interests, framing structures debate and decision-making by highlighting certain considerations while deemphasizing or ignoring others. Framing issues to emphasize new or different elements can change an audience's perceptions and win support from individuals who, prior to the reframing of an issue, might have opposed a particular course of action. When used strategically, framing can be a powerful means of influencing debate and policymaking.

Growing scholarship on framing has led researchers in disciplines including psychology, sociology, behavioral economics, and political science to analyze the possible effects of framing on discourse. This thesis builds on foregoing research in two ways: first, by analyzing the use and impact of framing in live policy discussions, and second, by considering the ways that elite decision-makers frame information in order to influence the preferences of their peers in the decision-making process. Using the POPs Review Committee of the Stockholm Convention as a case study, this research analyzes the ways in which individuals participating in the earliest stages of policymaking use framing tactics to protect their interests, set the agenda for POPs-related policymaking, and promote their policy goals. While the role of issue framing has been studied extensively with regard to its top-down application by political elites, media, and social movement entrepreneurs seeking grass-roots support for political agendas, as well as its bottom-up applications by collective action movements and other groups seeking to influence politicians and other individuals with decision-making power, to date, no studies have explored the ways in which elites frame information for other elites. Furthermore, while some studies have suggested that individuals with relevant expertise are likely to be particularly responsive to framing (Druckman 2004), none have analyzed the role of elite issue framing in live policy negotiations.

Experts' use of framing tactics in science-based decision-making is particularly intriguing, because scientists who serve as technical advisors to policymakers are in a unique position to define issues and set the agenda for policymaking. In their roles as gatekeepers to the policymaking process, scientists can play a critical role in determining how issues will be understood and dealt with on a global scale. Analysis of the influence of scientific advisors in policymaking concentrates on a specific area of scientific work: the translation of existing technical knowledge into information that can be understood by policymakers and used to support policy choices. Advisory committees such as POPRC do not produce original data; rather, they gather and evaluate existing evidence in order to make policy-relevant recommendations to bureaucrats and other decision-makers, most of whom lack scientific expertise. The scientists who are members of POPRC are expected to use predetermined scientific criteria to assess data and decide whether particular substances can be categorized as persistent organic pollutants. This process is often complicated by scientific uncertainty about a host of elements, which may include issues ranging from research methods to applicability of the findings to the climate in particular geographic regions.

Scientists working on environmental issues, and particularly on chemical regulation, are often faced with data gaps and other impediments to full understanding of these complex problems. As Skodvin and Underdal note, "…the process through which scientific knowledge is transformed into decision premises is neither pure science nor pure politics. It combines elements from both realms and adds its own distinctive characteristics" (2000 p. 23). Scientists must interpret knowledge in order to make it relevant to and usable for policymaking, and in so doing, scientists engage in the early, influential stages of policymaking. According to Skodvin and Underdal, "…only when *interpreted* in the context of a particular policy problem, can knowledge be utilized as policy premises" (2000, p. 30). In the context of the Stockholm Convention, data are evaluated to determine whether they meet predetermined scientific parameters. These parameters allow scientists and policymakers to categorize chemicals with certain qualities as transboundary pollutants which require a global response, as opposed to local or regional regulatory action (Selin 2010). A chemical can be categorized as a POP if it is bioaccumulative, toxic, persistent, and subject to long-range environmental transport. Furthermore, judging whether substances meet these criteria involves determining whether they meet predetermined numerical values that were agreed upon during negotiations of the Stockholm Convention. The political necessity that led to the creation of the concept of a POP (a category established by CLRTAP's task force on POPs, which preceded the development of a global agreement to regulate these substances) demonstrates one way that policy shapes science (Selin 2010). In turn, the interpretive responsibility of scientists gives them a unique influence over the policy process, allowing them to define issues, evaluate the risks and hazards associated with particular substances (or lack thereof), and direct the attention of policymakers toward particular issues and away from others.

In the context of the Stockholm Convention, scientists who serve as members of POPRC are responsible for determining which chemicals meet the criteria for listing in the Annexes of the Stockholm Convention, thus setting the agenda for the COP's decision-making, as well as defining the key issues for non-scientists who participate in later stages of the process as decision-makers and representatives of governments, corporations, environmental or public health NGOs, etc. In other words, scientists frame the issues for individuals who lack scientific expertise. The process of determining how issues should be framed is likely to be contested among the scientists participating in the work of POPRC, as experts themselves may reach different conclusions about the validity of evidence, and subsequently, the policy implications of the data under review. The epistemic communities approach is a useful analytical framework for evaluating the role of those experts participating in POPRC's work, as it systematically addresses the preferences of scientists in policymaking and facilitates consideration of the ways in which scientists may use issue framing to promote their policy goals.

This research draws on both constructivist and rational choice perspectives to explore the use and effects of framing on policy discourse. Combining these two approaches facilitates deeper understanding of the mechanics of framing and the role of science in policymaking, both of which can be explained by constructivist theories, as well as critical analysis of the way framing is used as a tool by rational actors who are seeking to promote their interests in policymaking. Combining constructivist and rationalist perspectives provides an analytically rich study that considers both the mechanics of framing, which is fundamental to understanding how this tool can be used to influence debate, and the way in which participants in the decision-making process use framing as a means of protecting their interests and promoting their policy preferences. The resulting analysis provides a more complete picture of the role of framing in decision-making than would be possible if this research were to be limited to a single theoretical perspective. This approach has been taken in other studies of international cooperation, including studies of biosafety (Falkner 2009), the International Criminal Court (Fehl 2004), and the World Bank (Nielson et al. 2006). As Zürn and Checkel argue, in spite of the attendant methodological challenges, linking constructivist and rational choice approaches allows scholars to develop "arguments that capture and explain the world as it really is" (2005, p. 1076). This thesis will draw on both approaches in order to explain the impact of issue framing on decision-making at the interface of science and politics; an area in which insights from both approaches are not only applicable but essential.

The implementation of this approach is facilitated by the nature of issue framing and the role of science in policymaking. Framing is a constructivist concept that provides insight into the way people make sense of the world around them. As interpreters of technically complex knowledge, scientists play a critical role in defining issues and guiding policymakers and the public. However, as previously noted, the relationship between science and policy is often reflexive, and particularly so in the case of science-based environmental policymaking, in which political needs and scientific expertise are blended to create cooperative solutions involving numerous stakeholders with diverse interests. Thus, scientists are capable of using their expertise to frame issues, and in the context of science-based policymaking, they are likely to have policy preferences and may use their unique expertise to deliberately frame issues in ways that support those preferences. As this research will show, constructivist theory explains the mechanics and influence of framing, and rational choice can explain how strategically-minded actors may utilize framing tactics to promote their interests. According to constructivist scholars, scientists construct issues as they interpret technical knowledge (Riegler 2001). POPRC scientists construct and define reality as they analyze data and determine which chemicals may be considered to be POPs. Notably, the concept of a POP is itself a political construct created to enable policymakers to work at the international level to regulate substances which have a global impact (Selin 2010). Thus, this thesis will focus on the way that scientists working in the context of global environmental negotiations interpret data and make technical decisions with significant socioeconomic, political, and environmental implications use strategic issue framing to support their policy preferences.

As this chapter will illustrate, framing is a broad concept that has been applied to diverse areas of research. The following sections will explore the origins and evolution of the concept of framing, its influence on public discourse, the primary categories of actors who use framing, and the unique ways in which scientists are capable of framing knowledge and technical information.

2.1 The Origins and Development of Frame Analysis

The concept of framing was first used in 1954 by Gregory Bateson in reference to epistemology and animal behavior (Noakes and Johnston 2005). Bateson used the term to describe the way animals sent messages about appropriate behavior, depending on whether their behavior (e.g., fighting) was "real" or a form of play. The animals under observation were effectively categorizing their messages to one another within frames of reference (Bateson 1973). According to Oliver and Johnston, a frame in this sense serves as "a metacommunicative device that sets parameters for 'what is going on'" (Oliver and Johnston 2005, p. 188). In 1974, Erving Goffman imported the concept to the social sciences, using it to describe the subjective meaning imparted by individuals to an event or occurrence. For example, observation of a group of children on a school playground could evoke the frame "recess." Such a frame might focus attention on certain elements of the scene (recreational equipment, the presence of teachers, etc.) that are key to an individual's interpretation of the event. In this way, Goffman argued, people use frames to make sense of the world; to give meaning to aspects of a scene which would otherwise be meaningless (Goffman 1974).

Since Goffman's publication of *Frame Analysis*, the concept of framing has evolved considerably and is now used in many areas of the social sciences, including (but not limited to) political science, sociology, linguistics, media studies, psychology and gender studies. The concept has been applied to many different phenomena over time, and its numerous definitions and usages are often disparate and incongruent. The multitude of usages can complicate frame-based analyses, as many authors fail to define their understanding of the term "framing" from the outset, and yet use the term to explain various phenomena, or even to critique the concept itself (Carragee and Roefs 2004). There is no single, coherent theory of framing (Mintz and Redd 2003; Levy 1997), a deficiency which makes clear explication of the primary contemporary uses of the concept essential to the foundation of this research project.

Scholarly literature analyzing frames reflects significant differences in the ways a "frame" is defined and subsequently evaluated. While some scholars have analyzed frames as tools used by media, politicians, advocacy groups and others to deliberately promote particular understandings of issues, other scholars have taken a more traditionally constructivist perspective, defining frames as subconscious means of understanding or interpreting events or issues. For example, in the field of policy studies, Schön and Rein define frames as "underlying structures of belief, perception, and appreciation" which are "tacit … they are exempt from conscious attention and reasoning" (1994, p. 23). This definition is closely linked to Goffman's conceptualization of a frame; it is a constructivist approach which sees frames as interpretive schema humans unconsciously use to make sense of the world. Such frames are indistinguishable from individuals' views, opinions, and preferences; indeed, in this conceptualization, a frame represents an individual's understanding of an issue, and illuminates the elements of the issue that a given person considers to be important. This definition of a frame differs substantially from the kind of frames analyzed in this thesis. This research considers the way that rational actors (scientists participating in a formal global environmental policymaking process) deliberately, consciously and strategically employ frames to support their policy goals.

Exploration of the literature on this rational approach to framing – framing that is deliberately used by actors seeking to shape the views and preferences of others – reveals two fundamentally different types of framing, which James Druckman (2004) refers to as *equivalency framing* and *issue framing*. Equivalency framing involves "the use of different, but logically equivalent words or phrases" to describe the same phenomenon, while issue framing entails emphasizing "a subset of potentially relevant considerations" while deemphasizing or ignoring other considerations

(Druckman 2001). These distinctive approaches to framing "have different implications, appear to occur via distinct psychological processes, and have varied moderators. In this sense, it is somewhat misleading that these two processes share the 'framing' label," he writes (Druckman 2004, p. 672). To further complicate matters, while it is possible to outline the basic shared elements of these two categories of framing, questions about how frames work, who can utilize frames effectively, and how frames can be defined and measured are subject to intense debate. These problems, as well as the distinction (and arguably, the significant potential for overlap) between equivalency and issue frames, will be explored in more detail later in this section. First, it is necessary to outline the common basis for framing theory as it is used in the social sciences.

2.1.1 The fundamentals of framing

"Frames are principles of selection, emphasis, and presentation composed of little tacit theories about what exists, what happens, and what matters," writes Todd Gitlin (1980, p. 6). A framing effect occurs when a speaker highlights the importance of certain elements of an issue, problem or event while deemphasizing or ignoring others, leading listeners to give priority (or sole consideration, in some cases) to the emphasized themes or terms when formulating their opinions. A more technical definition is provided by Snow and Benford, who define a frame as an "interpretive schemata [sic] that simplifies and condenses 'the world out there' by selectively punctuating and encoding objects, situations, events, experiences and sequences of actions within one's present or past environment" (Snow and Benford, 1992, p. 137). As such, frames "allow individuals to 'locate, perceive, identify and label' events within their own life space or the world at large" (Snow and Benford 1992, p. 137). This process of contextualization can be politicized by the use of frames to characterize an issue in a way that leads audiences to support or oppose a particular action. According to Pan and Kosicki, "framing is an ideological contest over not only the scope of an issue, but also over matters such as who is responsible and who is affected, which ideological principles or enduring values are relevant, and where the issue should be addressed" (2001, p. 40). This characterization of framing leans heavily toward issue framing in particular, as opposed to equivalency framing (the distinction between the two will be explored in more detail in the next section), but it is possible to use both types of framing to manipulate an audience's perceptions of a problem or concern.

Framing tactics are used by a broad range of actors seeking to promote a particular view of an event or issue. In the political realm, studies have shown that framing is used by policymakers, social movement entrepreneurs, representatives of private interests, and members of epistemic communities, among others (Noakes and Johnston 2005; Sell and Prakash 2004; Haas 1992a). The targets of framing efforts are not limited to potential supporters of a particular agenda; rather, actors who use framing techniques "are viewed as signifying agents actively engaged in the production and maintenance of meaning for constituents, antagonists, and bystanders or observers" (Benford and Snow 2000, p. 613). Thus, framing is a technique by which actors seek to construct parameters for thought and discourse about an issue or event among all who are exposed to the frame. Benford and Snow emphasize that such frames are not merely neutral interpretations used by an individual internally to give meaning to everyday events, as in Goffman's conception of framing; rather, frames can be deliberately constructed and used by individuals as tools for the advancement of a political or social agenda. In other words, they can be strategically designed and deployed by individuals seeking to influence the decision-making processes of others.

This conception of framing as a tactical device for political manipulation is closely related to William Riker's theory of "heresthetics," which is essentially the strategic practice of "structuring the world so you can win" (Riker 1986, p. ix). According to Riker, the "heresthetician" uses language as a tool to manipulate the opinions of a target audience. In particular, the heresthetician "describes social nature, importing to his description the exact twist that leads others to respond to nature as he wishes" (Riker 1986, p. x). This aspect of heresthetical practice involves strategic framing, a practice in which framing is deliberately used to set the agenda for debate by presenting a problem in a manner that is likely to lead the audience to respond to an issue in a particular way. The overarching goal of the heresthetician is to define, or if necessary, redefine, multi-dimensional issue space so that he can achieve his political goals (McLean 2002). By restructuring an issue to highlight different considerations, the heresthetician can change the focus of the debate and, potentially, the decision about which policy response is most appropriate. This strategic manipulation of political debate need not change the underlying preferences of the audience, but as with strategic framing, it will change the emphasis of the debate so as to influence the way an issue is perceived and considered.

In this way, strategic framing differs from rhetoric, which seeks to change "someone's heart and mind through argument" (Clingermayer 2004, p. 382). The key to Riker's conception of heresthetical manipulation lies in the way an existing problem is linked to different considerations, such that the new considerations can be given priority over the old. James C. Clingermayer cites the use of land-zoning controls in the Unites States as an example: he claims that wealthy, homogenous groups of homeowners seeking to prevent low-income families from purchasing land in the general vicinity of their neighborhoods will campaign for zoning rules ostensibly designed to protect the environment, reduce urban sprawl, cut down on congestion, etc. (2004). By framing issues in terms of these "good planning principles," wealthy homeowners are able to exclude "the poor and minorities" from their neighborhoods without openly stating that these groups are not wanted (Clingermayer 2004, p. 377). Clingermayer acknowledges that these arguments may be sincere at times, and in such cases, exclusion of low-income groups is unintentional. These situations, which Clingermayer refers to as "happenstance," differ significantly from the intentional introduction of such issues by actors seeking to structure political debate in any way that is likely to bring about their desired outcome. In this example, policymakers are not asked to consider the potential effects of exclusive zoning laws on economically disadvantaged citizens; rather, they are asked to consider the impact of development on the environment. Thus, their underlying beliefs about the government's role in addressing the welfare of individual citizens are not challenged, and their preferences on that issue may remain fixed while they choose a policy which actually contradicts those beliefs.

Druckman and Nelson (2003) draw a similar distinction between strategic framing and persuasion via belief change. While persuasion is often intended to change people's beliefs, framing seeks to change the *importance* individuals attach to those beliefs. Druckman and Nelson provide a clear illustration of the difference between the two concepts with the following example:

> …if a speaker describes a hate-group rally in terms of free speech, then the audience will subsequently base their opinions about the rally on free-speech considerations and, perhaps, support the right to rally. In contrast, if the speaker uses a public-safety frame, the audience will base their opinions on public-safety considerations and oppose the rally (2003, p. 730).

In this illustration, the considerations highlighted by the speaker are unrelated to one another; they are not simply two sides of the same coin (e.g., pro- or anti-free speech). Rather, the speaker is contextualizing the issue so as to establish parameters for discussion and reflection. By embedding the issue within a public-safety frame, the speaker can deflect attention from considerations of the group's legal rights and possibly bring about his desired outcome. Likewise, by utilizing a free-speech frame, the speaker can deflect attention from a hate-group's potential message by concentrating on the broader rights and freedoms of all citizens to express their opinions. Riker's heresthetician would engage in precisely this type of manipulation – by strategically choosing which elements of an issue to emphasize, the heresthetician would attempt to change the perspective from which an audience views an issue, thereby potentially changing the foremost considerations in the decision-making process.

Thus, strategic framing tactics do not seek to change an individual's beliefs about the merits of a particular issue; rather, they can be used to persuade individuals that their original beliefs should be superseded by the concerns highlighted by a new frame. Frames encourage individuals to assign weight to particular elements of an issue in a way that supports the political agenda of the "frame initiator" (Mintz and Redd 2003). "Frames may supply no new information about an issue, yet their influence on our opinions may be decisive through their effect on the perceived relevance of alternative considerations," write Nelson et al. (1997, p. 226). Thus, frames may be used to persuade, but they simply persuade individuals to prioritize aspects of an issue in different ways. People may change their positions on an issue without changing their beliefs. In this way, Riker's heresthetician uses strategic framing to shape policy problems and political debate in such a way that his preferred outcome will be achieved.

Ultimately, however, framing is just one aspect of heresthetics, which is closely tied to social choice theory. Riker is concerned largely with how individuals can use language to manipulate others, but he also focuses on the strategic manipulation of processes less closely related to framing, including other forms of agenda control (e.g., ordering of issues) and strategic voting (Riker 1986). In Riker's view, the heresthetician makes use of all available tactics to restructure the world in a way that favors his or her preferences. Strategic framing is fundamental to a heresthetician's approach, but it is not the only heresthetical tactic.

The foregoing discussion of framing theory represents the analytical perspective used to define and assess framing theory for the purposes of this research. The following sections will clarify this approach and differentiate the specific definition of framing used within this thesis from other common delineations of the concept.

2.1.2 Distinguishing between the effects of framing and priming

It is important to distinguish framing from the concept of priming, which is often used in the context of studies of the influence of the media on public opinion. Priming refers to the process of increasing an individual's cognitive access to particular thoughts or ideas. Individuals repeatedly or recently exposed to ideas will be more likely to retrieve those themes from their memories than older, less regular and therefore less accessible cognitions (Brewer et al. 2003). While some theorists (e.g., Kinder and Sanders 1996) have suggested that framing is just an extension of priming, Nelson et al. have shown that framing and priming are substantively different processes. Whereas theories of priming are based on the idea that concepts which are more accessible will be recognized more easily and more quickly by individuals, theories of framing suggest that individuals exposed to frames may attribute greater weight to already accessible considerations which have been emphasized by a frame initiator. Priming may work independently of framing by increasing the accessibility of particular ideas, but framing will influence an individual's perceptions of the relevance and importance of those ideas. As Nelson and Oxley point out, not all accessible ideas are equally relevant to a particular issue, and when formulating opinions, individuals will not "mindlessly" repeat every cognitively accessible idea with a connection to a problem (1999, p. 237). Rather, individuals will assign degrees of value to the pieces of information they have mentally stored, and then consider the relative importance of each idea as they are formulating their opinions. Framing can influence this process of weighting various ideas. Druckman clarifies this difference using his free speech/public safety illustration:

> "For example, instead of basing their opinion about a Ku Klux Klan rally on whichever consideration – free speech or public safety – happens to be (automatically) accessible due to the frame, people consciously think about the relative importance of the considerations suggested by the frame" (2001 p. 1043).

While studies of priming focus on how levels of *exposure* to particular ideas affects individual opinions, studies of framing focus on how shifts in the actual *content* of ideas influence opinion formulation (Druckman 2001).

2.1.3 The role of strategic framing in policymaking

The strategic use of frames as tools designed to influence perceptions of issues and establish parameters for debate has significant implications for policy discourse and decision-making. As the previous sections illustrated, framing affects discourse in two ways: first, as a mechanism for interpreting and communicating reality, and second, as a heresthetical tool designed to structure other people's understanding of an issue in a way that will support the framer's preferences and interests. The former role of framing is a constructivist interpretation of the way people understand and communicate about the world around them, while the latter focuses on the way rational individuals attempt to manipulate the world around them to promote their interests. While understanding the mechanics of framing is critical to accurate analysis of the effects it can have as a heresthetical tool for influencing discourse, this study will focus on analyzing rational actors' use of framing as a mechanism for promoting their interests.

While framing tactics are often used by elites to characterize political problems in ways that will win the support of less powerful or less knowledgeable actors, elites can also effectively use framing to characterize issues or concerns for other elites. Research has shown that certain types of framing are actually more effective among experts than among groups with less knowledge of a particular subject (Nelson et al. 1997). In particular, "experts may be more susceptible to issue frames because they possess the knowledge and ability to connect the considerations suggested by the frame to their opinions" (Druckman 2004, p. 684). If framing is effective in technical, knowledge-based discourse, one could expect to find evidence of its use in policymaking debates at the highest levels of governance, including within the policy negotiations of the Stockholm Convention. Given that previous studies have shown that issue frames are most effective when employed by experts seeking to influence other experts (Druckman 2004), use of strategic framing in the context of POPRC's decision-making is of particular interest. Furthermore, given POPRC's positioning as the gatekeeper to the Convention, successful framing of issues during POPRC's discussions is likely to have a particularly strong impact on the course of decision-making.

Thus far this thesis has concentrated on concepts related to framing as a general theory, but it is important to recognize that framing can actually be divided into two distinct categories: issue framing and equivalency framing. These two varieties of framing differ substantially in application and function. While the distinction between the two concepts is often ignored, analytical precision demands that they be discussed with greater specificity and care. The following sections will provide a closer analysis of the two types of framing, their differences, and their potential relevance to policymaking under the terms of the Stockholm Convention.

2.2 Breaking Down the Concept: Issue Frames and Equivalency Frames

As Druckman (2004) has noted, different methods of framing can be used to pursue a range of goals. This range of applicability is based in part on the important differences between issue frames and equivalency frames: how they work, how they can be measured, and what their implications are for the policymaking process. The two types of framing are also based on distinct cognitive processes, and the effects of each are manifested in fundamentally different ways. Although both issue frames and equivalency frames emphasize some elements of a problem and deemphasize others, thereby causing the audience to concentrate on the former and ignore or attribute less value to the latter, issue frames and equivalency frames cause such an effect in different ways (Druckman 2004). While issue frames are expected to be of greater significance to this research project, equivalency framing and its potential overlap with issue framing should not be ignored.

2.2.1 Equivalency frames

Equivalency framing involves presenting an individual with two different, but rationally equivalent, choices. In their ground-breaking study of equivalency framing effects, Tversky and Kahneman (1981) asked subjects to choose between two national health programs intended to deal with the effects of an "unusual Asian disease" expected to kill 600 people. Subjects could choose Program A, by which "200 people will be saved," or program B, through which "there is a 1/3 probability that 600 people will be saved, and a 2/3 probability that no people will be saved" (Tversky and Kahneman 1981, p. 453). The wording of these alternatives was designed to test people's attitudes to risk within a frame which emphasized potential gains (the phrasing of the alternatives stressed the number of lives that could be saved). Although the alternatives were logically equivalent, 72% of the subjects chose the risk-averse option, Program A, while only 28% chose the seemingly riskier Program B.

A second group of subjects was presented with the same story, but instead of emphasizing the number of lives that could be saved with each alternative, the choices were worded negatively: "if Program C is adopted 400 people will die," and "if Program D is adopted there is a 1/3 probability that no one will die, and 2/3 probability that 600 people will die" (1981, p. 453). Although the alternatives in the second test were logically equivalent to the choices in the first, the response pattern was reversed: 22% chose the first alternative, and 78% chose the second. Tversky and Kahneman repeated versions of this test with several different groups (including university students, faculty members and physicians), and the results were consistent: the shift in wording from positive to negative (or from gains to losses) was accompanied by a shift from risk-averse to risk-seeking decision-making. The findings of Tversky and Kahneman's study challenge the tenets of expected utility theory, which posits that individuals faced with alternative courses of action will attempt to maximize their utility by multiplying the value of each possible outcome by the probability that the outcome will occur, and then summing across all possible outcomes. The subjects in Tversky and Kahneman's study evaluated their choices according to the frames in which they were presented, meaning that their choices were influenced by factors that changed their perceptions of their expected utility.

The findings also challenge one of the core tenets of rational choice theory, which assumes that individuals have invariant preferences. In other words, if an individual prefers policy A to policy B, this preference should not change if the policies are described in different, but logically equivalent, terms. As Tversky and Kahneman explain, "different representations of the same choice problem should yield the same preference" (1986 p. 453). In the 1981 study, the preferences of subjects changed according to the perspective from which the problem was framed, even though the alternatives were logically equivalent. "Because of imperfections of human perception and decision … changes of perspective often reverse the relative apparent size of objects and the relative desirability of options," write Tversky and Kahneman (1981, p. 453). Thus, exposure equivalency framing effects can cause individuals to have incoherent preference orderings.

Based on this and subsequent experiments, Kahneman and Tversky developed prospect theory, which posits that people: i) are more sensitive to changes in assets than to the net levels of assets, ii) assign greater weight to losses than to gains, iii) tend to value current assets more highly than assets they do not yet possess, and iv) tend to be risk-averse with respect to securing gains and risk-seeking with respect to avoiding losses (Levy 1997). Prospect theory is still in the comparatively early stages of development, and has been criticized by some researchers as being riddled with too many conceptual and methodological problems in real-world applications to be useful in empirical studies. For example, Jack Levy argues that the primary problem with the theory is that it is based on descriptive generalizations of behavior that are explained by findings derived from strictly controlled laboratory conditions. Levy argues that the results of such highly structured experiments are unlikely to be replicated in studies of real-world decision-making situations, and furthermore, that prospect theory is currently unable to explain the cognitive processes that give rise to these decision-making patterns (1997).

While exploration of the cognitive processes underlying the effects of equivalency framing and prospect theory is beyond the scope of this thesis (and is more appropriate to studies of political psychology than public policy), the patterns of decision-making highlighted by this type of framing are potentially relevant to analysis of support for global regulation of persistent organic pollutants. As highlighted above, studies of equivalency framing have demonstrated that individuals are often risk-averse when faced with a choice of actions that could either result in gaining utility or maintaining the status quo, but are risk-seeking when faced with prospective losses (Berejikian 2002). In other words, people tend to be willing to take risky actions to protect the current assets, but they are less willing to take risks to secure gains. This finding has important implications for the influence of strategic framing of issues involving some element of risk, particularly with regard to gains and losses. For example, if a ban on a particular persistent organic pollutant is proposed at the global level, it is possible that framing the issue in terms of risk to health (which involves the risk of personal loss of utility for individuals who are likely to be affected) would have greater salience than framing the issue as an environmental hazard (which could still involve risk in terms of losing a valued commodity, but as the risk is less direct, it may not be weighted as heavily as risk to one's health).

Brewer and Kramer (1986) found that framing affects peoples' willingness to cooperate to resolve a social dilemma. The results of their 1986 study showed that when an issue was framed as a commons dilemma, in which resolution required individuals to exercise restraint in taking from a common pool resource, people were willing to cooperate. In contrast, when the issue was framed as a public goods problem, which required people to make some kind of contribution toward the provision of the good, individuals were less willing to cooperate. This finding supports one of the primary tenets of prospect theory, which states that individuals value the status quo more than future gains, and that they assign greater weight to potential losses than to potential gains. In the public goods frame, subjects would be required to make an actual contribution, thereby incurring a loss, whereas in the commons frame, people could cooperate by refusing future gains, thereby maintaining the status quo.

If the implications of Brewer and Kramer's study are applied to a study of support for or opposition to global regulation of persistent organic pollutants, it is possible to suggest that the decisions of key actors will be influenced by the frame in which the dilemma (whether to regulate a particular chemical) is embedded. For example, an environmental advocate might characterize continued use of a chemical as an act of taking from a common pool resource (every product containing persistent organic pollutants causes direct environmental harm, and this harm is multiplied by each POP-containing product purchased by consumers). A consumer considering her potential gains or losses from this perspective would recognize that she could cooperate by refusing to purchase products containing the chemical, and still maintain her status quo. On the other hand, a chemical manufacturer facing economic losses resulting from a ban on a particular chemical would view support for the ban as a contribution to the provision of a public good (a POPs-free environment). The chemical manufacturer could attempt to counter the common pool resource frame advanced by the environmental advocate by reframing the issue as a public goods problem: if a particular chemical is banned in order to achieve a POPs-free environment, consumer freedom to choose among a wide range of products will be legally restricted, reducing a consumer's right to choose which products she wants to use. If the consumer actually values this "right" to use whatever chemicals she wishes, the chemical manufacturer might successfully change the value she assigns to each consideration by shifting the frame from that of a commons dilemma involving restraint to a public goods problem involving loss.

As this example illustrates, global regulation of POPs can be framed as either a public goods problem or a commons dilemma. The way in which this social dilemma is framed could have a significant impact on the decision-making processes not only of policy-makers, but also on the opinions and interests of stakeholders throughout the policy sphere. Therefore, while many studies of public policy focus strictly on the way issue frames are used to build support for a policy or political agenda, equivalency framing effects may also have a significant impact on the way the issues are presented and perceived by key actors. Therefore, while this research will concentrate primarily on the influence of strategic issue framing on POPs-related policymaking, the potential effects of equivalency framing will be considered where such effects may influence decision-making.

2.2.2 Issue frames

The second type of framing effect identified by Druckman (2001) is based on "alternative definitions, constructions, or depictions of a policy problem" (Nelson and Oxley 1999, p. 1041). Also referred to as "thematic framing" (Mintz and Redd 2003), "issue framing effects refer to situations where, by emphasizing a subset of potentially relevant considerations, a speaker leads individuals to focus on these considerations when constructing their opinions" (Druckman 2004, p. 672). Frame initiators often use particular words, phrases or images to provide a shorthand interpretation of an event or issue. This interpretation creates a point of reference from which subsequent courses of action may be judged. By drawing attention to certain elements of an issue while deemphasizing or ignoring others, frame initiators seek to focus future debate and individual decision-making on particular dimensions of an issue. Furthermore, frames are often used to "highlight connections between issues and particular considerations, increasing the likelihood that these considerations will be retrieved when thinking about an issue" (Feldman 1995, pp. 267-268, quoted in Mintz and Redd 2003). Issue framing is frequently used in political communication by the media, elites, and social movement entrepreneurs, and it is this type of framing effect that many theorists refer to when analyzing collective action movements and policymaking (see Zavetoski et al. 2004; Price et al. 2005; Kohler-Koch 2000; and Riker 1986).

In contrast to equivalency frames, which influence individuals' decision-making processes subconsciously, issue frames lead people to consciously evaluate the importance of elements highlighted by the frame initiator. Thus, the cognitive processes underlying the two types of framing effects differ substantially. As Druckman explains:

> With issue frames, conscious weighting of alternative considerations, including those suggested by a frame, can still sensibly lead one to endorse one of those considerations, such as public safety or free speech (i.e., issue framing effects can still occur). In contrast, deliberate weighting and endorsement of a given consideration makes little sense for successful equivalency framing effects since it suggests, for example, that people deliberately decide if 90% unemployment is preferable to 10% unemployment (i.e., equivalency framing effects would not occur) (2004, p. 674).

Accordingly, listeners may be fully aware that issues are being framed in particular ways, such as when two opposing social movements seek to frame an issue in competing ways (e.g., opponents of abortion in the US, who refer to themselves as being "pro-life," thus emphasizing the "sanctity of life"[1], while supporters of legal abortion refer to themselves as being "pro-choice," thereby

[1] See, for example, the Christian Patrons for Life website, <http://www.cpforlife.org> [Accessed 14th February 2010].

emphasizing the legal rights of women[2]). By drawing attention to particular elements of a subject, issue frames seek to change the importance individuals attach to their beliefs (Druckman 2001). In other words, listeners consciously consider the relative importance of elements highlighted by a particular frame, and often do so in comparison with considerations highlighted by a frame promoted by a competing actor or organization.

Thus, while individuals may or may not be conscious of the framing of an issue, even total awareness and understanding of the way a problem has been framed will not necessarily diminish the impact of the frame. In fact, studies have shown "in the case of issue framing, knowledge facilitates the use of frames" (Druckman 2004, p. 684). While experts may be sensitive to the presence of frames in discourse, they are also more likely to use their expertise to connect the emphases of the frames to their knowledge and understanding of an issue (Druckman 2004). In this way, the potential uses and effects of issue frames differ substantially from those of equivalency frames. While equivalency frames can result in illogical preference formation, issue frames are intended to structure debate and highlight elements of a subject which frame initiators believe should be taken into consideration as listeners form opinions within the context of rational decision-making.

2.2.3 Issue framing in the Stockholm Convention

The heightened effectiveness of issue framing in discussions among experts is directly relevant to decision-making under the auspices of the Stockholm Convention, and particularly to the deliberations of POPRC. As a scientific committee which is making decisions which often carry significant economic and political implications for stakeholders, the work of POPRC has the potential

[2] See, for example, the Abortion Rights website, <http://www.abortionrights.org.uk> [Accessed 14th February 2010]

to become highly politicized. Furthermore, POPRC is made up of scientists from a range of disciplinary backgrounds, which may lead the experts to reach to conflicting conclusions about the validity and importance of evidence discussed in relation to various chemicals. Issue framing could play an important role in influencing discourse under either scenario; thus, this study will not only seek to identify patterns of framing in POPRC and the relative influence of frames used, but also the motivations of the frame initiators.

The epistemic communities approach, which will be discussed in detail in the next chapter, facilitates analysis of the preferences of scientists and distinguishes these preferences from those of interests groups and other politically-motivated actors. This approach assumes that such preferences are derived from scientists' technical knowledge, and will change in the face of conflicting evidence (Haas 1992a). In contrast, political preferences which are derived from socioeconomic interests, such as those attributed to governments, industry associations, and advocacy groups are based on criteria which are external to science and will not necessarily be affected by the introduction of new scientific evidence. In either case, scientific uncertainty is likely to play a key role in discussions. Uncertainty may lead to conflict among epistemic communities of scientists, each of which may attempt to use issue framing to strengthen their own arguments for or against regulation of a substance. Furthermore, participants with socioeconomic interests in a substance can point to gaps in knowledge in an effort to prevent chemicals from proceeding through the regulatory process. As Selin notes, actors with interests in particular chemicals "frequently cite particular scientific reports and claims that support their own position while downplaying less supportive findings" (2010, p. 37). Highlighting certainty or uncertainty is a form of issue framing, and as such, demands close examination to determine whether or not patterns can be identified which link systematic use of particular issue frames with the socioeconomic interests of the parties with which scientists are affiliated. Use of strategic issue framing to promote political interests at this stage of review would suggest that the process is more politicized than is generally acknowledged and would call into question the design of the policy process which is predicated on separate science from politics (the policy process is described in detail in Chapter 5).

2.3 Stakeholders in the Policymaking Process

A range of actors may use framing tactics as a means of influencing discourse and debate, including elected officials, bureaucratic policymakers, industry representatives, advocacy groups, and the media. Most previous studies have concentrated on three primary categories: elite decision-makers, members of the media, and collective action movements. The following sections will elucidate the findings from studies of each of these groups' use of framing to promote their policy preferences, and will add a fourth category – epistemic communities. This category of actors is intriguing because, as interpreters of technical knowledge, members of epistemic communities are in a unique position to influence the policymaking process.

2.3.1 Elites

Framing has often been studied from a top-down perspective; in other words, it has often been analyzed as a form of political manipulation particularly likely to be used by elites to influence the opinion of less-knowledgeable citizens (Mintz and Redd 2003; Kuklinski et al. 2000; Callaghan and Schnell 2001). Many such studies are based on the assumption that citizens are not well informed about political issues, a premise which is widely accepted in political science literature on democracy (Callaghan and Schnell 2001). Elites may take advantage of this asymmetry by disseminating skewed or selected information which supports their political agendas. According to Kuklinski et al.:

> Those best positioned to provide relevant facts, elected officials and members of the media, lack the incentive to do so. Politicians want their preferred policies to prevail,

> and so they employ manipulative rhetoric and create themes and images that will sway the electorate in the desired direction …. When elected officials do cite facts, it is to dramatize their own cause, not to educate and elucidate (2000, p. 791).

According to this argument, political elites use issue framing as a strategic tool to influence public opinion. While basic issue framing may draw attention to particular aspects of an issue, such framing may be unconscious, as conceived by Schön and Rein (1994), who take a reflectivist approach to analysis of frames. Additionally, according to Goffman's interpretation, framing may be used simply to define situations or events without any intent to influence or change the perceptions of others. In contrast, *strategic* issue framing is specifically intended to affect the opinions of listeners so as to produce support for, or opposition to, a particular policy or political agenda (Mintz and Redd 2003).

Evidence of elite framing can be found at all levels of politics, from local to global. For example, Mintz and Redd cite United States President George H.W. Bush's use of framing to describe Iraqi President Saddam Hussein as "Hitler" in the build-up to the first Gulf War (2003, p. 200). Bush's intention, they argue, was to secure support for regime change in Iraq through "demonization" of its head of state. In this case, the framing was successful but the political strategy backfired, as Bush subsequently lost public support when he failed to oust Hussein (Mintz and Redd 2003). Similarly, Beate Kohler-Koch describes responses to a 2000 speech in which German Foreign Minister Joschka Fischer proposed drastic changes to the governance structures of the European Union. The UK Conservative party framed the speech as a threat to British independence, while New Labour tried to minimize the importance of the speech by framing it as "a minority view within Europe" (2000, p. 514). An example of framing at the local level is provided by Zavetoski et al., who analyze the US Environmental Protection Agency's (US EPA) frequent use of frames to smooth relations with citizens exposed to chemical pollution (2004, p. 260). The US EPA adjusted its framing tactics according to its beliefs about citizens' knowledge of a situation and willingness to defer to authority, but consistently attempted to use framing to enhance its standing with the communities in question and ensure that it maintained control over information given to the public and decisions about future action.

These examples are a very small sample of the studies of the effects of elite framing on public opinion, but they represent the broad themes in the literature – framing transpires at all political levels, it can be countered by frames promoted by political opponents, and it is used to generate support for the frame initiator's policy agenda. Given the asymmetries of power that exist between political elites and average citizens (created by elites' access to information as well as their direct influence over decision-making processes), many theorists have suggested that framing could allow elites to engage in "freewheeling exercises in pure manipulation" (Druckman 2001, p. 1045). Druckman has shown that the effects of framing are bounded, however, and cannot be utilized with guaranteed success. He argues that individuals are more likely to accept frames promoted by sources which they believe to be credible, while frames presented by non-credible sources will have no influence on an individual's opinion. Because citizens are constrained by limits on time, information, etc., they rely on certain elites to provide interpretations of problems which help citizens form their opinions. In order for an elite actor (which could be an individual, an organization, an agency, etc.) to achieve credibility in the eyes of the public:

> "(1) the speaker's target audience must believe that the speaker possesses knowledge about which considerations are actually relevant to the decision at hand, and (2) the speaker's target audience must believe that the speaker can be trusted to reveal what he or she knows" (Druckman 2001, p. 1045)

If these two conditions are met, an actor can successfully use framing to influence public opinion. If an individual questions an actor's credibility, however, that actor's ability to use framing will be limited or eliminated entirely. Thus, even if "the average citizen is neither an active consumer of information nor a consistent political participant," she may still be rationally engaged in the policy process. Accepting the frames promoted by trusted officials is similar to the fundamental democratic practice of delegating responsibility for policy decisions to elected officials. In the case of framing, however, Druckman argues that citizens use the frames promoted by trusted, credible officials as “guidance” in individual opinion formulation and decision-making (Druckman 2001).

2.3.2 Media

Credibility and trust are also key to the influence of a second category of actors: the media. “Ideally, the media are expected to serve as political watchdogs or ‘guardians of the public interest’…who champion truth, pluralism, objectivity, balance and accuracy,” write Callaghan and Schnell (2001, p. 186). In reality, however, media outlets often fall far short of such lofty goals. Many have political preferences that are determined by organizational culture or by the leanings and interests of their target audiences. Because media outlets are generally businesses which seek to maximize income, it is rational to suggest that one of their primary concerns would be to maximize the size of their audience. In order to attract as many consumers as possible, media outlets often use issue framing tactics to increase public interest in the stories being presented (Kuklinski 2000; Callaghan and Schnell 2001). Kuklinski, et al. write:

> … television news, the dominant source of information in American society, seeks to gain and maintain its viewers’ interest. Rather than present general facts and pace them in context, it reports specific events and personal situations, and the more vivid, the better (2000, pp.791).

In a study of media framing effects on the gun control debate in the United States, Callaghan and Schnell found that the news media favored elements of the debate which “fit journalistic news criteria of drama, conflict, and good visuals” (2001 p. 201). While congressional opinion and interest group input did not seem to affect media frames, in many cases public opinion of an issue was found to correlate with the way the issue was framed. Furthermore, media coverage does not rely solely on existing frames; news outlets sometimes create their own frames in order to increase readers' interest in an issue. Callaghan and Schnell found that, in the above case, the media "disproportionately favored one side over the other, they disproportionately co-opted or pushed one frame – 'Crime and the Culture of Violence' – for nearly half of all news stories" (2001, p. 201).

It is important to note that the media are particularly susceptible to the influence of frames promoted by other actors. Issue frames are not static constructs; the framing process is dynamic and evolutionary, and frames may shift as the socio-cultural context in which they are constructed changes, or as the salience of a particular frame wanes. External actors often attempt to use the media to convey their preferred frames to the public. Political elites in particular are often able to take advantage of their positions of authority to transmit particular frames through media outlets, leading to charges of media bias. According to Pan and Kosicki:

> …political actors skew the flow of information and opinions in public deliberation toward their advantage by using discursive means …. News media…more often than not are found to be collaborating with the ruling elite in weaving this discursive order (2001, p. 36).

This statement differs from Callaghan and Schnell's findings in the study of media framing of gun control, but it has been supported in a number of other studies of media framing. For example, Zavetoski et al.'s 2004 study of the US Environmental Protection Agency's use of framing to assuage citizens in Woburn, Massachusetts, who discovered high levels of toxic pollutants in their town's water supply, found that the media adopted the frames promulgated by EPA officials. While these studies appear to contradict each other, it seems that the findings of both may actually support the argument that media outlets strategically adopt those frames which are most salient and will attract the largest audience. Gun control is a relatively accessible issue; technical knowledge is not required to understand or formulate an opinion on the subject. In the case of the polluted water supplies, however, technical knowledge is critical to understanding the risks posed by the chemicals.

Therefore, while public opinion on gun control might be strongly held and less susceptible to the influence of policymakers and other elites, the public was less able to formulate opinions on the risks posed by polluted water supplies without the intervention and interpretation of the experts employed by the EPA. Ultimately, however, media outlets themselves may be unable to distance themselves from the frames promoted by other actors. According to Carragee and Roefs, "… journalistic framing of issues and events does not develop in a political vacuum; it is shaped by the frames sponsored by multiple social actors, including politicians, organizations, and social movements" (2004, p. 216). Thus, media framing develops within a complex network of competing interests and demands.

Media outlets can be particularly influential sources of framing, as they often reach wider audiences than any other actor. They both create new frames and endorse frames promoted by other actors. They are directly involved in the fundamental work of framing, which is to define and construct meaning for events and issues. Furthermore, by deciding how much coverage to give particular issues, the media can significantly affect the salience of issues. Thus, the media play a very important role in setting the "public agenda" (Callaghan and Schnell 2001, p. 188). As with elites, the credibility attributed to media sources can influence their ability to frame issues. Sources perceived to be highly credible have the potential to play a significant role in establishing the parameters for public discourse about policy issues, and in affecting the salience of issues by determining which are "newsworthy."

2.3.3 Collective action movements

As highlighted in the above discussion, interest groups use strategic issue framing tactics to influence public opinion and policymaking on various issues. Mintz and Redd argue that "framing, as an attempt at political manipulation, occurs when an actor targets a decision maker and attempts to influence attitudes and behavior" (2003, p. 194). They go on to define "purposeful framing" as "an attempt by leaders and other influential actors to insert into the policy debate (or into group deliberation), organizing themes that will affect how the targets themselves as well as the public and other actors (e.g., media) perceive an issue" (2003, p. 194). While one might question the appropriateness of the term "purposeful" to distinguish between the bottom-up and top-down directions of framing, as both types of framing involve purposive action intended to influence individual decision-making, it is important to note that framing is used by political actors at all points within the political sphere to influence actors with varying degrees of political power.

Issue framing has been studied extensively as a tool of social movement entrepreneurs and others who wish to spark or sustain collective action movements, and the definition of collective action framing closely follows the definition of issue framing. According to Noakes and Johnston, "At its most basic, a frame identifies a problem that is social or political in nature, the parties responsible for causing the problem, and a solution" (2005 p.5). This definition builds on the work of Snow and Benford, who argue that issue frames have three fundamental tasks: diagnosis, prognosis, and motivation (Snow and Benford 2002). *Diagnostic framing* is intended to develop a new interpretation and definition of an issue based on an understanding of the problem that is shared between those affected and the actors attempting to use issue framing to characterize the problem. In this stage of framing, causality and blame for a problem are attributed to someone or something specific. In the second stage, *prognostic framing*, a solution to the problem is suggested, and in the third stage, *motivational framing*, the frame initiator urges people to join a collective action movement to bring about change. In this last stage new reasons for action are often proposed, as "the problem defined in the diagnosis and the solution in the prognosis are usually not sufficient to get people to act" (Noakes and Johnston 2005, p. 6). However, frames do not always emphasize each of these three stages. In fact, argue Noakes and Johnston, "most frames promoted by mass media and the state interpret situations in ways that are in synchrony with the status quo, thus working to discourage collective action" (2005, pp.6-7). Therefore, collective action frames can be categorized as a subcategory of issue framing. While all issue framing may involve diagnostic and prognostic stages, collective action frames are defined by the purposive use of motivational framing to persuade people not just to support a particular policy, but to join a collective action movement to bring about change.

2.3.4 Epistemic Communities

The actors discussed in this section – political elites, the media, and collective action movements – constitute the three groups which have been researched most extensively with regard to their use of strategic issue framing. However, this thesis argues that a fourth group of actors, scientists, are also central participants in the policymaking process, and that their role in decision-making is crucial in shaping the choices and policies that are ultimately evaluated and discussed by the political elites, interest groups, and the media. As mentioned in the introduction to this chapter, scientists are uniquely positioned within the decision-making process to influence policymaking, and are also afforded a level of credibility that other groups of actors must often work harder to earn. These factors make them a particularly interesting group of actors in global policymaking. The epistemic communities approach offers a means of aggregating and analyzing the preferences of scientists and other actors with relevant technical expertise in a way that distinguishes these specialists from other participants in the policymaking process. This approach suggests that, unlike other stakeholders, the preferences of scientists and technical experts (in the context of POPRC, technical experts are those with a level of scientific expertise that enables them to interpret and engage with data; this will be discussed in detail in Chapter 3) are derived from their technical expertise, which informs both their understanding of a problem and its possible solutions. The next chapter will delineate the epistemic communities approach, discuss the composition of such groups in theory and in the context of the

Stockholm Convention, address the criticisms of this approach as a means for analyzing the role of scientists in policymaking, and explain its relevance for this research.

2.4 Conclusion

The foregoing discussion is an attempt to pull together the diverse conceptions and theoretical understandings of framing. Endeavors to define frames and framing are complicated by the wide range of applications of the concept in academic research, as well as the fundamentally different cognitive processes underlying issue and equivalency framing. These cognitive processes should not be ignored, as the conscious/subconscious dichotomy between the two kinds of framing has important implications for individual and collective decision-making. While studies of equivalency framing have produced results that are difficult to replicate outside a strictly controlled laboratory environment, evidence has indicated that individuals' decision-making can be heavily influenced by their perception of risk. This finding suggests that equivalency framing effects could play a role in the packaging of policy issues; frame initiators seeking a particular policy outcome may frame policy issues in ways that appeal to individuals' perceptions of risk and their potential for personal gains or losses. This is particularly relevant to the study of POPs, which are considered for regulation precisely because of the risk they pose to both human health and the environment.

In the context of this research, however, equivalency framing is subsidiary to issue framing strategies, as rational actors seeking to capitalize on people's perceptions of risk may deliberately emphasize these aspects of the issue as they try to build support for their own policy preferences. Such heresthetical tactics may be particularly effective in environmental policymaking, as the uncertainty and complexity associated with many contemporary environmental issues provides scope for multiple interpretations of a problem. Given the substantial socioeconomic consequences of particular actions, science-based decision-making processes are likely to be more politicized than is generally acknowledged. First, as the next chapter will explain, scientists may have policy preferences derived from their unique technical expertise. Second, stakeholders such as interest groups, political elites, and others may seek to support their policy preferences using issue framing in each stage of the decision-making process. Furthermore, framing may be particularly effective in discussions among elite actors, as experts are likely to be responsive to framing by other experts. While studies of framing have previously focused on top-down and bottom-up uses of framing, this thesis will analyze the way experts use issue framing to win the support of other experts for their policy preferences in the context of live policy discussions. Finally, as the next chapter will explain in more detail, scientists participating in the policymaking process may engage in the two types of framing, acting in their roles either as disinterested interpreters of reality or as politically motivated actors with clear policy preferences. The epistemic communities approach provides an analytical means of reconciling this duality in the role of scientists working in the policy process; thus, the next chapter will evaluate this approach to identifying and analyzing the motives and roles of scientists in the policymaking process.

The overarching goal of this thesis is to explore the influence of strategic issue framing, as utilized by scientists, on decision-making under the terms of the Stockholm Convention on Persistent Organic Pollutants. The next sections will: i) address the relationship between strategic issue framing and agenda-setting, ii) identify the members of the epistemic communities associated with the Stockholm Convention, and iii) delineate the specific frames used to structure the debate over global POPs regulation.

Chapter 3: Epistemic Communities

As discussed in the previous chapter, an epistemic communities approach is a natural foundation for analysis of the ways scientists participating in the work of the Stockholm Convention use issue framing tactics to influence debates over global chemical regulation. This policy domain is characterized by high levels of uncertainty and technical complexity, traits which invite the extensive involvement of scientists and technical experts in both risk analysis and policy formulation. Because scientific expertise is required in multiple stages of POPs policymaking, the division between science and policy is becoming increasingly blurred. As scientists engage in designing policy responses to the hazards created by the use of persistent organic pollutants, and particularly those substances which are still widely produced and used, scientists' roles are evolving from those of disinterested technical advisors to advocates for particular courses of political action. Assessing the risks posed by chemicals is an inherently subjective process, due to the difficulty of predicting the impact of substances years or even decades into the future. Furthermore, scientific research is often funded by parties with political interests, including corporations, non-profit advocacy groups, and even governments. The relationship between a funding body and a scientists' research agenda can be highly political, as researchers pursue funding for their work and organizations use the findings of their studies to promote their non-scholarly agendas. Further complicating matters are natural divisions among scientists working in different disciplines, who may come to diverse and contradictory conclusions about the same phenomenon. Arguably, each of these factors could contribute to the development or reinforcement of epistemic communities, as, in the context of chemicals-related policymaking, the ties that bind such communities would be derived from scientists' research and professional analyses of complex problems posed by chemical pollution. This chapter will explore each of these possibilities by: 1) considering the features of epistemic communities and the distinctive ways in which these groups may influence policy discourse; 2) evaluating the strengths and weaknesses of an epistemic communities approach, with particular attention to the approach as conceived by Peter Haas; 3) looking at the links between epistemic communities and policy networks; and 4) exploring the possibilities for the existence of epistemic communities working in association with the Stockholm Convention on Persistent Organic Pollutants. Overall, this chapter argues that an epistemic communities approach is useful for analyzing the role of scientists working within the Stockholm Convention decision-making process, and should, therefore, be integrated the theoretical framework adopted by this research.

An epistemic community is “a knowledge-based network of specialists” with “shared beliefs in cause-and-effect relations, validity tests, and underlying principled values” (Haas 1992b, p. 187). Theoretically, in their role as socially-recognized, credible experts capable of analyzing technically complex information, epistemic communities are in a powerful position to influence others’ perceptions of the world, its problems, and the range of feasible or positive solutions to policy problems. However, research on epistemic communities has been laden with both theoretical and practical obstacles which have led many scholars to question the value of the concept. Gaining access to these communities, and thereby finding empirical evidence of coordinated political action among scientists, is a significant practical challenge. The lack of hard evidence of politically-motivated cooperation among scientists has led some scholars to doubt the existence of epistemic communities (Harrison and Bryner 2004). Other scholars have questioned the degree to which scientists can effectively manipulate information, particularly in policy domains in which multiple stakeholders are pursuing disparate outcomes (Dimitrov 2006). On the surface, both of these criticisms seem to highlight serious, and perhaps even fatal, flaws in the epistemic communities approach. However, observations of environmental policymaking have indicated that scientists act not only as suppliers of technical information about a particular issue, but they also engage in risk assessment, act as policy advisors, and represent the political interests of private actors, such as corporations and environmental and public health advocacy groups. As the ties between scientists and these more traditional political actors become stronger, it is important to consider the extent to which the knowledge-based opinions and policy preferences of scientists could become increasingly interwoven with their work to analyze various environmental problems. The epistemic communities approach facilitates analysis of the way that science is used by those actors with asymmetric control of technical information – scientists and technical experts - who are working at the interface of science and policymaking. While scholars have leveled some important criticisms of the approach, including those noted above, the strength of the approach is that it acknowledges the unique positioning of scientists and technical experts within the policymaking process. In order to operationalize the approach within this research, this chapter will set out the epistemic communities approach, as initially delineated by Haas, and will explore the key critiques and extensions of the approach put forward by a range of scholars.

Critical to this analysis is precise explication of the composition of epistemic communities. Haas' demarcation of who can belong to an epistemic community is broad; he refers to members of epistemic communities as "specialists" (Haas 1992b, p. 187) or "professionals" (Haas 1992a, p. 3). While some scholars have defined epistemic communities as consisting of scientists (Dimitrov 2006), others take a broader view, and argue that epistemic communities include both scientists and non-scientists with the technical expertise to interpret scientific data for policymaking (e.g., Litfin 1994; Bernstein 2002; Dunlop 2009). This definitional issue is directly relevant to this research, as the work of POPRC is conducted by individuals with varying levels of scientific expertise and with a range of scientific credentials.

The role of epistemic communities as interpreters of technical information, their responsibility to advise policymakers, their positioning in the first stages of the policymaking process, as well as the internal consensus that underlies their work, places these groups in a unique position to influence policy discourse. According to Dunlop, “Control over the production of knowledge and information enables epistemic communities to articulate cause and effect relationships and so frame issues for collective debate and export their policy projects globally” (2009, p. 289). Epistemic communities bridge the constructivist-rationalist divide in a way that other participants in the policymaking process do not. As they produce policy-relevant data and risk assessments for policymakers, members of epistemic communities have the opportunity to strategically frame this information in ways that support their policy preferences. Thus, the epistemic communities approach offers a theoretically unique model of networking among like-minded groups of scientists and technical experts, and highlights characteristics that distinguish these groups of scientists and technical experts from all other actors in the political sphere. Recognition of these differences in expertise, position and motivation is vital to a precise analysis of political discourse and its implications for policymaking.

3.1 The Epistemic Communities Approach

The concept of epistemic communities was introduced to the social sciences in 1972 by John Ruggie, who suggested that such communities are composed of interconnected actors playing roles built around a particular *episteme*, or disinterested, objective field of knowledge which is valued for its own sake (as opposed to *techne*, or practical knowledge which is valued for its usefulness in achieving further aims). According to Ruggie, these communities use their expertise to “delimit for their members the ‘proper’ construction of reality” (1972, quoted in Antoniades 2003, p. 23). In a 1992 special issue of *International Organization* dedicated to exploring the role of epistemic communities in global policymaking, Peter Haas elaborated upon Ruggie’s conceptualization in what has become the defining explication of the approach. According to Haas, “an epistemic community is 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" (Haas 1992a, p. 3). These networks of experts are called upon to advise decision-makers working in conditions of uncertainty, and can perform several functions. As interpreters of technical knowledge and advisors to policymakers, epistemic communities: 1) "elucidate the cause-and-effect relationships and provide advice about the likely results of various courses of action;" 2) clarify the interlinkages among issues and the possible consequences of failure to act or from implementing a given policy; 3) help states to define their self-interests, or the interests of a sub-state faction; and 4) help to devise policies (Haas 1992a).

Epistemic communities may include experts from a variety of disciplines and professional backgrounds. According to Haas, the key is that members of epistemic communities "have a sufficiently strong claim to a body of knowledge that is valued by society" (Haas 1992a, p. 16). This means that an epistemic community may include both natural scientists and other experts with the technical expertise to understand, interpret, and use relevant data. The importance of this characteristic is illustrated by the diverse backgrounds, areas of expertise, and educations of those individuals who participate in the work of POPRC (both members and observers, as members of both of these categories are intimately involved in almost all stages of the Committee's work). While Haas conceived of these groups as naturally-evolving networks of experts with a shared normative agenda, Dunlop notes that expert groups, the members of whom may be carefully selected by decision-makers, may also constitute epistemic communities. This suggests that an epistemic community (or, possibly, more than one community) could have naturally arisen within the context of POPRC, or that the committee itself could constitute an epistemic community. These possibilities will be explored below.

3.1.1 Distinguishing features of epistemic communities

Epistemic communities can be distinguished from other groups of experts by four characteristics: i) "a shared set of normative and principled beliefs" which serve as a rationale for action, ii) "shared causal beliefs" which are based on the community's analysis of practices or events which have led to a particular problem or set of problems, iii) "shared notions of validity," meaning that each community has "internally defined criteria for weighing and validating knowledge in the domain of their expertise," and iv) a "common policy enterprise," or a "set of common practices associated with a set of problems to which their professional competence is directed, presumably out of the conviction that human welfare will be enhanced as a consequence" (Haas 1992a, p. 3). Importantly, when faced with a flaw in their logic, epistemic communities will withdraw from the policy process to reconsider their data and refine their analysis of a problem (Haas 1992). This assumption about the nature of epistemic communities plays a crucial role in differentiating these networks of experts from interest groups, as it indicates that the policy preferences of an epistemic community are derived from its research-based understanding of a problem's underlying cause(s). Interest groups, in contrast, frequently use science to support their pre-determined political goals. In other words, while data are often secondary to the agenda of an interest group, an epistemic community's policy preferences are based on and will change with its understanding of the evidence. The primacy which epistemic communities afford to scientific research and analysis is unique to these particular groups, and distinguishes them from other politically-motivated actors.

While Haas conceived of epistemic communities as "naturally evolving, self-regulating enclaves of experts" (Dunlop 2010, pp. 205-206), subsequent research has identified the possibility that expert groups, like POPRC, could also be categorized as epistemic communities (Verdun 1999, Dunlop 2010). Verdun argues that expert communities may constitute epistemic communities because they are knowledge-based groups that seek to achieve goals based on shared "principled normative and causal beliefs." Such groups are not self-selected in the way that Haas envisioned, but they are defined by the same characteristics that distinguish epistemic communities from other actors in the policy process. Furthermore, in Verdun's case study of the Delors Committee (which authored the blueprint for the economic and monetary union in the European Union), the experts were "carefully selected so that they were seen to be authoritative and credible actors both in the domestic and in the European arena (Verdun 1999, p. 321). While Verdun's study found that the Delors Committee did constitute an epistemic community, exhibiting all of the characteristics defined by Haas (1992), analysis of POPRC does not support a similar conclusion. Rather, POPRC more closely resembles Kapstein's 1992 study of central bankers in the US and Britain (cited by Verdun 1999). Notably, Kapstein writes that "the central bankers involved in this case were a group of bureaucrats who were attempting to serve several conflicting public and private sector interests…" (Kapstein 1992, cited in Verdun 1999, p. 315). As subsequent analysis will demonstrate, this statement is also applicable to the members of POPRC.

3.1.2 How epistemic communities shape policy discourse

Like Ruggie, Haas bases his definition of epistemic communities on the constructivist assumption that human understanding of reality is subjective and contextualized. With their expertise-based claims to authoritative knowledge, epistemic communities provide credible interpretations of "truth" in various matters. Members of epistemic communities interpret scientific research, assess data in the context of a given issue or problem, and translate this information into advice that is used by individuals without technical expertise (elected officials, bureaucrats, etc.) to formulate public policy. As they work at the interface of science and policymaking to assess policy-relevant data and evaluate risks, members of epistemic communities have the opportunity to strategically frame information in ways that support their policy preferences. According to Haas:

> The information needed…consists of depictions of social or physical processes, their interrelation with other processes, and the likely consequences of actions that

> require application of scientific or technical expertise. The information is thus neither guesses nor "raw" data; it is the product of human interpretations of social and physical phenomena (1992, p. 4).

Interpretation of the physical world is a fundamental aspect of scientific research, one which can be distinguished from rationalistic presentation of knowledge for the purposes of supporting policy goals. "Scientific information is not an objective output of mechanistic inquiry but a product of social processes among scientists and other social actors," writes Dimitrov (2006, p. 37). This primary function of science must be distinguished from deliberate strategic framing of information by scientists seeking to endorse particular policy goals. However, this responsibility for defining and constructing our understanding of natural events provides scientists with the opportunity to construct a narrative of an event that emphasizes those aspects of reality that they judge to be most important or relevant to policymaking.

Andreas Antoniades (2003) contends that epistemic communities can influence the policy process in two distinct stages of knowledge production; he refers to these as the cognitive and practical levels. At the cognitive level, epistemic communities use their socially-recognized expertise to contribute to the construction of "social reality"; i.e., "social facts, social structures, and identities" (Antoniades 2003, p. 29). This ability to affect our understanding of the world exceeds the scope of strategic manipulation of individual decision-making processes. According to the constructivist perspective, humans cannot comprehend objective reality, and must respond to the world through socially constructed frameworks. Epistemic communities interpret and disseminate information in order to create a collective understanding of reality; they shape "the knowledge and ideas comprised within social structures" (Antoniades 2003, p. 29).

Understanding this role of epistemic communities in structuring the policy process is central to analysis of their use of strategic framing, as it clarifies such groups' positions in the political sphere and their relationships to other actors. This interpretive responsibility is based on a "sincere" effort to make sense of reality. At this level, epistemic communities do not seek to manipulate the policymaking process in order to promote a particular political agenda. James Clingermayer's distinction between "heresthetics and happenstance" is a useful way of conceptualizing the differences between the cognitive and practical levels of epistemic community influence; at the cognitive level, at least, influence is a product of circumstance, or happenstance, rather than a heresthetical or manipulative attempt to bring about a particular outcome (Clingermayer 2004).

At the practical level of knowledge production, the roles, and potentially the objectives, of epistemic communities are quite different. At this level, argues Antoniades, epistemic communities seek to influence the policy process and individual decision-making. Through their authority to define social reality, epistemic communities can "influence the conceptual framework in which every policy process is embedded" (2003 p. 30). This influence can affect actors' definitions and understandings of: i) the policy process, ii) the roles to be played by various actors, iii) the definition of a problem, and iv) "the way in which the possible/impossible and acceptable/unacceptable axes are conceptualized, and thus the way in which actors conceptualize structural constraints" (Antoniades 2003, p. 31). Epistemic communities can also be directly involved in policymaking. According to Haas, key roles include "articulating the cause-and-effect relationships of complex problems, helping states identify their interests, framing the issues for collective debate, proposing specific policies, and identifying salient points for negotiation" (1992a, p. 2). Strategic issue framing belongs to this level of epistemic community influence, as it is a tool by which actors can engage in heresthetical construction of issues. In other words, at the practical level of knowledge production, rational individuals with expertise in a particular area can strategically frame issues in ways that favor their policy preferences. At this stage of knowledge production, epistemic communities can use their unique expertise and position in the policy process to structure the world so they can win.

The potential for epistemic community involvement and influence in policymaking increases "in conditions of complexity, uncertainty and crisis" (Antoniades 2003, p. 32). Thus, the more technically dense a policy problem becomes, the more scope scientists have to influence policymaking. Uncertainty has increasingly become a feature of international policymaking, due to i) the "technical nature" and growing number of issues which must be addressed on a global, rather than national, scale, ii) the increasing number of actors involved in global politics and the degree to which their interests overlap, and iii) "the expansion of the global economy and the modern administrative state" (Haas 1992a, p. 12). The role of scientists in policymaking is likely to expand as environmental issues become ever more complex and require global coordination for resolution. The need for supranational cooperation to stem the spread of transboundary chemical pollutants like those targeted by the Stockholm Convention exemplifies this kind of policy problem, which is frequently characterized by seemingly intractable conflicts among a range of parties. While studies of the importance of science in policymaking have shown mixed results (Andresen et al. 2000; Harrison and Bryner 2004; Dimitrov 2006), the level of policy work being done by scientists working to review chemicals for regulation under the Stockholm Convention is arguably very high – at least high enough to warrant closer examination of the influence of scientists on policymaking.

The involvement of epistemic communities in global policymaking is particularly intriguing because of the credibility and influence afforded to these groups - assets which are often withheld from other stakeholders (e.g., collective action movements, business and political interests, etc.). However, some scholars have suggested that the importance of epistemic communities has been overemphasized in relation to that of other participants in the decision-making process (Toke 1999; Harrison and Bryner 2004; Dimitrov 2006). Others have argued that the approach incorrectly asserts that the ideas of epistemic communities will always trump those promoted by non-epistemic competitors (which lack the same level of authority and credibility) (Bernstein 2001). This thesis does not seek to advance an argument that epistemic communities are more important than other actors in bringing about particular policy outcomes; nor does it suggest that epistemic communities will invariably achieve success in their attempts to define (and thereby set the agenda for management of) an issue. As Dunlop has indicated, epistemic communities seeking to promote a particular agenda may have to build coalitions with other groups, bargain over policy goals, etc. (2000). Their unique expertise does not guarantee that they will invariably achieve their goals. However, epistemic communities may have a unique advantage over other actors in a policy domain in that they are able to construct the way an issue is perceived scientifically, and they can establish such frames early in the policy process. In other words, scientists and technical experts may define issues and the range of policy responses recognized as appropriate, thus shaping the way an issue is perceived and understood by policymakers and the public. Subsequent framing efforts by non-experts participating later in the policymaking process will have to counter the established framing of the issue. This advantage could give scientists and technical experts a significant level of influence over the policymaking process which is both unacknowledged and perhaps unrecognized by other participants.

3.2 Criticisms of the Epistemic Communities Approach

Theoretically, in their role as socially-recognized, credible experts capable of analyzing technically complex information, members of epistemic communities are in a powerful position to influence other actors' perceptions of the world, its problems, and the range of feasible or appropriate solutions to policy problems. Arguably, however, Haas' conception of the approach is somewhat skeletal, and must be fleshed out via application to particular policy contexts. As Dunlop notes, "…the framework's inability to engage with the real world of politics, and the other groups therein, is a product of its lack of theoretical refinement and rigorous empirical examination" (2000, p. 137). Research on epistemic communities has met with both theoretical and practical obstacles that have led some scholars to question the value of the approach. The key criticisms are addressed below.

First, while Haas argues that epistemic communities have "recognized expertise" and "an authoritative claim to policy-relevant knowledge" in particular issue areas, he does not specify how multiple epistemic communities working within the same policy domain relate to one another (1992a, p. 3). Nor does he explain how epistemic community influence may be affected by institutional variables, such as the structure of command in decision-making and the potential involvement of competing interests (Bernstein 2001). In an attempt to pinpoint the role of epistemic communities in a policymaking domain, Bernstein provides a summary which clarifies what he believes to be the unstated assumptions of Haas' model:

> Stated formally, an epistemic communities explanation asserts that scientific consensus within an epistemic community, "politically empowered through its claims to exercise an authoritative knowledge and motivated by shared causal and principled beliefs," (Haas 1992a:41) and its promotion of norms derived from that consensual knowledge, leads to the adoption of its ideas over others as guides to appropriate behavior (Bernstein 2001, p. 125).

The notion that an epistemic community invariably manages to establish its preferred framing of an issue without competition from other interests is implausible, given that these groups must operate in a field populated by other actors with strong interests and varying levels of power and influence. As shown by several studies of issue framing, multiple groups may compete for dominance in framing a particular policy problem, and an established issue frame may be successfully countered by an alternative frame (Druckman 2001; Pan and Kosicki 2001; Mintz and Redd 2003). It is unreasonable to suggest that one particular group can always succeed at framing an issue without regard for other variables which may change the context in which policy is being analyzed. Scientific advances, unexpected events in the natural world, developments or shifts in the social, political or economic spheres, or other changes to the policy context may have a significant impact on the salience of an issue, its relative importance in comparison with other concerns, alliances among decision-makers, etc. Furthermore, political interests may outweigh the policy goals promoted by scientists, regardless of the availability of evidence. Epistemic communities of scientists may have a competitive edge in shaping technical information before it is passed along to policymakers, but this early advantage in framing a particular policy problem is almost certain to be challenged in later stages of the policymaking process. As Dimitrov writes, "science cannot dictate policy since politics intervenes between knowledge and action, and the transition from information to interest formation is shaped by values, power and institutions" (2003, p. 126). It is important to recognize that while a like-minded community of scientists with a shared normative agenda may engage in strategic issue framing, its preferences may not prevail against those of other powerful actors who attempt to promote their own preferences later in the policymaking process.

In the case of the Stockholm Convention, many influential actors from a variety of political, social and economic backgrounds are engaged in the decision-making process. Science is not guaranteed to have the final word, especially given that the issue of transboundary chemical pollution is characterized by high levels of uncertainty about actual risks to humans and the ecosystem. In cases which are subject to rapid change or in which conclusive evidence is lacking, other actors are likely to exploit knowledge gaps to promote their own agendas (Gough and Shackley 2001). For example, corporate interest groups participating in the Third Conference of Parties (COP-3) to the Stockholm Convention (May 2007), such as CropLife International, repeatedly called upon the POPs Review Committee (POPRC) to require Parties nominating chemicals for inclusion in the Convention to provide more evidence that substances are subject to long-range environmental transport (LRET). These actors argued that Parties nominating chemicals were presenting only part of the evidence necessary to meet the screening criteria established by the Convention, and that by accepting this limited evidence, POPRC was exercising subjective judgments biased in favor of precaution and, therefore, was exceeding its authority. These representatives suggested that substances which fail to meet all of the requirements were wasting the "scarce resources" of the committee and diverting attention from those chemicals which pose an "actual" threat to human health and the environment (Stockholm Convention COP-3, POPRC Side Event, 2 May 2007). A representative of the environmental and human health advocacy coalition International POPs Elimination Network (IPEN) contested these calls for more stringent information requirements, saying that the representatives were not attempting to uphold the requirements of the Convention, as the CropLife representatives claimed, but were actually trying to make it more difficult to add chemicals to the Convention. In this case, it could be argued that both groups were attempting to use gaps in scientific knowledge to their own advantage; industry, by suggesting that chemicals should only be considered when there is no uncertainty associated with the substance, and the environmental/human health interest groups by pushing for a more precautionary approach to regulation.

Furthermore, as Bernstein has noted, in a global society increasingly defined by a liberal environmentalist ethic which promotes market-based mechanisms for controlling environmental problems, economic development often prevails over ecological concerns (2005). Given the plethora of variables with the potential to affect a group's perception of a policy problem, it is short-sighted to suggest that a single group is capable of defining public understanding of an issue and bringing about its preferred policy response. Bernstein's criticism of the approach seems to be making this very point. However, there is no reason to suggest that this approach claims that epistemic communities are given primacy over all other actors in a policy network. In fact, the approach, as defined by Haas (1992), simply ignores the issue.

Bernstein's interpretation also suggests that only one epistemic community can exist in a particular issue domain. In a comparison of economists and natural scientists, two expert groups with reasonable claims to knowledge-based authority in different spheres, he writes:

> …treating both equally as epistemic communities undermines the logical basis of the explanation – that a single community is granted legitimacy based on its claim to authoritative and policy-relevant knowledge in a certain issue area. If more than one such community exists, the reason for adopting the position advocated by such a group could not be accounted for simply by looking at its privileged position owing to its knowledge claims (2001, p. 125).

The problem with this analysis is the suggestion that one group is given primacy over another on the basis of a claim to authoritative knowledge over the same issue, when in reality the expertise of scientists and economists exists in two distinct areas. Because each group draws upon a different bank of knowledge and uses different methodologies to analyze a problem, they will approach the same policy problem from separate perspectives. Both groups could conceivably form legitimate epistemic communities, complete with authority derived from their ability to analyze complex technical information that can only be understood by individuals with expertise in the subject. Presumably, the interests of each group would correspond to its individual competency, meaning that scientists could perceive a particular problem (and potentially, appropriate responses or solutions) through a scientific lens, while economists would consider an entirely different set of criteria when determining how an issue should be understood and analyzed.

Furthermore, it is possible for members of a single profession to divide into two competing epistemic communities. In the case of global chemical regulation, such divisions are facilitated by the high level of uncertainty inherent in the predictive science required for risk evaluations of chemicals, the environmental and health effects of which may not be entirely clear for decades. Scientists working within the professional boundaries of legitimate scientific research, underpinned by internally agreed norms of practice intended to maintain a high standard of professionalism and objectivity (e.g., adherence to Mertonian norms, peer review, etc.), may nevertheless arrive at different conclusions about the nature of a particular problem. Early studies of climate change are a good example of this kind of conflict within the scientific community. Another example is provided by Powell (2007), who explores divisions among scientists working on issues related to nanotechnology. Powell argues that scientists positioned "upstream" in the research process (those "involved with the development of emerging nanotechnologies," such as chemists, physicists, and engineers), frame the risks of such technology differently than scientists positioned "downstream" (scientists who study public health impacts of nanotechnology, such as toxicologists and epidemiologists) (2007, p. 175). In interviews, upstream scientists emphasized that nanotechnology is not "new," and expressed little concern about risks. In contrast, downstream scientists argued that nanotechnology "is both old and new," and Powell found that "most are concerned about the potential environmental and health risks related to these materials" (Powell 2007, p. 183). Powell notes that previous studies have indicated that "disciplinary backgrounds, institutional affiliations, and worldviews can affect scientists' risk perceptions," and argues that scientists' "risk frames are contingent on their locations relative to the risks under consideration" (p. 175). These findings underscore the influence of disciplinary perspective on the way issues are identified and analyzed by scientists, and particularly highlight the fact that scientists from different disciplines may attribute greater or lesser weight to particular forms of evidence based on their relevance to the scientists' own areas of expertise. The fact that scientists working within the same field can arrive at dissimilar conclusions about the same issue underscores the point that multiple, competing epistemic communities may legitimately exist within a single policy domain.

Interestingly, divisions among scientists may also fall along sub-disciplinary lines. For example, toxicologists and epidemiologists both study the effects of chemicals on human health, but the methodological approaches utilized within these two fields differ and may lead practitioners to view the same environmental problem from divergent or opposing perspectives. Whereas epidemiological studies tend to be observation-based and may involve assessment of the effects of multiple chemicals on a subject, toxicological studies tend to be laboratory-based and usually consider one chemical at a time (van den Brandt et al. 2002). van den Brandt et al. note:

> Epidemiology is the only scientific discipline that directly addresses phenomena of disease occurrence in the human population with the aim of explaining and clarifying them as well as advising public health agencies regarding preventive measures (2002, p. 390).

This explicit goal of epidemiology could influence the research agenda of the discipline's practitioners, as it encourages scientists to focus on finding the causes of existing human health problems (e.g., leukemia clusters). Using a disease as their starting point, epidemiologists attempt to trace the various factors linked to the condition, in hopes of pinpointing the causal mechanisms. Toxicologists, in contrast, start from the opposite direction by testing a chemical's toxicity to flora or fauna. These scientists attempt to pinpoint the level at which exposure to a chemical causes harm to humans and the environment. In other words, while epidemiologists use an existing health problem as the starting point for a research agenda, thus searching for the cause of a problem which has already been manifested in humans (and may be related to any number of factors), toxicologists tend to analyze a single chemical's potential for harm in a hypothetical scenario.

The work of both toxicologists and epidemiologists is subject to strict controls within their respective communities, and evidence provided by scientists from both disciplines may be cited in risk assessments used to evaluate the eligibility of chemicals for regulation under the terms of the Stockholm Convention. While both disciplines include scientists with authoritative claims to knowledge, the information they produce may be used to support opposing policy actions. So long as consensus is achieved among the members of each discipline, however, each could legitimately be categorized as an epistemic community. Thus, epistemic communities may coexist without contradicting the fundamental premise of Haas' model.

If consensus is not achieved among members of each discipline, however, then even a group of toxicologists (for example) who explicitly work together to promote a specific policy agenda could not be classified as an epistemic community. In the absence of consensus within a discipline, scientists will not have internally uncontested authoritative knowledge and will be unable to present a unified front to consumers of the knowledge they offer. The power derived from their authoritative understanding of a problem will be diminished. It is this power that the epistemic communities approach seeks to pinpoint and analyze; without it, scientists cannot wield the same level of influence in defining issues, much less in proposing policy responses.

Ultimately, Bernstein's interpretations compress the epistemic communities approach into strictly defined boundaries which effectively negate its usefulness as a tool for analyzing the role of knowledge-based influence and authority in competitive policymaking environments. While his charges appear to add up to a damning assessment of the approach, Bernstein bases his analysis on assumptions which have never been stated in or implied by Haas' writings on epistemic communities. Haas' work does not suggest that epistemic communities invariably succeed in bringing about their preferred policy outcomes, or even in establishing the dominant issue frame for policy discourse (Dunlop 2000). Nor does Haas claim that only one epistemic community may exist in any given issue domain. These assumptions are based on Bernstein's interpretation, and he gives no evidence to support their credibility. Therefore, these assertions do not represent a substantial challenge to the validity or usefulness of the concept. Bernstein's analysis does highlight the need for further clarification and testing of the model, however, as application of the model to empirical studies will allow researchers to clarify the actual strengths and weaknesses of the approach.

Another important set of criticisms of the epistemic communities approach is presented by Dimitrov (2006), who suggests that the model suffers from three major shortcomings. First, Dimitrov argues that the influence of epistemic communities may be no greater than that of interest groups. As previously discussed, this should not be considered to be a fatal flaw in the approach; arguably, the very possibility that scientists would cooperate to advance normative policy goals warrants exploration, regardless of the groups' success in bringing about their preferred outcomes. Understanding the conditions under which such groups fail or succeed could provide valuable insights into the policymaking process and improve our understanding of power, bargaining, and other important themes in global environmental policy studies. Furthermore, the position of scientists in the policymaking process differs from that of traditional interest groups, as scientists act as interpreters of knowledge for non-experts (policymakers, advocacy groups, consumers, and all other laypersons with an interest in the subject). This unique position gives scientists a degree of authority and influence which is not shared by other actors working in the policy domain.

Dimitrov partially addresses this distinction in his second criticism of the theory of epistemic communities, in which he argues that while the approach claims to be interested in the role of information/knowledge in environmental policymaking, it actually focuses on the role of scientists as transmitters of that knowledge. "Supposedly knowledge-based, the entire epistemic communities literature in fact advances an interest-group explanation of outcomes….what accounts for the outcome is not knowledge but the carriers of knowledge whose political power derives from their status as experts," he writes (Dimitrov 2006, pp. 30-31). This criticism does not undermine the theory so much as highlight the need for researchers employing the approach to clearly specify the causal mechanisms under investigation. An analysis of the extent to which epistemic communities may strategically frame information in order to bring about their preferred policy outcomes spotlights scientists *use* of information, thereby giving the role of scientists themselves primacy over the information they may (or may not) deliberately frame in support of policy preferences. However, a core tenet of the epistemic communities approach is that scientists' preferences are derived from their unique understanding of complex technical data and its implications. Furthermore, the assumption that scientists will withdraw from the policymaking process when faced with a flaw in their logic is based on the observation that knowledge (and "correct" interpretation of data) is of utmost importance to scientists. The epistemic communities approach recognizes this attribute of scientific inquiry, which distinguishes scientists from all other interest groups, and also recognizes that in spite of the norm of disinterestedness which is supposed to guide scientific endeavor, scientists are playing increasingly important roles in actual policymaking. Thus, the epistemic communities approach is simultaneously interested in the role of information/knowledge in policymaking and the role of scientists as transmitters of that knowledge.

Dimitrov's argument is closely related to an earlier criticism advanced by Karen Litfin in her analysis of science, knowledge, and political power in the context of the ozone negotiations. In *The Ozone Discourses* (1994), Litfin argues that the epistemic communities approach draws an unrealistic division between science and politics, and is premised on the unsupportable notions that "science transcends politics," and that "knowledge is divorced from political power" (Litfin 1994, p. 186). According to Litfin, it is critical to recognize the interplay between knowledge and interests, and particularly that actors tend to be more receptive to knowledge that supports their preexisting preferences or interests. In this way, scientific knowledge and political power interact non-linearly. Litfin argues that the epistemic communities approach fails to acknowledge the interaction between knowledge and interests, and instead is predicated on the assumption that scientists and technical experts interpret knowledge which then shapes policy preferences.

Litfin argues that the concept of "knowledge brokers" more accurately reflects the "competitive and conflictual dimensions of knowledge claims in the policy arena" (1994, p. 188). According to Litfin, knowledge brokers "are not themselves researchers but have the skills needed to understand the work of academics and other resesearches" (1994, p. 37). Noting that knowledge brokers "have a flair for translating" technical information, "identifying policy-relevant angles in it, and framing it in language accessible to policymakers," Litfin explains that knowledge brokers act as intermediaries between science and policy. This approach underscores that the way technical information is presented is more important than fact, and that using science to inform policy "is itself a political act" (Litfin 1994, p. 37). In other words, Litfin argues that knowledge may be used by actors within the policy process, and highlights the possibility that knowledge may be used to further particular goals. This concept underscores the argument that knowledge does not exist in a vacuum; rather, it is discursive. Science itself cannot explain outcomes in science-based policymaking; rather, one must consider the role of discourse in shaping the way that science is both interpreted and presented, as this determines the way issues are understood and may be addressed.

Finally, Dimitrov and other scholars have questioned the very existence of epistemic communities. Harrison and Bryner argue that:

> Where there is scientific uncertainty, an epistemic community is imputed from the parallel actions of several scientists who appear to have a common set of values. Such a community is more virtual than real, with more theoretical value than political influence (2004, p. 8).

This research project will attempt to address this criticism by testing the assumptions of the approach in the context of the Stockholm Convention. To show that epistemic communities exist, documentation of *coordinated* action among like-minded groups of scientists is needed. Potentially, evidence of these relationships could be obtained through interviews with scientists and other political actors, as well as observation of Convention work in which scientists play an important role (e.g., POPRC meetings). Until such evidence is available for scrutiny, as a result of this and other studies, the practical value of the epistemic communities approach will remain in doubt.

Both Bernstein and Dimitrov highlight key shortcomings in the epistemic communities approach, and their concerns should be addressed in order to improve our understanding of the role of these groups in international policymaking. Future research (both in the context this research project and in the work of others) should explicitly address these concerns in order to provide an improved understanding of epistemic communities and their ability to influence public policy. Arguably, rising demand for science-based assessments of risk and proposed policy responses to environmental issues, and the subsequent involvement of scientists in virtually all stages of the policymaking process have set the stage for the formation of epistemic communities.

3.3 Epistemic Communities and Policy Networks

Crafting effective regulatory policy to minimize the impact of transboundary chemical pollution requires extensive reliance upon scientific analyses of present and future risks to both human health and the environment. As the only experts capable of assessing the technical effectiveness of proposed policies reduction or elimination of POPs, scientists are likely to be engaged in virtually every stage of decision-making. Given the multifaceted involvement of scientists in POPs-related policymaking, it is necessary to specify the roles played both by scientists and epistemic communities within the network of actors who work together to determine how these chemicals should be regulated under the terms of the Convention.

By definition, epistemic communities seek to promote political agendas which are grounded in their expert analyses of particular phenomena. Given this interest in applying technical knowledge to practical courses of action, epistemic communities must interact closely with decision-makers responsible for developing policy in a particular field. As the salience of an issue increases, the number of actors with a stake in the policy outcome will also increase. Thus, epistemic communities often work in issue space which is crowded with other actors seeking to promote their own political agendas. The evolving role of scientists in policymaking (from disinterested sources of technical information to policy advisors) can be difficult to pinpoint, particularly as scientists become increasingly willing to associate themselves with various interest groups. As will be discussed below, while scientists maintain a distinctive position within this network of actors, they are not wholly separate from other participants in the policymaking process.

Epistemic communities can be categorized as subgroups within a policy network made up of all of the actors working within a particular issue area. A policy network can be defined as "a self-organizing group that coordinates a growing number of public (decision-makers) and private (interest groups) actors for the purpose of formulating and implementing public policies" (Dahan et al. 2006, p. 1578). Dahan et al. adopt Marsh and Rhodes' (1992) typology, which acts as an umbrella concept for a range of possible incarnations of a cluster of actors connected to one another within a particular issue domain. According to this conceptualization, policy networks can be imagined as a continuum with two ideal forms on either end. On one side of the continuum are policy communities: tightly-knit groups made up of a strictly controlled number of members with similar beliefs and interests. On the opposite end of this continuum are issue networks, which are "loose, issue-based, coalitions that include large numbers of participants with asymmetrical resource endowments, irregular access, and who frequently argue not only over policy options but even values" (Dahan et al. 2006, p. 1579). Epistemic communities, they argue, "would correspond to a sub-category of policy communities where the main resource exchanged by members is knowledge" (Dahan et al. 2006, p. 1580).

In the context of the Stockholm Convention, these typologies can be modified somewhat to create a more accurate representation of the actors and their relationships. The entire network of groups directly involved in Convention activities (those who attend meetings as observers, Parties or invited experts, or those who contribute written advice which is incorporated into discussions or negotiations in official Convention activities) constitute a group which would fall somewhere between a policy community and an issue network (as most groups do) (Dahan et al., 2006). In keeping with the characteristics of a policy community, participation in Stockholm Convention activities is restricted (individuals or groups wishing to attend meetings must obtain permission from the Secretariat, and participation in certain stages of decision-making may be limited to Parties to the Convention or members of particular committees). Membership (in an informal sense) is also stable over time; Convention records show largely consistent patterns of participation by a range of advocacy groups, corporations, industry associations, intergovernmental organizations, and nations which have been involved in negotiations to establish the Convention, as well as in subsequent activities. Most of these actors are involved in several aspects of the Convention's work; many individuals, acting as representatives of various organizations or coalitions, participate in multiple sub-committees and working groups.

However, the assortment of participants in Stockholm Convention activities also exhibits two of the key characteristics of an issue network. First, resource endowments are highly asymmetric. Parties to the Convention include both developed and developing nations from every region of the globe, and observers/participants range from non-profit advocacy groups (e.g., Armenian Women for Health and Healthy Environment, International POPs Elimination Network, Healthcare Without Harm) to multinational corporations (3M, Makhteshim Agan Industries, BASF) and industry associations (CropLife International, Chlorinated Paraffins Industry Association, European Semiconductor Industry). Second, participants often have conflicting values and policy goals, and alliances may shift as different chemicals are considered for regulation. For example, Parties to the Convention may support elimination of a chemical and, therefore, choose to work closely with an environmental advocacy group with similar preferences. Furthermore, while environmental groups may form coalitions with human health advocates in many circumstances, their positions may diverge when faced with regulation of a chemical such as DDT (which may pose a risk to human health and the environment in the northern hemisphere, but is currently the only effective method of malarial vector control in sub-Saharan Africa). These shifting alliances and competing goals complicate the relationships among actors, and may preclude agreement on proposed policies.

Thus, for lack of a more precise typology, the network of actors directly involved in the work of the Stockholm Convention can be characterized as a policy network, which allows us to recognize that the network has characteristics of both a policy community and an issue network. The role of epistemic communities within this policy network is easier to pinpoint, as in many cases the relationships between scientists and interest groups can be clearly documented. In POPRC meetings, all of the actors (governments, public health advocacy organizations, and environmental groups) are represented by scientists, according to Convention records (www.pops.int), but these scientists do not form a single, cohesive, like-minded community with a shared agenda. Rather, these actors frequently take opposing positions on risk assessments of particular chemicals, appropriate policy responses, etc.

When scientists act as representatives of interest groups, corporations, or national governments, their policy preferences are often implied and sometimes overt. The authoritative status of scientists is a boon for the actors they are representing, as these entities can use the credibility and weight of science to promote their policy agendas. As Ozawa writes, “Science is conceived as a process that yields an objective, rational, politically neutral body of knowledge. Decisions consistent with scientific knowledge, therefore, command acceptance” (1996, p. 221). Actors lacking scientific expertise frequently enlist the help of scientists to increase the power of their arguments, which leads to a scenario in which science is “used as a weapon in the arsenal of warring public policy actors” (Ozawa 1996, p. 220). In spite of the apparent contradiction to the neutrality which has long been a hallmark of science (Andresen et al. 2000), many scientists and academics have called for the increasing involvement of scientists in public policymaking. As Susskind notes:

> Once a problem has been defined, and the scientists have had their say, bargaining tends to be framed mostly in terms of potential economic losses, possible domestic political advantages, and apparent attacks on sovereignty. The likely effectiveness of a treaty in reversing ecological damage, however, is not something that the politicians are capable of deciding alone. Scientists have far too long been the missing link in the bargaining process (1994, p. 65).

In an article addressing the intersection between science and policy, one epidemiologist argues that scientists not only have the right to engage in policymaking, but that such action is demanded by ethical guidelines for the profession (Weed and Mink 2002). According to this line of thought, active participation in policymaking allows epidemiologists to pursue practical solutions to public health problems. Such activity is within the remit of this group of scientists, they argue, as:

> …coparticipation does not imply that epidemiologists' voices at the policy table should be limited to dispassionate descriptions of study results. It is our responsibility to actively participate in decisions concerning the application of those results to the prevention and control of diseases (Weed and Mink 2002, p. 68).

This is just one illustration of the growing connection between scientists and policymaking. However, if, as the epistemic communities approach emphasizes, scientists differ from traditional interest groups in that their professional ethics demand that they withdraw from the policymaking table when faced with a flaw in their logic, then we can expect scientists who work both independently and in conjunction with corporations, industry associations, and NGOs to behave differently from their non-scientist counterparts. Therefore, even though scientists may have increasing ties to interest groups, like-minded scientists sharing expertise and knowledge can be considered to be epistemic communities, in keeping with Haas' model.

Arguably, the epistemic communities approach is one of the most intriguing models for evaluating the role of scientists working in international environmental policy, as it accounts for scientists' asymmetric possession of knowledge which is valued by policymakers and other actors working within an issue domain. The approach also emphasizes the ways in which epistemic communities' motivations and priorities differ from those of other interest groups. While scientists might have normative policy goals, the unique foundations of these goals may give rise to behavior among scientists which is markedly different from the behavior of other actors pursuing their interests.

Theoretically, the epistemic communities approach should allow scholars to develop analytically precise explanations of the conditions under which scientists are able to exert influence over policymaking. In the context of the Stockholm Convention, the approach will facilitate close examination of the influence of scientists with the authority to set the agenda for regulation of new persistent organic pollutants, and more specifically, the way that these scientists may compete to promote their policy goals as they participate in the work of the POPs Review Committee.

3.4 Conclusion

The Stockholm Convention presents an intriguing case for analysis of the interface between science and politics. Like many contemporary environmental issues, global transboundary chemical pollution is a comparatively new, technically complex, and highly uncertain problem that poses a significant threat to human health and the environment. Assessment of the risks posed by POPs and development of appropriate policy responses are both science-based endeavours which must be undertaken jointly by policymakers and scientists with technical expertise in fields such as toxicology and epidemiology. Scientists are integral to the work of the Stockholm Convention, and in their roles as technical advisors, they interpret scientific knowledge, converting it to usable information for policymakers, and provide science-based advice about how policies should be designed to balance the risks and benefits associated with continued use or regulation of each chemical under review. Thus, in contrast to the "traditional" division of labor between science and politics, scientists working under the auspices of the Stockholm Convention are deeply engaged in virtually every aspect of policymaking.

The epistemic communities approach allows researchers to evaluate this increasingly blurry division between science and politics, and provides a theoretical foundation for analysis of the extent to which scientists may engage in strategic issue framing. The model attempts to account for the normative policy preferences of scientists, and suggests that such preferences are derived from scientists' unique ability to interpret and analyze complex technical information. Crucially, the approach highlights the differences between the motivations and subsequent behaviour of scientists and those of traditional interest groups. The approach also allows us to consider the potential advantages scientists may derive from their asymmetric possession of knowledge. To improve the analytical power of the model, however, the approach must be empirically tested and its assumptions must be fleshed out. The application of the model to policymaking within the remit of the Stockholm Convention should provide insight into: 1) the role of science and scientists in the decision-making process; 2) the sources of scientists' policy preferences; 3) the use of strategic issue framing by scientists to support policy preferences; and 4) the validity and usefulness of the epistemic communities approach.

Chapter 4: Methodology

This research seeks to analyze the interface between science and policy in the context of an international political regime designed to manage a global environmental hazard. The two previous chapters argued that: 1) scientists are not disinterested, impartial advisors to policymakers; rather, they have policy preferences and, like other participants in the decision-making process, they attempt to support these preferences in policy discussions, 2) scientists' preferences may be shaped by a number of factors, including participation in an epistemic community, 3) the use of issue framing by scientists may be particularly effective because studies have shown that individuals with expertise are more susceptible to framing effects than individuals with little or no previous knowledge of an issue, and 4) credibility is an important aspect of an actor's ability to establish a frame which will be supported by the target audience. Together, these premises suggest that scientists have both the motivation and the opportunity to strategically frame issues as they participate in the crucial decision-making which occurs in the earliest stages of the policymaking process. This analysis will pinpoint the role of scientists in policymaking under the auspices of the Stockholm Convention, and will study the ways scientists, in particular, use strategic issue framing to define issues, set the agenda for chemicals to be reviewed, define the relevant issues to be considered, highlight certain aspects of an issue while deemphasizing others, and, ultimately, shape global policy responses to human health and environmental problems created by production, use and disposal of POPs.

Participants who successfully create a masterframe, or a frame which achieves dominance over all others, will "win" the policy debate and establish a foundation for the implementation of a policy which is compatible with their preferences (Snow and Benford 1992). While establishing a masterframe is the best possible outcome for an individual using strategic issue framing to promote certain goals, even frames which fall short of this standard can have a substantial impact on the way issues are understood by others. In other words, the success of a frame is not a dichotomous variable; in the context of policy negotiations, issue frames may achieve varying degrees of success by changing the course of debate, affecting the pace of decision-making (for example, in the context of POPs regulation, delays can be economically valuable to opponents), highlighting scientific uncertainty and, potentially, a lack of consensus, or by establishing a dissenting view in the records of the policy discussion (which can be used in later stages of policymaking to challenge the validity of the decision-making process). The implications of each of these possible results of issue framing may vary according to the context in which framing tactics are being utilized, and the goals of the framers, the frames chosen to support their preferences, and the possible outcomes will depend on the norms, procedural rules, range of feasible decisions, etc. that are associated with the process in which the framing occurs. In the context of POPRC, the conditions for and implications of successful framing will be heavily influenced by the scientific nature of decision-making. The methodological approach to this analysis is likely to be applicable to other international environmental negotiations in which science plays a definitive role in decision-making, although contextual factors such as norms, degrees of uncertainty, and socioeconomic issues, among others, will certainly affect the way issue frames are employed by participants, thus potentially limiting the direct applicability of the findings to other contexts.

4.1 Research Goals

To date, the role of strategic issue framing in science-based decision-making has not been explored by framing scholars. This research will seek to build on the work of constructivist research which has analyzed the role of science in decision-making by considering scientists not just as actors capable of defining the truth, but as rational actors who deliberately frame information in ways that support their policy goals. An important part of this research will be to pinpoint the motivations of scientists, and to explore the rationales behind their interests.

While many scholars have focused on the way the media or elites (politicians, interest groups, etc.) have framed issues in order to influence the policy preferences of citizens, this study analyzes the way that elites frame information for other elites. Specifically, this study focuses on the way in which POPRC participants - individuals with scientific expertise - attempt to use strategic issue framing to influence the preferences and decisions made by other experts. This situation is intriguing because, unlike debates in which actors have explicit political agendas, POPRC is designed to be a politically-neutral committee in which decision-making is based entirely on scientific data. As such, decisions are expected to be objective and free of the bias that would be introduced by consideration of political concerns, socioeconomic interests, and other non-scientific factors. This perception of decision-making as predicated on disinterested, objective, science-based analysis is the foundation of POPRC's credibility, which, in turn, is the basis for the legitimacy of the Stockholm Convention as a global environmental agreement. Thus, identifying the use of strategic issue framing in POPRC discussions, as well as analyzing the varying levels of effectiveness of different frames, will provide critical insight into the way strategic political actors may attempt to capitalize on the power that comes with setting the agenda for POPs-related decision-making.

4.2 The Research Question

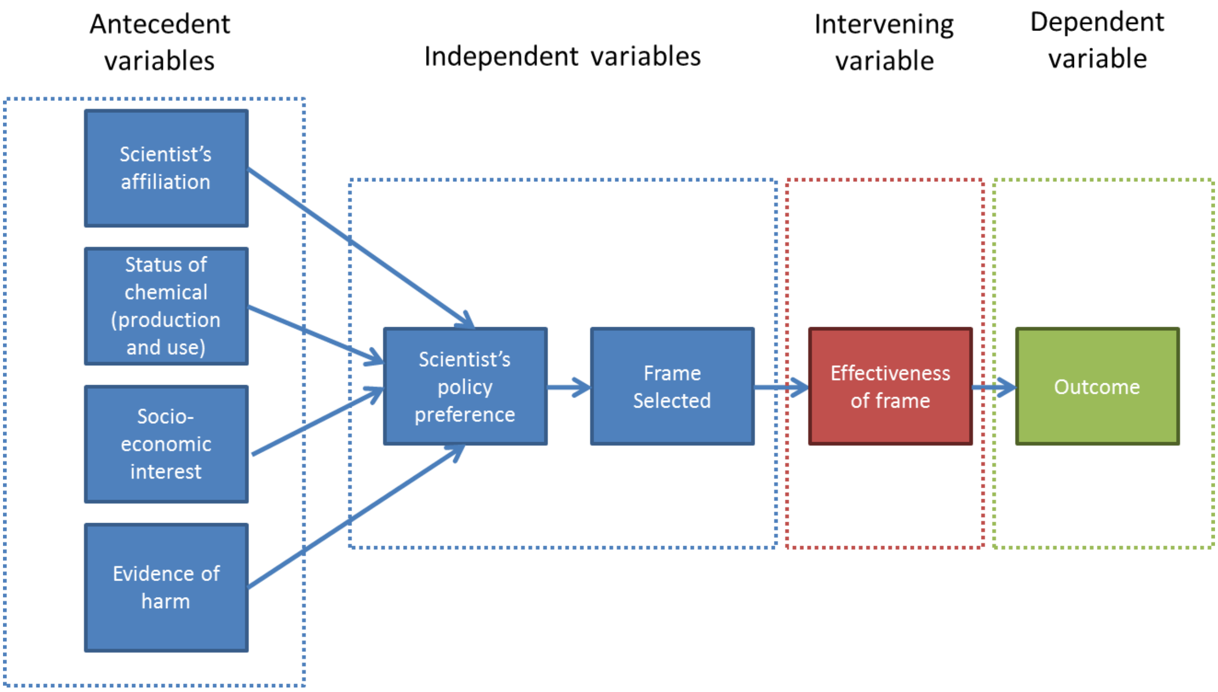
The key question guiding this research is the following:

In the context of global chemical regulation, why are some persistent organic pollutants regulated quickly, with broad support from stakeholders, while proposals to regulate chemicals which pose similar threats are met with strong resistance from many of the same actors?

As noted in Chapter 1, the three standard answers to this question include: 1) lack of scientific consensus on the risks posed by chemicals in question, 2) a lack of available substitutes, and 3) potential financial gains or losses for influential stakeholders. While each of these answers may be partially correct, they fail to account for the way that these and other issues can be used by stakeholders to support their predetermined interests. In other words, each of these explanations ignores the potential for participants to strategically manipulate policymaking discussions to support their preferred policy outcomes by emphasizing certain aspects of an issue while deemphasizing others. This study attempts to answer this research question by pinpointing the role of scientists in policymaking and analyzing the ways in which scientists may use strategic issue framing to support their policy preferences as they set the policymaking agenda for the Stockholm Convention.

The hypotheses and causal model, which will be discussed in detail later in this chapter, are summarized here in order to provide an overview of the logic guiding this research. This model offers an explanation for the ways in which scientists formulate and support their policy preferences prior to and throughout POPRC's decision-making process. In brief, this research hypothesizes that: 1) scientists have policy preferences that they seek to promote during science-based evaluations of nominated substances, 2) these preferences are derived from their expertise, and lead scientists to work within epistemic communities to promote their values-based agendas, or alternatively, are shaped by their other affiliations (e.g., the government of their home country), 3) scientists use strategic issue framing to support their policy goals, 4) the interests of scientists will result in systematic differences in discussions of dead and live chemicals, and 5) elites with technical expertise will be affected by strong frames, and will identify and ignore weak frames (Druckman and Chong 2007). This approach emphasizes that all frames are not equal, and that the "loudest" (or most frequently used) frames are not always most successful in competitive situations. Rather, frames may be categorized as strong or weak by identifying particular elements that are crucial to success or failure. Specifically, strong frames are those which come from a "credible source," reflect “consensus values,” and avoid contradicting “strongly held prior beliefs” (Druckman and Chong 2007, p.104). In the context of this research, credibility, shared values, and strongly held prior beliefs may determine the direction of debate; for example, frames emphasizing evidence or uncertainty may have particular strength in science-based discussions, while frames emphasizing social impacts of POPs pollution may not be dismissed as irrelevant. The causal links among these hypotheses are illustrated in Figure 4.1 below.

Figure 4.1 The Causal Model



As this model illustrates, this research is designed to analyze the source of scientists’ policy preferences, the frames used by scientists to support these preferences, and the influence of strategic issue framing on decision-making. This diagram denotes the key factors which determine scientists’ preferences, highlighting the possibility that, in addition to consideration of the evidence of harm posed by exposure to chemicals, scientists’ preferences are shaped by their affiliations, as well as by the current status of production and use of the chemical. This allows for the possibility that preferences are influenced by the socioeconomic or political interests of scientists’ employers, as well as scientists' participation in an epistemic community. Establishing the source of scientists' preferences is crucial, as this will clarify the role of political and socioeconomic interests in the earliest stages of POPs-related policymaking. This research hypothesizes that scientists will introduce issue frames to support their policy goals; these frames will achieve varying levels of effectiveness (the measurement of which is discussed below), and may have a significant impact on debate. The impact on debate can be measured by the decisions taken by the Committee, as well as by the frequency of use of each frame (as determined by its use by the frame initiator, as well as adoption by other participants). This is discussed in greater detail below. Even frames that do not garner widespread support that ultimately leads to a decision supported by the frame may have a significant impact on discourse, and may also have the practical consequences of consuming substantial amounts of Committee time, establishing dissent (which can be raised again in later stages of the policymaking process, such as during meetings of the COP, in order to build a case against the validity of POPRC's decisions or recommendations), and disrupting the flow of decision-making. For Parties interested in slowing or preventing regulation of chemicals, such disruption can be a valuable result, as it may delay decision-making by a year or more. These impacts on the decision-making process – which are distinct from the dependent variable (the action the committee formally decides to take with regard to the chemical being review) – may have significant practical implications, and may in themselves represent an achievement for opponents to regulation.

The causal model and the variables within it are discussed in greater detail in section 4.3.4 below. First, however, it is essential to explain the analytical foundation for this model. The next section sets out the methodological approach which directs this research. This is followed by a discussion of the hypotheses to test the overall research question; the causal model underpinning them and the variables which make up the causal model (see section 4.3); an explanation of the methods selected to test the hypotheses (section 4.4) and a description of the design of the research (section 4.5).

4.3 Methodological Approach

4.3.1 Problems with existing methods

Most previous studies of framing effectiveness have utilized an experimental approach in which participants were subjected to frames in a controlled setting. Such studies allow researchers to determine the effectiveness of frames in gaining the support of the exposed individuals. The effectiveness of a frame, also referred to as a frame's "potency" (Pan and Kosicki 2001, p. 49), is determined by the extent to which an individual finds the argument to be compelling. In experimental studies, frame potency has been evaluated by "by asking individuals (e.g., in a pre-test) to rate the effectiveness or persuasiveness of various frames in communication, in a particular issue" (Druckman, in press). Citing his classic example of the hate-group rally, previously described in Chapter 2 of this thesis, Druckman notes that participants may find concerns about free speech to be compelling, while they would be less engaged by concerns about possible traffic congestion (Druckman, in press). In experimental studies, participants are able to directly address the frames presented and tell researchers why one frame is compelling and another is not, allowing researchers to compare participants' preferences prior to and following exposure to a particular frame. Furthermore, researchers can use questionnaires, interviews, etc. to determine participants' interest in an issue, a factor which may influence the effectiveness of any type of frame to which participants are exposed (if a participant has no interest in an issue and is not motivated to consider the validity or importance of a frame, frames are likely to be ineffective) (Druckman et al. 2010). Thus, experimental studies afford a number of advantages in allowing researchers to explore the impacts of introduction of frames, as well as the opportunity to follow up with participants to determine why some frames were effective and others were not.

As Slothuus (2010) notes, however, "studies of framing have been criticized for relying too heavily on laboratory and survey experiments in which participants are exposed to frames different from how political debates often take place in the real world" (p. 161). In particular, Slothuus suggests that experimental studies of framing may not provide accurate reflections of "the way issues are typically discussed in real-world political contexts" (2010, p. 158), because, as Sniderman and Theriault (2004) have argued, in such studies, "citizens are artificially sequestered, restricted to hearing only one way of thinking about a political issue" (p. 141-142, quoted in Slothuus, 2010, p. 158-159). However, analyzing strategic issue framing in real-world discourse entails substantial methodological challenges, precisely because researchers have little control over information presented. Furthermore, researchers must identify the interests and preferences of the framers. In order to recognize and analyze issue frames in live policy discourse, it is critical to identify and understand the motivations of those introducing frames, as well as the interests of those whom the frames are intended to influence. In studies of scientists' perceptions of risk (which influence the ways in which scientists frame issues), their disciplinary backgrounds, institutional affiliations, or worldviews were found to affect their perceptions (Powell 2007). Similarly, this thesis analyzes the effect of a scientist's affiliation or membership of an epistemic community on their policy preference and therefore their framing of an issue. This is particularly important to analysis of issue framing in science-based policymaking, because scientists are unlikely to acknowledge their non-science-based interests or motives. In most circumstances, highlighting outside interests would weaken the credibility of the scientist and the decision-making body in question.

To accomplish these goals, an analysis of the influence of issue framing in policy negotiations requires a multi-faceted approach that: 1) identifies the frames used in policy discussions, 2) using data which is supplementary to policy discussions, identifies the socioeconomic and political preferences of participants in order to determine links between framing and pre-determined political preferences, and 3) analyzes the influence of issue frames on the course of discussion and decision-making. In the context of POPRC, it is possible to measure the effectiveness of an issue frame empirically by determining the extent to which the frame is adopted or supported by others in policy discussions and decisions. This can be determined through analysis of: 1) the frames used by participants, and 2) the key decisions made by POPRC members during each meeting (to defer discussion to the next meeting while more evidence is gathered, to move the chemical to the next stage of evaluation, to end evaluation of a substance, or to recommend the chemical for listing in the Annexes of the Stockholm Convention).

4.3.2 Justification of case study approach

Evaluation of the influence of issue framing in real-world policy discussions requires a fine-textured analysis of the speech, interests, and roles of participants in a particular discursive context, and is best suited to a case study approach. Using a case study facilitates close examination of discourse, which is essential to identification of frames and analysis of their impact on decision-making. Specifically, a case study approach enables consideration of analytically significant "contextual factors" (George and Bennett 2004, p. 19) such as the rules which shape the decision-making process (e.g., timeframes for policymaking, distinctive roles for different categories of participants), or the backgrounds of POPRC members and observers (e.g., affiliations, disciplinary expertise, etc.). Accounting for such contextual factors is essential to framing analysis, as the types of frames which are employed, and their effectiveness, will be heavily influenced by the setting in which a framer is attempting to promote his or her goals. Case studies allow for development of hypotheses and identification of causal mechanisms which are specific to a particular context.

The Stockholm Convention on Persistent Organic Pollutants was selected as the case study for this research because decisions to regulate chemicals (the decision taken by the scientific committee is the dependent variable in this study) are often controversial, in spite of indications that all chemicals proposed for listing pose risks to human health and the environment. By the time chemicals are proposed for listing in the Stockholm Convention, they have often been regulated locally and regionally, indicating that at least some countries have determined that the chemicals pose a significant threat to human health and/or the environment. The comparatively greater controversy associated with proposals to list live chemicals, as opposed to dead, suggests that non-scientific factors, such as current use, economic interests, etc., may be playing a role in the stages of discussion which are supposed to exclude non-scientific concerns. Thus, the dependent variable itself invites further scrutiny of this case. While selecting a case based on the dependent variable should be avoided in statistical studies, George and Bennett suggest that doing so in a single-case research project can facilitate identification of "potential causal paths and variables leading to the dependent variable of interest" (2004, p. 23). Following this logic, this research highlights three existing explanations for the contentious nature of discussions about some chemicals, and posits that these explanations are insufficient because they neglect the role of issue framing in science-based discussions. The established explanations fail to account for the ways in which participants may attempt to manipulate discourse at the earliest stages of policymaking to support their predetermined political agendas. The causal model shown in Figure 4.1 illustrates the role of framing in decision-making, positing that frames are independent variables, and the effectiveness of a frame is an intervening variable which shapes the outcome of the debate.

While analyzing the role of issue framing in other science-based environmental policymaking processes would be valuable for purposes of comparison and generalizability of findings, attempting to carry out such a comparison in the context of this research project would be virtually impossible due to the intensive, time-consuming methods necessary to conduct analysis of framing in live policymaking discourse. Furthermore, while single-case approaches are sometimes criticized for being unrepresentative or leading to indeterminate conclusions, this approach is not a weakness in this study. First, the findings of this study are not intended to be generalizable to all science-based global environmental policymaking. Rather, this study is designed to analyze the way issue framing is used within the context of global chemical regulation, and particularly within the Stockholm

Convention on POPs. This research builds on previous studies of issue framing by applying the concept to live policy negotiations, and contributes to science-policy studies by analyzing the ways in which science is translated into policy decisions. To achieve this goal, this research emphasizes the importance of contextual factors, and identifies issue frames which are specific to the policy discourse related to global regulation of persistent organic pollutants. As a contribution to the field, this research provides a fine-textured analysis of the role of issue framing science based policymaking, and could be used as model for similar studies of other science-based environmental policy contexts. It is crucial to emphasize, however, that issue frames are created within and are reflections of particular discursive contexts, and the frames themselves will not necessarily be relevant to other environmental issues. A significant exception to this may be issue frames relating to scientific uncertainty or evidence of harm, both of which are likely to be used in other environmental policy contexts (e.g., climate change, biodiversity, mercury pollution, etc.).

A strength of the Stockholm Convention as a case study for framing analysis is the opportunity it provides to conduct comparative, within-case analyses of chemicals that have been evaluated by POPRC in a given time period (for this purposes of this research, the analysis will concentrate on those chemicals evaluated between the Committee's second and fifth meetings – this is discussed in section 4.5.1 below). These chemicals vary in terms of type (e.g., pesticide, industrial chemical or unintentional by-product), current status of production and use, and availability and affordability of alternatives (see Annex A for a full list of chemicals and relevant details). This study analyzes discourse about both dead and live chemicals; chemicals which are of continued importance and those which have been out of use for decades. This range provides the opportunity to compare the way frames are used with reference to chemicals which are of varying levels of socioeconomic and political importance, thus facilitating identification of patterns in discourse which indicate the introduction of non-science-based preferences into decision-making.

Another strength of the Stockholm Convention as a case study is the opportunity it provides for observations of different stages of the decision-making process. As noted in section 4.4 below, four meeting reports published by IISD's Earth Negotiations Bulletin have been coded and analyzed, and three meetings of POPRC and two meetings of the COP were observed as part of this research. Within this timeframe, 12 chemicals were evaluated by POPRC, and while no chemicals have been permanently rejected by the Committee, neither have all nominated substances progressed at every stage of evaluation. Thus, the risk of explanatory indeterminacy that may be associated with single-case studies, as highlighted by King, Keohane and Verba (1994), is significantly reduced.

In summary, the Stockholm Convention represents a valuable case for analysis of issue framing because it offers multiple opportunities for observation of meetings, involves consideration of a range of chemicals of varying degrees of importance to Parties to the Convention, and includes participants with a wide range of disciplinary backgrounds and professional affiliations. Analysis of POPRC, in particular, will provide insights into the ways in which scientists may promote their preferences in the context of policymaking discussions that are expected to be free of the influence of political, social, and economic interests. The next section will set out the hypotheses that underpin this research, as well as the ways in which they can be tested. The subsequent sections will describe the methods used to conduct this research.

4.3.3. Hypotheses

Hypothesis 1: Scientists have policy preferences that they seek to promote during science-based evaluations of chemicals proposed for listing.

The notion that scientists have policy preferences, and are not entirely disinterested in the policy options for which their technical advice is sought, is a central tenet of science-policy literature, including the epistemic communities approach delineated by Haas (1992a). An important issue about which there is little agreement in the literature is the basis on which these preferences are formed. The epistemic communities approach suggests that scientists' policy preferences are derived from their technical expertise, and that scientists will step away from the policymaking table when faced with a flaw in their logic. If scientists do not temporarily withdraw from policymaking when confronted with such contradictory evidence, and instead continue to support a policy agenda which is not supported by evidence, their policy preferences must be derived from a source other than their technical expertise. In order to explain the role that scientists play in the policymaking process, the sources of scientists' preferences must be identified, as preferences derived from technical expertise are likely to differ significantly from those which are rooted in social or economic concerns.

This hypothesis can be tested through analysis of the interventions made by scientists in POPRC meetings, during which participants reveal their preferences for action by expressing support for or opposition to moving chemicals through the stages of evaluation which lead to recommendations for listing. All substantive interventions are recorded in ENB reports of the meetings, and these reports have been coded to allow for interventions to be categorized and counted. Interviews with members of POPRC and with observers of the process provide insights which help to explain patterns identified in the analysis of the ENB reports, as well as information about relationships among participants, any responsibilities scientists may have to the countries which have nominated them as experts for POPRC, etc.

Hypothesis 2: One or more epistemic communities of scientists and technical experts working within the context of the Stockholm Convention engage in coordinated action to promote their values-based agendas.

This hypothesis, which builds on the first, is premised on the idea that scientists and technical experts will have policy preferences derived from their interpretation of data. POPRC itself could form an epistemic community, or one or more epistemic communities could have developed within the context of POPRC's work. The latter possibility acknowledges that differences of opinion among scientists may be due to variations in their disciplinary practices and perspectives. For example, while toxicologists employ a bottom-up approach to evaluate risk by testing the levels at which a substance becomes harmful in isolation from other chemicals, epidemiologists use a top-down approach which involves identifying a human health or environmental problem (e.g., a leukemia cluster in a particular location), and then searching for possible causes. These variances in approach may lead scientists to different conclusions about the risks posed by particular substances, which may in turn be translated into dissimilar or opposing policy preferences. Thus, building on the epistemic communities approach delineated by Haas, this research will attempt to identify any epistemic communities which have formed in the context of the Stockholm Convention, and specifically among the participants in POPRC.

As noted in the literature review, identifying coordinated action among scientists is crucial to establishing the existence of an epistemic community; however, existing literature on epistemic communities provides little guidance as to the extent of coordination necessary to categorize a group of scientists as such. In other words, how many scientists constitute an epistemic community, and how much coordinated action is required to justify such a designation? Answering these questions requires evaluation of scientists' relationships with one another, as well as identification of their interests, areas of expertise and most importantly, the sources of their policy preferences. Thus, in this context of this research, the validity of this hypothesis can be tested through a combination of methods: first, the disciplinary background of each POPRC member must be identified. Second, analysis of POPRC discussions will facilitate identification of any patterns in interventions which could be linked to speakers' disciplinary backgrounds. Third, interviews with scientists are necessary to obtain insights into their relationships and motivations, which could support any conclusions derived from analysis of scientists' interventions. This multi-pronged approach will facilitate the kind of fine-textured analysis that is essential to accurately identifying the coordinated action among scientists that would be characteristic of an epistemic community.

Hypothesis 3: Scientists' policy preferences reflect the socioeconomic interests of their countries and determine their approach to debates within the policy process.

The causal model set out earlier in this chapter allows for the possibility that scientists' preferences are not shaped by their technical expertise or participation in an epistemic community, but instead reflect the socioeconomic interests of the countries with which they are affiliated. This hypothesis tests this possibility. Like Hypothesis 2, this hypothesis is established to identify the source of scientists' policy preferences. Understanding the reasons for interventions is essential for clarifying the respective roles of science and politics in POPRC's decision-making process.

The test for this hypothesis will require identification of the socioeconomic interests of parties to the Stockholm Convention, and consideration of the ways in which these parties are likely to be affected by the continued use, production, or regulation of a substance. This information can be compared with the frames and framing strategies utilized by the scientists affiliated with these parties. A positive correlation between the two factors (that is, the frames used by the scientists consistently advance the interests of their home countries) would support the hypothesis. This could be validated in two ways – first, the frames themselves support the interests of a scientist's home country; second, a scientist would intervene most actively in discussions on those chemicals where there is a clear country interest while expressing less interest in those substances in which their countries have limited or no socioeconomic interests in the continued production, use or regulation of the chemical in question. This hypothesis does not assume, however, that all countries have clear interests in each chemical under discussion or that scientists will intervene in all debates consistently.

Hypothesis 4: Scientists who promote their preferred policy agendas will use strategic issue framing to emphasize certain facts and considerations while deemphasizing or ignoring others.

In their roles as advisors to policymakers, scientists can frame their interpretations of technical information in ways that cause other participants' discussion of issues to reflect the interests and emphases of the scientists. This hypothesis assumes that actors are rational and seek dominance in determining how issues will be understood and considered by others. In other words, scientists seek to create masterframes, which define the ways in which issues are discussed and addressed by other participants.

This hypothesis can be tested by conducting a systematic analysis of the interventions made by participants in POPRC meetings, as captured in the Earth Negotiations Bulletin reports for each meeting. As described in detail below, each intervention will be coded, and patterns will be identified to help determine the preferences of various participants. The economic interests of parties and observers can be identified through reviews of documents such as the risk profile and online data searches for information about production and use of the each substance under consideration. The information gathered can then be compared with the interventions made by the affiliated scientists. Those scientists from countries with predetermined preferences for or against listing substances will have the greatest incentive to employ strategic issue framing, and will use frames which support their policy preferences (e.g., scientific uncertainty, precaution, etc.). Linking patterns of interventions to existing interests (either disciplinary, if the scientist is part of an epistemic community, or socioeconomic, if the scientist is representing the economic or social interests of the party with which he or she is affiliated) is the key to establishing a scientist's interest in each chemical undergoing evaluation. If scientists were neutral, systematic patterns based on country preferences would be unlikely; instead, interventions are likely to vary in accordance with the presentation and discussion of strengths and weaknesses of the data being evaluated. As indicated by the observation of POPRC meetings, as well as analysis of the ENB reports, scientists frequently make interventions which highlight both evidence for action and scientific uncertainty. However, if scientists are representing the interests of parties, rather than acting as disinterested arbiters of technical knowledge, their interventions will systematically and repeatedly align with the socioeconomic interests of the parties with which the scientists are affiliated.

Hypothesis 5: Systematic differences will exist between discussions related to dead chemicals (e.g., the 'legacy POPs') and live chemicals (substances which are currently produced and used by one or more countries).

This hypothesis follows naturally from Hypothesis 3 in positing that if debate were just about the scientific evidence relating to potential risks posed by substances under review, the patterns of framing among all chemicals, regardless of their economic value, should be similar. The Stockholm Convention does not distinguish between dead and live chemicals; parties nominating a substance must submit the same detailed evidence regardless of the chemical's current production or use status. Thus, scientific evaluation of the data should be equally as rigorous for all substances, without regard for the socioeconomic importance of the chemical. If scientists are using strategic issue framing to support preexisting policy preferences, the debate around live chemicals will be substantively different than that associated with evaluation of dead chemicals, reflecting the influence of parties' preferences.

This hypothesis can be tested by analyzing the interventions and frames used by participant to identify systemic differences in discussions of live and dead chemicals. (The breakdown of live and dead chemicals that have been reviewed by POPRC is included in Appendix A.) A systematic difference in the use of frames would indicate that participants had approached the debates differently, thus supporting the hypothesis that scientists are representing the pre-determined policy agendas of the countries with which they are affiliated.

Hypothesis 6: Elites with technical expertise will be affected only by strong frames, and will be able to identify and ignore weak frames.

As noted above, Chong and Druckman (2007b) use the terms “strong” and “weak” frames in a precise sense: strong frames “emphasize available considerations” and effectively change listeners’ perceptions of an issue, while weak frames are rejected and can even inadvertently cause listeners to give more support to competing frames than they would have in the absence of the weak frame. Thus, rational actors, attempting to create an effective rhetorical strategy will make use of frames that bring out considerations that their audiences consider relevant and avoid irrelevant considerations. In the context of POPRC, given the scientific background of participants, strong frames are likely to consist of technical information which supports or undermines a case for regulation, such as the underlying evidence of harm, or a lack of scientific certainty. While non-technical frames, such as emotional appeals about the harm caused by chemical pollution, may be compelling to non-expert audiences with little prior knowledge of POPs, in the context of scientific review, participants are likely to be most responsive to those frames which appeal to their scientific expertise. Furthermore, strong frames will invoke scientific evidence which is considered to be credible by other scientists; for example, data gathered using widely accepted methods, as opposed to either very new or outdated techniques. Thus, in the context of POPRC, “available considerations” will comprise references to technical information which is regarded as credible, based on accepted methods of data collection, and in keeping with the requirements for data outlined in the text of the Convention. Chong and Druckman (2007b, p. 109) argue that “motivation and ability…increase an individual's tendency to focus on the substantive merits of a frame in judging its persuasiveness." As highly motivated individuals with knowledge about chemical pollution, scientists are more likely to be influenced by strong frames, or those frames which use credible technical information to make compelling arguments, than by weak frames. Weak frames are those which emphasize information which is judged to be irrelevant or of little consequence. Not only will such frames fail to gain support, but Chong and Druckman (2007b) note that highly motivated individuals may actually react to the frames by moving away from the action it promotes, and increasing their support for the position advocated by a competing frame.

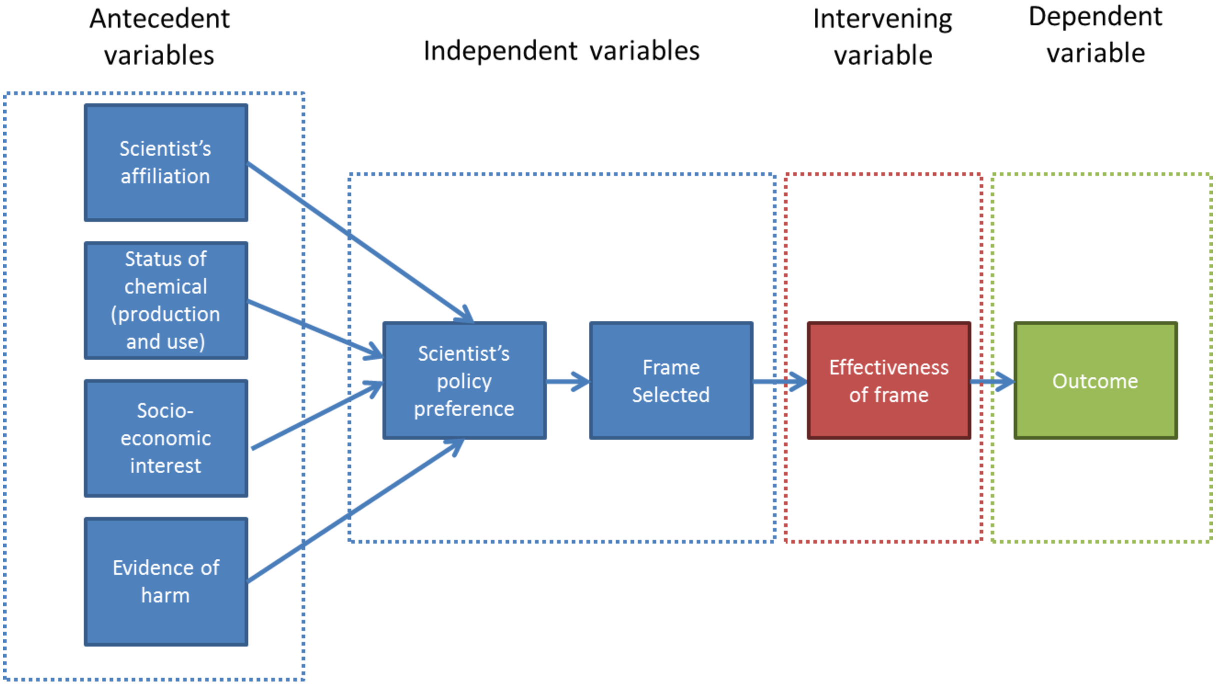
This hypothesis focuses on the strategies used by rational actors to promote their policy preferences. It is necessary to consider the relative strength and weakness of frames, as these characteristics underpin the effectiveness of framing strategies. Identifying patterns in success of frames will contribute to the depth of analysis by providing insight into the influence of framing on science-based policymaking, the reasons for the effectiveness of different types of frames, the possible importance of the professional background/expertise of the speaker, and the types of evidence which are considered to be important by other participants.

Taken together, these six hypotheses examine the links within the causal model illustrated in Figure 4.1. In testing these hypotheses, this research will demonstrate whether strategic issue framing is a tool that can be used by scientists to influence the outcome of the earliest stages of the policymaking process, and therefore add a critical component to analysis of why some chemicals progress smoothly through the regulatory process to listing in the Stockholm Convention while others, which present similar risks, do not. The causal model, which illustrates the relationships among the variables which underpin this research, is discussed in the next section. This is followed by a discussion of the data sources (section 4.4) and methods used to test these hypotheses (section 4.5).

4.3.4 Causal model and variables

This research hypothesizes that scientists have policy preferences which they seek to promote using strategic issue framing. Scientists' preferences will be influenced by their affiliations, either with an epistemic community (which means that scientists' preferences would be derived from and defined by disciplinary expertise), or with a government or NGO which may seek to use the scientist to represent its non-science-based interests. Scientists with policy preferences will use strategic issue framing as a tactic to promote and achieve their preferred outcome (which depends on the chemical under consideration). Thus, discourse about a given chemical may be characterized by competition among frames, as participants seek to establish a masterframe and thereby shape the way an issue is perceived and addressed. The interplay of competing issue frames means that, in order to achieve a detailed and accurate analysis of the way frames are used to support policy preferences, it is necessary to identify the relative effectiveness of frames. Importantly, more than one frame in a given discussion (or set of discussions) can be effective; thus, the effectiveness of a frame does not automatically or invariably correlate with the policy outcome. This particular scenario is clearly illustrated by the case of SCCPs, which is examined in detail in Chapter 7. The role of frame effectiveness as an intervening variable is discussed in more detail below. For ease of reference, the causal model is presented again here.

Figure 4.1 The Causal Model



Scientists' affiliations, the status of production and use of a substance, and the data presented as evidence for or against regulation can be categorized as antecedent variables, as each of these factors precedes the formation of scientists' policy preferences. The two independent variables are scientists' policy preferences and the frames they select to promote those preferences. The dependent variable is the outcome of discussions at each stage of review, which will be a decision to take one of three possible actions: 1) advance the substance to the next stage of evaluation, 2) decide the criteria for regulation are not met, thus ending review and removing the chemical from POPRC's agenda, or 3) defer further consideration of the chemical for a set period of time (each of these actions will be discussed in greater detail below). The determining factor in the role of strategic issue framing in science-based policymaking is the *effectiveness* of frames. Effectiveness, in this context, refers specifically to the degree to which frames are adopted and repeated by other participants. The degree to which frames resonate with POPRC members may vary, with some frames being adopted by other participants, while others receive little support or are ignored entirely. Thus, the relationship between a frame and the outcome of the debate is determined by the intervening variable of frame effectiveness. Identifying the relative strength of frames is critical in a competitive environment in which actors are attempting to use different framing strategies to pursue disparate or opposing aims, as not all frames will have equal impacts on debate (Chong and Druckman 2007a). This issue is discussed in more detail below.

a) Antecedent and independent variables

As the causal model illustrates, there are two independent variables in this analysis: 1) the policy preferences of scientists, and 2) the issue frames they employ to support those preferences. In framing studies, the most important independent variable is the frame, or the description of an issue (Chong and Druckman 2007a). In the context of this research, descriptions that support or undermine the case for listing a nominated substance are identified as issue frames. (These frames are discussed in detail in section 4.5.3 below; how the effectiveness of a frame may be measured is discussed in section 4.3.5.) These descriptions are designed to influence the course of debate and win support for the speaker's preferred policy decisions by emphasizing certain aspects of the issue while deemphasizing others. For example, issue frames may highlight the risks to human health and the environment from the continued use of a substance, or they may highlight gaps in the evidence in an attempt to undermine the case for regulation. The preferences of those using the frames may be shaped by antecedent variables, including: 1) scientists' affiliations (nationality, employment, and/or discipline), 2) the status of production and use of the chemical (is the chemical dead or live?), 3) the socioeconomic interests of the parties and observers who participate in POPRC's work, and 4) the data presented for evaluation. Affiliation with a particular country, company, or organization is a critical variable if scientists' preferences are influenced by their participation in an epistemic community, or, alternatively, if they are acting as representatives of the interests of stakeholders (e.g., parties to the Convention), rather than as independent, disinterested technical advisors without predetermined policy preferences. In addition to analysis of the interventions made by scientists during POPRC meetings, interviews have been conducted with participants (both POPRC members and observers) to identify the coordinated action which would indicate the existence of an epistemic community. Furthermore, the socioeconomic interests of the parties can be compared to the interventions made by scientists in order to identify any correlation between a scientist's support for, or opposition to, POPRC's decision to recommend or set aside a nominated substance.

b) Dependent variable

The dependent variable is the outcome, or the course of action POPRC selects at each step of its decision-making process. This can be measured by identification of the decisions POPRC makes at each stage of its evaluation of a particular substance. At every meeting, POPRC will take one of three actions for every chemical under discussion. The Committee may: 1) defer discussion to the next meeting, 2) advance the chemical to the next phase of evaluation (or recommend the chemical for listing), or, 3) if the Committee determines that the substance fails to meet the criteria for listing, it may set aside the proposal, thus ending POPRC's review of the chemical (the substance could be nominated for further evaluation, but to reintroduce a chemical, a Party would have to submit a formal request to the COP, which could then decide to instruct POPRC to reconsider its evaluation. To date, this step has not been taken, as no chemicals have been rejected by POPRC). POPRC's choice of action has been identified for each chemical under discussion in each meeting analyzed for this research (POPRC-2, -3, -4, and -5).

c) Intervening variable

The relationship between a frame (an independent variable) and the decision made by POPRC (the dependent variable) is determined by an intervening variable: the effectiveness of the frames employed by POPRC participants. The goal of any participant who engages in strategic issue framing is to influence POPRC's decisions, and the outcome of each stage of review is the ultimate reflection of the success or failure of a particular way of framing the issues being discussed. To influence the outcome, actors need to win support. This can be achieved by strategically framing issues in ways that resonate with other participants. To fully understand the role of issue framing in POPRC's decision-making, it is critical to look not only at the outcomes themselves, but also at the discourse which led to POPRC's choices. A frame (the independent variable) will not automatically lead to an outcome (the dependent variable); the frame must resonate with the audience and thus be effective in garnering support (Chong and Druckman 2007a). Even effective frames – those which garner support from the audience and are adopted by others – may not achieve dominance, or become a masterframe, as they may be countered by an equally effective frame that supports a different outcome (as illustrated by the case of SCCPs). Importantly, effectiveness is purely a measure of support for a frame; it is not a measure of success. An effective frame may be unsuccessful at achieving a given outcome, due to the introduction of one or more competing frames. Evaluating the effectiveness of frames is important because discourse may be shaped by competition between two or more frames.

This intervening variable is important to an analysis of framing in a competitive environment because it helps us to determine which types of frames may be successful. This approach is predicated on the assumption that scientists and technical experts actively engaging in the evaluation of evidence will not be swayed simply by the frequency with which a frame is presented (the "loudness" of a frame); rather, in this context, a frame's "strength" will determine its success. Chong and Druckman argue that a frame's strength increases when "it comes from a credible source…resonates with consensus values…and does not contradict strongly held prior beliefs" (Chong and Druckman 2007b). Thus, the intervening variable in this causal model is consistent with the approach taken by Chong and Druckman (2007b). The importance of a frame initiator's credibility to the success of a framing strategy is addressed in Hypothesis 6.

The effectiveness of frames can be determined through analysis of the interventions made by participants during POPRC's discussions. If a frame is adopted by other participants, such that these individuals express support for the concerns raised by the frame initiator or use the frame themselves, the frame can be considered to be effective in highlighting certain considerations while deemphasizing or ignoring others (Benford and Snow 2000). Once the frame has been adopted by other participants, the focus of discussion has changed to highlight the considerations emphasized by the frame. By coding the interventions made by scientists in POPRC's discussions, it is possible to identify frames and trace their effectiveness in: 1) shaping subsequent discourse, and consequently, 2) highlighting a subset of considerations that are given more emphasis, time, and consideration in the decision-making process.

4.3.5 Categorizing the effectiveness of issue frames

For the purposes of this research, the effectiveness of frames can be broadly categorized as ineffective, moderately effective, or highly effective. The measurement of effectiveness is the extent to which a frame is adopted and repeated by others. Empirically, this can be achieved through coding of interventions made by delegates during POPRC meetings, which are recorded in detail in the Earth Negotiations Bulletin reports (see section 4.4.1). By looking at the number of times a frame appears and its use by a narrow or wide group of participants, one can measure the effectiveness of a frame.

While the effectiveness of a frame depends on the support it garners among other participants within the debate, its *influence* actually refers not to the number of times a frame is repeated by other participants, but to the action taken by POPRC at the conclusion of its discussion of a particular issue. Two competing frames may be highly effective, but only one will be reflected in a final decision, thus becoming a masterframe. An effective frame may not automatically lead to a particular outcome, due to the presence of other effective frames in a discussion. This is particularly applicable to controversial discussions in which two or more factions are promoting opposing views, as is the case in discussions of many of the live chemicals currently being evaluated by POPRC. Since a frame is considered to be influential when it leads to an outcome consistent with its message, (e.g., an influential frame emphasizing scientific uncertainty would lead to a chemical being delayed or dropped from consideration for listing), analytically, a frame's influence is not distinct from the outcome. Therefore, the influence of a frame is not considered as a separate variable within the causal model set out in Figure 4.1 above. Not including a variable specifically accounting for a frame's influence, and strictly limiting the measurement of a frame's effectiveness to the support it garners among other participants, reduces the risk of circular reasoning. Such logic would suggest that a frame is considered to be effective because it influences an outcome, and an outcome is achieved because a frame is effective. In this causal model, frames that resonate with others and win support are considered to be effective. However, even effective frames do not automatically lead to particular outcomes. Rather, outcomes are the products of policy debates that may be shaped by the interplay of several effective frames. This approach thus emphasizes that all frames are not equal, and that even effective frames may be matched or countered by other effective frames.

Frames introduced to POPRC discussions may achieve varying levels of effectiveness. If a frame introduced by one participant is ignored by all others (e.g., it is not repeated by other participants or considered during discussions), it can be categorized as ineffective, as it has failed to have any impact on the discussion. If a frame is repeated or supported by other participants, it has been effective in its impact on the course of discussion. However, the degrees of effectiveness may vary. The following section will delineate the varying levels of effectiveness of issue frames, which can be determined by identifying specific responses to the introduction of an issue frame to policymaking discussions. This proposed categorization is derived from and directly applicable to POPRC's decision-making process, but is likely to apply to science-based decision-making processes in other global environmental negotiations (e.g., the current negotiations to establish a global, legally-binding instrument on mercury, as well as established institutions such as the Montreal Protocol on Substances that Deplete the Ozone Layer and the United Nations Framework Convention on Climate Change).

As noted, the first category of frames includes those which are ineffective. These frames are neither adopted nor addressed by other participants, and therefore fail to influence the course of discussions. The second category of frames consists of those with a low level of effectiveness. This category includes those frames which are discussed or adopted by other participants, but may be successfully countered by another frame during subsequent discussion (the success of a counterframe would be subject to the same measures of effectiveness, and may either match or exceed the success of the previous frame). For example, one participant may raise concerns about scientific uncertainty, which may lead other participants to introduce new evidence or to emphasize the strength of existing data. The first frame could be considered to have achieved a low level of effectiveness, as it has been adopted by others and has influenced the course of discussions.

Alternatively, a moderately effective frame will be repeated or adopted by other participants, thereby shaping the course of discussion, but may be countered by other frames which are supported by a different subset of participants. While one frame could achieve dominance by winning the support of most or all participants, it is possible that neither frame (assuming there are two) will trump the other. This is the situation with SCCPs, for example, as Chapter 7 will illustrate with a meeting-by-meeting analysis of discussions of this substance. In this case, the issue has been reintroduced year after year in POPRC, with approximately half the committee employing frames that emphasize scientific uncertainty, and the other half highlighting a need for precautionary action. In this case, no frame has achieved dominance, and the Committee is unable to move forward with its decision making. This is an example of competition between two moderately effective frames, neither of which is compelling enough to win broad support among participants. Despite the fact that neither of these frames have led to a decision (either to recommend or reject a proposed chemical), the frames have effectively shaped the discourse in ways that have benefitted opponents. Deferrals of decisions are designed to give Committee members time to address the issue(s) emphasized by the frame(s). Such deferrals fall short of a definitive decision on a substance, but may have a significant impact on the potential time-frame for regulation. Delays in POPRC's evaluation process may result in recommendations being made to later meetings of the COP than would occur if a chemical progressed through POPRC's evaluation process, which envisions each stage of review being completed in the course of one year, as has been the case with most of the chemicals reviewed to date (with the notable exception of short-chained chlorinated paraffins (SCCPs), which, as of this writing, have been held in the same stage of evaluation for four years. The role of strategic issue framing in discussion of SCCPs will be analyzed in this thesis). For example, a one-year delay in POPRC's evaluation process could cause the Committee to submit a recommendation not to COP-7, which is scheduled to be held in 2013, but to COP-8, which will be held in 2015. Such delays could translate into a minimum of two additional years during which a chemical is not regulated by the Stockholm Convention, which can be economically valuable for producers and users of the substance. In this sense, moderately effective frames could be considered to be successful by those participants who wish to delay or avoid regulation of a particular chemical.

A highly effective frame will garner widespread support among participants within a debate Empirically, highly effective frames can be distinguished from moderately effective and ineffective frames through identification of their use in the statements made by other participants and observers. Highly effective frames engender a shift in discourse by achieving a high degree of resonance with other participants, and thus win broad support. As part of an analysis of the course of decision-making, it will be possible to trace the course of decision-making and identify the points at which frames are adopted by other participants. These points can be identified as critical junctures in decision-making, as they influence subsequent choices and signal an informal choice of the Committee.

The categories of framing effectiveness are delineated in Table 4.1 below.

Table 4.1 The categories of framing effectiveness

Degree of effectiveness	Description
Ineffective	Frame is not repeated or adopted by other participants
Low	Frame is adopted or repeated by one or more participants
Moderate	Frame is adopted by other participants and is not definitively countered by other frames
High	Frame is adopted by other participants. A highly effective frame may be successfully countered by another frame introduced later in the process.

4.4 Data Sources

In order to identify issue frames and accurately assess their impact on the course of policy discussions, it is necessary to collect data from a variety of sources that can provide insights into the way discourse can be used to promote political goals. Data will be drawn primarily from two sources: The Earth Negotiations Bulletin (ENB) coverage of meetings of POPRC and the COP, and interviews with participants. Reports produced by ENB will be used to identify and code frames, while interviews with POPRC members and observers will be used to gain insight into participants' interests and perceptions of the decision-making process. Supplementary data include meeting reports published by the Secretariat, which are used to verify the accuracy of ENB reports, official documentation from meetings (including conference room papers, information documents, decision documents, etc.), and position papers and other relevant materials published by participants. The nature, benefits and limitations of these sources of data are set out in the following sections.

4.4.1 The Earth Negotiations Bulletin

With funding from a number of national governments (including, but not limited to, the USA, the UK, Finland, New Zealand, and Japan), the European Commission, the United Nations Environment Programme (UNEP), and the World Bank, among other donors, ENB provides comprehensive, nonpartisan coverage of meetings of POPRC and the COP (as well as of several other environmental negotiations which are not addressed by this research). ENB summaries report all substantive interventions made during plenary sessions with reference to each issue addressed by the Committee or Conference, as well as the actions taken (e.g., decisions) during each meeting. These reports are significantly more detailed than the meeting reports produced by the Secretariat, which reflect decisions made and agenda items discussed during the meetings in general terms: they summarize key points and do not attribute statements to specific participants. While meeting reports produced by the Secretariat are useful for verifying the course of events in a meeting, their deliberately vague, diplomatic style significantly reduces their value in a study of framing in policymaking discourse. In contrast, ENB reports capture the statements of participants in a manner which is close to word-for-word. According to one senior editor with the organization, "we like to say that every word written in an ENB report can be attributed to someone else."[3]

ENB reports are the most detailed meeting records available, and are generally perceived by meeting participants to be comprehensive and reliable records of the proceedings. Several interviewees noted that they submit the ENB summaries as their official reports to their home governments, corporate offices, etc., following each meeting. The credibility of ENB reports is

[3] Spence, Chris. Deputy Director, IISD Reporting Services. Interviewed by telephone. 28 June 2008.

bolstered by their public availability and the ease with which participants can report mistakes. ENB summaries are published online, on webpages designated for each meeting, and are subject to scrutiny by all who participate in the meeting. If reports were to include any errors, these are likely to be identified by participants and corrected if necessary. Participants have a significant incentive to correct any mistakes or misrepresentations of their statements, because these reports are permanent records of meetings and, as noted above, are widely used both by participants and by individuals who cannot attend the meetings but are interested in following events. For example, AGROW News, an online news source for the agricultural chemicals industry, used ENB's coverage of POPRC-6 as its only source in an article regarding Endosulfan (Beer 2010). It is worth noting that no errors have been reported in any of ENB's POPRC coverage.

Because ENB reports provide chronological coverage of POPRC's discussion of each chemical, they can be used to trace the introduction and development of issue frames. They also provide detailed reports about decisions made at each stage of consideration by both POPRC and the COP. A text sample from an ENB report from POPRC-4 has been included below to illustrate the style of reporting, and for further reference, a complete report has been included in Annex C. Both of these samples provide a clear indication of the type of data provided by ENB reports. The following selection was taken from ENB's summary of a discussion of SCCPs which took place during the fourth meeting of the POPs Review Committee (13 - 17 October 2008):

> France, with Sweden and Switzerland, noted that there is enough information to conclude that SCCPs may produce adverse effects on the environment. China emphasized that the risk profile must focus on the migratory effects of SCCPs. India questioned whether the substance fulfills the criteria in Annex D and Annex E and strongly opposed any move toward global action. Japan stated that more scientific evidence was needed before SCCPs could be categorized as POPs. A representative of the Indigenous Environmental Network and Alaska Community Action on Toxics noted that while SCCPs are not used in the Arctic, they are present in the environment and in humans, and called upon the Committee to consider the health implications of SCCPs for people living in the region. India stated that in the absence of evidence of adverse effects on human health, SCCPs do not meet the criteria for regulation. Arndt reminded the Committee that it must decide whether a chemical is likely to lead to adverse

> effects on either human health or the environment, not necessarily both (Kohler et al. 2008, p. 8).

This selection illustrates the way participants' interventions (e.g., statements, comments, questions) are recorded in ENB reports. As this paragraph demonstrates, the ideas and arguments advanced by each participant are captured and summarized, not quoted. This style is compatible with a study of issue framing (the methods used to code these reports will be discussed later in this chapter), as it summarizes the key message and attributes each statement to the speaker. This allows for identification of the speaker and frames, and also facilitates the tracing of the course of discussion from introduction of an issue to the Committee's decision at each stage of review. The categorization of frames is discussed in detail below (see section 4.5.3).

While ENB reports represent the most detailed records of meetings available, as data sources, these reports have two significant limitations. First, in accordance with strictly-enforced UN rules, ENB's reporting of interventions is restricted to statements made during plenary sessions. While ENB writers frequently observe non-plenary meetings (e.g., working group sessions), interventions made during meetings of contact or drafting groups may not be recorded by ENB or any other entity. Discussions held in these informal sessions are not essential to a study of issue framing, as the key points are repeated in plenary sessions, but the less guarded discussions in these groups can provide great insight into participants' interests, preferences, and motives.

Second, while ENB reports reflect interventions in a manner that is as close to word-for-word as possible, the writers shorten statements to highlight what they consider to be the key points. ENB reports cannot be used or interpreted as precise transcripts of meetings. Rather, these are condensed summaries of meetings, and it is important to recognize the human intervention between speakers' statements and the way those statements are reflected in ENB reports. While direct transcripts of meetings would be ideal sources of data for analysis, such records are not produced for UN meetings (indeed, audio recording of meetings is prohibited by UN rules).

Thus, ENB reports are the best available records of the interventions made during each meeting. As noted above, their content is appropriate for a study of issue framing, as this type of framing is based on themes of argumentation rather than the precise word choices that would be subject of analysis in a study of equivalency framing. This research project seeks to identify the influence of the strategic presentation of ideas, reasons, and evidence in a way that is intended to shape others' perceptions of what matters by highlighting certain elements of an issue while deemphasizing others. In the absence of transcripts of full meetings, ENB reports provide the best records of participants' statements (and therefore the frames they employ during debate), the way events unfold over the course of each meeting, and the decisions which are made by the conclusion of each session. They capture the substantive interventions, are subject to scrutiny by participants, and are widely considered to be reliable and accurate reports of the proceedings. As such, they provide useful data for analysis of the role of strategic issue framing in the context of UN environmental negotiations.

4.4.2 Formal interviews

A second important set of data consists of interviews with participants in the work of the Convention. Interviews have taken two distinct forms, including 12 semi-structured, formal interviews, and an estimated 300 informal, unstructured interviews conducted during meetings of POPRC and the COP (POPRC-3, -4, and -5, and COP-3 and -4). All interviews were conducted with the aim of gathering information about participants' views of the decision-making process, including their roles within this process, their relationships with others, and the issues which they consider to be of significance. However, the structure and format of the two categories of interviews differed significantly. The formal interviews were conducted either by telephone or in person, and were based on a set of basic questions which were adapted according to the interviewee and the themes he or she raised during each interview. In contrast, the informal interviews were entirely unstructured. These interviews took place during meetings of the COP and POPRC, and often focused on specific issues that were being discussed at that point in time during the meeting. These interviews provided useful information about the policy process and issues being discussed, as well as insights into participants' motivations, perceptions of others' motivations and interests, and views of the policymaking process as it was occurring.

a) Selection of interviewees

Potential interviewees for both formal and informal interviews were selected on the basis of POPRC role (member, observer, Secretariat, etc.) and affiliation (country, employer, etc.). In order to ensure that the interviews would be as representative as possible of POPRC participants, special attention was given to requesting interviews with people representing each of the categories of observer (government, environmental and/or public health NGO, and industry). With respect to both POPRC members and observers, requests for formal interviews were sent to participants from a range of geographic regions, and from high, middle and low income countries. (Unlike other international environmental agreements, such as the Kyoto Protocol, the Stockholm Convention does not officially classify countries based on economic development; for the purposes of ensuring appropriate coverage of interviewees, the World Bank classification of high, middle and low income countries was used[4]). The official participant lists from POPRC-3 and -4 were used as bases for the requests for formal interviews (UNEP/POPS/POPRC.3/INF/28.Rev.1 and UNEP/POPS/POPRC.4/INF/23), as were the subsequent recommendations of individuals who

[4] The list of countries in each of these groups can be viewed here http://data.worldbank.org/about/country-classifications [Accessed 14th February 2011]. The World Bank states that its "main criterion for classifying economies is Gross National Income (GNI) per capita." Classification of the Parties to the Stockholm Convention and observer countries is set out in Chapter 5.

responded to interview requests. These recommendations were particularly helpful as, in two instances, they led to interviews with people who had been involved in intergovernmental negotiations to create the Stockholm Convention, as well as early stages of its implementation.

In total, 53 requests for formal interviews were sent to participants via email, and 19 responses were received. A small number of these responses did not culminate in interviews: in two cases, industry representatives asked to see a list of possible questions before the interview, and then declined to participate due to concerns about violating company policies. In four other cases, people responded positively to the initial request for interviews, but did not respond to subsequent requests to finalize times. Thus, the 12 formal interviews which were conducted were fewer than initially anticipated, and represented a response rate of less than 25 percent. While the response rate was lower than expected, it nevertheless achieved broad coverage in that the final list included representatives from at least one low, middle and high income country; a balance between POPRC members and observers; and representatives of both industrial and environmental groups. The names of interviewees, dates of interviews, country affiliations and roles within POPRC are delineated in Table 4.2 below.

A number of issues might have negatively affected the response rate to requests for formal interviews. First, many participants in the work of the Stockholm Convention do not speak English fluently or at all. This may have led to outright rejections of the idea of an interview, if the request was even read. Second, many participants from low or middle income countries may have limited access to email. A third factor to consider is that these interview requests were sent to elite actors who have many responsibilities, travel frequently, etc. It is likely that many of these individuals simply were not interested or could not take the time to give an interview. All of these possibilities are confirmed to some extent by the largely positive responses received when participants were asked in person for informal or formal interviews. Many agreed to give various amounts of their time during meetings, saying that it would be more convenient to have the interview during the week of the meeting than to try to arrange a time when they were back in their workplaces and home countries.

b) Conducting the interviews

The formal interviews were conducted in person and by telephone, and ranged in length from 30 minutes to over two hours. All but three were recorded, with the permission of the interviewees, and subsequently transcribed. Two were not recorded at the request of the interviewees, and the third unrecorded interview was held in a location in which the high level of background noise rendered a test recording unintelligible. A table listing the interviewees, dates, affiliations of interviewees, and other relevant information is presented below.

Table 4.2 List of formal interviewees

Interviewee	Date	Location of Interview	Affiliation	Area of expertise	POPRC Role	Recorded
Arndt, Reiner	08/04/2008	Via telephone	Germany	Chemistry	Member (Chair)	Yes
Asare-Danso, Robert	22/11/2007	Geneva, Switzerland	Health Canada	Chemical regulation and policy	Observer	Yes
Bouwman, Henk	22/01/2008	Via telephone	South Africa	Zoology	Member	Yes
Harris, Mike	11/05/2007	Via telephone	Industry consultant	Chemistry	Observer	Yes
Rae, Ian	29/01/2008	Via telephone	Australia	Chemistry	Member	Yes
Saoke, Paul	19/09/2007	Nairobi, Kenya	International POPs Elimination Network (IPEN)	Epidemiology	Observer	Yes
Trewhitt, Mark	18/11/2009	Via telephone	CropLife International	Chemical regulation and policy	Observer	No
Wahlström, Bo	12/12/2007	Via telephone	Sweden	Zoophysiology and toxicology	Member	Yes

Whitelaw, John	10/01/2008	Via telephone	United Nations Environment Programme	Chemical regulation and policy	Observer	Yes
Willis, Jim	29/10/2007	Washington, DC	United States Environmental Protection Agency; former member of Stockholm Convention Secretariat	Chemical regulation and policy	Observer	Yes
Ylä-Mononen, Leena	08/05/2008	Via telephone	European Commission	Environmental science and chemicals risk management	Member	Yes
Yormah, Thomas	27/11/2009	London, UK	Sierra Leone	Chemistry	Member	No

The formal interviews were semi-structured and covered topics such as the roles played by different groups in decision-making (e.g., environmental NGOs, industry, etc.), relationships between POPRC members and observers, and the weight given to scientific information in comparison with socioeconomic concerns. The questions used to guide the interviews, listed in Appendix D, were emailed to participants prior to each interview. These questions were not asked in the same order or in exactly the same way in every interview, and prior to each interview, some questions were added that would draw on the particular expertise or perspective of the interviewee. However, every interview covered the same general themes, as well as other issues which the interviewees raised in the course of the conversation.

The formal interviews provided valuable insights into the process, the perspectives of participants on their own roles and the roles of others in decision-making, the crafting of the Convention, and the careful balance that is usually struck between the diplomatic norms which guide UN negotiations and scientific evaluation. While the response rate to interview requests was lower than anticipated and was initially a concern, the incremental value of these lengthy conversations eventually decreased, particularly in comparison with the value of the informal interviews that could be conducted during meetings. During the formal interviews, respondents tended to be very careful about presenting information in a quotable, diplomatic way, whereas during informal interviews, participants were much more relaxed and open with their views. Furthermore, while formal interviews provided valuable information about the fundamentals of decision-making in POPRC, informal interviews were more useful for eliciting responses to specific circumstances, insights about events that were unfolding, etc.

4.4.3 Informal interviews

As previously noted, a large number of unstructured, informal interviews took place during meetings of the COP and POPRC. Using a recording device for these interviews would have been inappropriate, as these interviews frequently consisted of conversations with participants in the hallways between plenary sessions, in contact group meetings, etc. In lieu of audio recordings, notes were made during or immediately following the interviews. These informal interviews provided a wealth of information regarding participants' perceptions of the decision-making process, their priorities and concerns, etc., as well as information about what happened in closed-door meetings, in intersessional working group communications, etc. Information gleaned during these interviews provided valuable insights into the preferences of participants, and helped to contextualize the positions individuals took during discussions of science and socioeconomic issues.

Awareness of the ethical implications of using information gleaned from informal interviews was critical to the integrity of this research. While my identity as a PhD student conducting interviews for the purposes of doctoral research was made explicit in formal interviews, first via the interview request and then at the beginning of each interview, when I briefly summarized my research, informal interviews were less structured. Participants in informal interviews did not receive a written request for an interview that stated my identity and research interests. Rather, informal interviews were, by nature, conversational, frequently unscheduled, shorter, and more casual than formal interviews. In order to protect the interests and privacy of the interviewees, it was incumbent upon me to ensure that the purpose of the interviews and my role as a PhD research were made explicit. Thus, my dual role as a writer for the Earth Negotiations Bulletin and a PhD researcher affiliated with the London School of Economics was made explicit to each interviewee. My affiliation with ENB was clearly stated on my official, Secretariat-issued pass/nametag, which I wore at all times during meetings (as did all participants). I was also seated with ENB at a table in the front of the conference room, and was thus clearly visible to all participants as a member of the ENB team. In interviews, I consistently explained my role as a PhD student and gave a brief description of my research before asking related questions, thus making my aims and interests explicit to the interviewees. Thus, my role as a researcher was overt.

Furthermore, ethics require the preservation of the anonymity of interviewees (Kawulich 2005), both in cases when they requested confidentiality and when the information shared could be detrimental to their relationships with others or to their reputations. This was a particularly sensitive issue in informal interviews, as the casual nature of these interactions meant that people may have been less “on guard” than they would have been during formal interviews. I developed rapport with several members of POPRC over time, as I participated repeatedly in meetings, and in many cases, the information shared became increasingly sensitive from a political or confidentiality perspective. Such information contributed to my understanding of the process and policymaking context, but has not been explicitly included in this thesis. A limited number of anonymous quotes from formal interviews and email exchanges were used, and these were only used with the explicit recorded or written permission of the interviewees.

In addition to repeated informal, face-to-face interviews conducted during meetings, seven interviewees responded to follow-up questions via email. The date and context of each interview have been noted when interviewees are quoted in this research. While all interviewees quoted gave permission for their remarks to be used in this research, some preferred to remain anonymous with regard to some or all of the observations and opinions they shared. The most common reasons for speaking on the condition of anonymity included: 1) concern about violating an employer's rules, 2) the information shared referred to events which occurred during closed-door meetings, and 3) the observations referred to other participants' motivations or interests. Given the importance of transparency and replicability, anonymous quotes have been used sparingly in this research, and are included when they provide particularly interesting insights into the decision-making process. The table below provides an overview of the individuals who shared information anonymously. Several of these interviewees shared information repeatedly throughout the research process, and the dates of communication and other contextual details have been cited in footnotes throughout this thesis.

Table 4.3 Anonymous Interviewees

Interviewee	Role/Affiliation	Affiliation
A	Industry Observer	High Income Country
B	POPRC Member	High Income Country
C	POPRC Member	Middle Income Country
D	POPRC Member	Low Income Country
E	POPRC Member	High Income Country
F	POPRC Member	High Income Country
G	POPRC Member	Middle Income Country
H	Industry Observer	High Income Country

Note: Countries have been classified based on the World Bank country income classification system. This is described more fully in Chapter 5 (see especially Table 5.1).

Both the formal and informal interviews provided valuable information about the policymaking process. The informal interviews were far more representative of POPRC participants than the formal interviews, primarily because many participants who had not responded to formal interview requests were often willing to engage in these informal conversations at a moment's notice. When asked about the possibility of conducting a formal interview after the meeting, many of these participants demurred, citing issues like busy schedules or, in the case of many participants from least developed countries, poor internet or telephone connections. Others noted that, because English is not their first language, they found it easier to have conversations in person. Given the full agenda of work at POPRC, conducting lengthy formal interviews during the meeting would not have been possible. Thus, informal interviews were frequently the only means of discussing issues with most participants. Given the limitations imposed by the international nature of the participant group, the data provided by interviews cannot be considered to be fully representative of participants. No participants from Asia or Latin America agreed to participate in formal interviews. However, the interviews did include participants from developed and developing countries, as well as delegates from environmental/public health NGOs and industry.

4.4.4 Participant observation

As noted above, a crucial part of the research for this project included observation of meetings of both POPRC and COP. The author attended POPRC-3, -4, and -5, as well as COP-3 and -4, for the purposes of gathering information for this research. These meetings took place between 2006 and 2009. It is important to note that the author attended COP-4 and POPRC-4, and -5 as a writer with the Earth Negotiations Bulletin team, which provided the coverage which is being used as a primary source of data. All interviewees were informed of this dual role, and only information obtained with the explicit permission of the interviewee for use in this research project has been included in this analysis.

Participant observation played a crucial role in this research, as it facilitated much more detailed understanding of the process and negotiations than would have been possible if research had been conducted using only analysis of documents and interviews with participants. According to Becker and Greer, participant observation allows researchers “to know what orders of information escape us when we use other methods" (Becker and Geer 1957, quoted in Gaskell 2000, p. 44). For this research, participant observation enhanced the value of other data sources (e.g., formal and informal interviews and analysis of ENB reports) by providing insight into the context in which decisions are made. Being on-site for meetings created valuable opportunities for informal interviews with participants, and also allowed the author to understand the dynamics of negotiations, in terms of both procedure and tone, in a way that would not have been possible if the analysis had been conducted without personal observation of the proceedings.

The value of participant observation is illustrated in part with reference to the limitations of other forms of data collection. In particular, Becker and Geer (1957, quoted in Gaskell 2000) highlight three limitations of interviews as data sources, all of which "arise from the fact that the interviewer relies on the informant's account of actions that occurred elsewhere in space and time" (Gaskell 2000, p. 44). If a researcher were relying entirely on interviews for information about a particular process or situation, the interviewer may not have an adequate understanding of the background or context for the answers provided by the interviewee. According to Gaskell, the first limitation is that "the interviewer may not fully understand the 'local language': the connotation of some ordinary terms may be quite different" (Gaskell 2000, p. 44). This is certainly the case for analysis of the proceedings of POPRC, which involve two kinds of specialized language: first, the language of science-based evaluations (understanding discussions necessitated understanding the meanings of terms and phrases like bioconcentration, long-range environmental transport, lipophilic, etc.), and second, the diplomatic and procedural language of UN negotiations (e.g., what is meant by a proposal to "set aside" a chemical). Being present at the meeting enabled the author to observe the process in action, and also provided opportunities to discuss technical issues with a range of experts. Increased familiarity with and understanding of the "language" of POPRC discussions enabled the author to follow the complex technical points raised by interviewees without needing to ask for explanations of what they would consider to be basic concepts. This enhanced both the flow of the interview, as it minimized interruptions and allowed the interviewee to elaborate on points which he or she felt inclined to discuss, and the quality of the interview, as it allowed the time to be devoted to substantive issues. An additional benefit arising from participant observation and better acquaintance with the language of POPRC was that it enabled the author to more accurately identify the frames used by participants when conducting the content analysis of the ENB reports (see section 4.5).

The second limitation of interviews highlighted by Gaskell is the possibility that the interviewee may "omit important detail. It may be that some things are just part of the taken for granted; others may be difficult to put into words or appear to the respondent to be impolite or insensitive" (Gaskell 2000, p. 44). Again, this potential limitation of interviews could have been significant for this analysis. Had this research relied exclusively on formal interviews and meeting reports, it would have been impossible to understand many of the sensitive interpersonal and political dynamics which were crucial to the success or failure of some of the framing strategies. For example, without being present at the meeting, it would have been impossible to identify the frustration of many POPRC members with the Indian delegate, whose brash interpersonal style offended so many others that they excluded him from an informal lunch and decided to take a vote to overrule his stance on Endosulfan (the contentious debate on Endosulfan is analyzed in Chapter 7). This unofficial event was not reported by ENB, but it was an important juncture in the policymaking process. Furthermore, as noted above, being physically present at the meetings afforded many opportunities to build relationships with participants, who were then willing to share politically sensitive information that would be unlikely to be shared with a stranger.

Gaskell notes that a third limitation of interviews is that "an informant may view situations through 'distorted lenses' and provide an account which is misleading and not open to checking or verification" (Gaskell 2000, p. 44). Again, this limitation is significant for this research, as participants were likely to view the same issue from a wide range of perspectives. For example, there is an ongoing debate about how Annex D, paragraph 2 of the Convention should be interpreted. The paragraph states that “The proposing Party shall provide a statement of the reasons for concern including, where possible, a comparison of toxicity or eco-toxicity data with detected or predicted levels of a chemical …“ (Stockholm Convention, Annex D, paragraph 2). The phrase “where possible” has been interpreted by environmental NGOs and some POPRC members to mean that providing the specified comparison is optional, while CropLife and other observers (including representatives of the US EPA) have argued that “where possible” was included in the text to allow countries without the capacity to conduct this test to propose chemicals for listing. Participants in the latter group argue that developed countries with the capacity to conduct the test are taking advantage of the phrasing to avoid submitting test results which would not support their nominations. Other participants, including the EU and its member states, have argued that the comparison is not always possible, or that the results are irrelevant (as in the discussion of SCCPs). This example highlights the extent to which participants may interpret an issue differently, and present their interpretations not as controversial issues, but as statements of fact. Observation of the proceedings provided clarification of the way this issue is perceived and addressed by participants, including by those who did not agree to participate in a formal interview. This is just one example of the way in which observation provides a much more detailed picture of the decision-making process than would be available if a researcher relied on interviews and report summaries alone.

In sum, using participant observation as a method of research for this project facilitated the collection of much more detailed, balanced, and substantive information than would otherwise have been possible. By attending meetings, the author was able to observe proceedings as they occurred, identify points which were excluded from ENB reports and not mentioned in interviews (such as the fact that, in order to build support for a vote on Endosulfan, two delegates who strongly favored voting took other delegates out for a wine-fueled lunch), identify the gaps in information provided during interviews, and employ the technical knowledge gained during participation in meetings to focus on substantive issues during interviews.

4.4.5 Information on participants' political and socioeconomic interests

As previously noted, one aspect of this research involves consideration of the ways in which political and socioeconomic interests of producers and users of particular chemicals may influence POPRC discussions. To identify these interests, the author conducted an exhaustive search for position or policy papers on the websites of all organizations associated with POPRC, including:

- foreign affairs or international development ministries,
- ministries or public agencies responsible for the protection of the environment
- ministries or bureaus responsible for promotion of business, industry and exports
- academic or media articles
- position statements produced by advocacy organizations, such as chemical manufacturers.

In addition, these issues were explored through both formal and informal interviews with participants. It was possible to identify clearly the positions on support for or opposition to regulation of chemicals for a small number of countries that sent delegates to POPRC. These were: the European Union and its member states, India, China, Sierra Leone, and the United States. It was not a premise of this research that *all* countries and participants would have explicit or identifiable policy preferences regarding every chemical nominated for review; therefore, this did not impede analysis of the role of scientists and of strategic issue framing.

4.5 Research Design

The research was designed in three parts. First, it was necessary to develop a precise understanding of the process by which chemicals are proposed, evaluated and approved for listing (or rejected); the role of scientists within the process; and the opportunities for participants to frame discussion in order to influence decision-making. Second, the ENB reports from POPRC-2 to -5 were analyzed to identify frames used and adopted by participants as chemicals passed through successive stages of the evaluation process. In the third stage, three substances were selected for closer analysis. These within-case analyses made use of the material generated in the first parts of this research design to provide explanations of the actions taken by POPRC during each stage of its review of these substances. These detailed analyses provide a clear picture of the ways in which frames are introduced to discussion, the degrees to which they are successful, and the responses of other participants. These analyses also provide clear tests of the causal model set out in Figure 4.1 above.

While the research was designed in three successive parts, it is important (as noted by George and Bennett 2004) to view each part as a contribution to an integrated and interrelated whole. Therefore, the causal model set out in Figure 4.1 and the hypotheses drawn from it in section 4.3.1 provided the unifying theoretical framework that guided the design of this research. The steps taken to carry the three parts of this research design are outlined below.

4.5.1 Describing the rules and decision-making process

The first stage of this research, presented in Chapter 5, explores the formal role of science in the decision-making process of the Stockholm Convention. This involves exploration of several key issues. First, the chapter explains the assumptions about the division between science and policymaking which are formally embedded in the structure of decision-making process. Second, it delineates the steps in the process by which chemicals are nominated, reviewed, recommended, and eventually listed in the Convention (or, alternatively, are determined to be inappropriate for listing in the Convention). Third, the participants are classified into the formal categories for participation, as established by the rules of procedure. In the context of POPRC, participants are either POPRC members or observers, but importantly, observers can be further divided according to their affiliation. The relative influence of each of these categories will be discussed, first considering the constraints and structure imposed by the formal rules for participation, and second, drawing on the interviews with POPRC participants, which shed light on the perceived differentiation in power among different groups working within POPRC. Finally, this chapter will identify the points at which framing could be used to influence discussion most effectively. For example, opponents to listing may find it easiest to challenge a nominated chemical during the risk profile stage of review, as this stage involves the closest scrutiny of evidence for listing. Alternatively, opponents may attempt to challenge a substance in the first stage of review, in order to prevent the substance from being examined too closely.

Examining the decision-making process and rules of procedure in this manner creates a foundation for the deeper analysis of framing presented in Chapters 6 and 7. This chapter presents a precise analysis of the process by which chemicals are introduced, evaluated, and recommended for listing, which facilitates identification of the role of science and scientists within the process. It also allows for precise categorization of the different roles played by the sub-groups participating in the process, and highlights the different ways in which they are able to influence decision-making, both due to the rules of procedure and as a result of their perceived credibility and expertise. These distinctions underpin the analysis of framing, as successful framing may depend in large part on the credibility of the frame initiator, as well as the frame initiator’s formal role in decision-making. These issues will be explored in detail in all three stages of analysis.

The following description and analysis of the decision-making process was based on observation of meetings of POPRC and the COP, as well as careful reading of the text of the Stockholm Convention and rules of procedure. The interviews with participants also played an important role in providing insights and perspectives of the participants themselves about their own roles in the process and the roles played by others. The opinions and ideas presented during these interviews helped to clarify the norms by which POPRC conducts its work. This was particularly helpful for understanding the way frames are used to support preferences, because it highlighted the way POPRC members perceive themselves (e.g., some as pure technical advisors, others as pulled between disinterested science and the demands of the governments with which they are affiliated) and provided insight into the types of frames which are likely to succeed in this particular environment (and, likewise, those which are likely to fail because they do not fit within the cultural framework that shapes POPRC's discussions, what is acceptable and what is not, etc.). These points are clearly elucidated by the within-case analyses presented in Chapter 7, and particularly in the analysis of Endosulfan, which involved highly contentious discussions and challenges to the validity of POPRC's decision-making process.

4.5.2 Issue frame analysis

The second part of this research was designed to identify the issue frames that scientists used during various stages of POPRC's review process (analysis of which is presented in Chapters 6 and 7). Identification and categorization of frames provided a foundation for recognizing patterns in framing, which in turn facilitated comparison of framing strategies across meetings and between chemicals. This analysis also enabled identification of Parties and observers with social and economic interests in the policy decision (i.e., countries affiliated with scientists who strongly opposed or favored listing nominated substances). Establishing these patterns within debate enabled the hypotheses set out in section 4.3.3 to be tested thoroughly and also provided material that was critical to the within-case analyses that were also conducted within the third part of this research (see section 4.5.3).

In order to identify and analyze the frames used during debate, it was necessary to carry out content analysis of the ENB reports. Using procedures outlined by both framing and research methods scholars (Chong and Druckman 2007, Krippendorf 2004, Neuendorf 2002, Bauer and Gaskell 2000), ENB reports from POPRC meetings 2, 3, 4, and 5 were systematically coded, and issue frames were identified and analyzed. The steps by which this analysis was conducted are delineated below.

Step 1: Establishing the timeframe of analysis

The decision to analyze POPRC meetings 2 through 5 was based partly on the availability of ENB reports. The first meeting of POPRC (POPRC-1, held in 2005) was not covered by ENB, and there is no record of proceedings which provides comparable coverage of the discussions which occurred during this session. A meeting report produced by the Secretariat is publicly available (UNEP/POPS/POPRC.1/10, available at www.pops.int) and provides useful background information about the first meeting of POPRC, but as with subsequent meeting reports, it does not provide the level of detail necessary for a framing analysis (as discussed in section 4.4.1). Consequently, this analysis begins with POPRC-2, held in 2006, which was the first meeting for which ENB produced a report, includes POPRC-3 (2007), and -4 (2008), and concludes with POPRC-5 (2009). A list of each meeting with information about dates, chemicals reviewed, and decisions can be found in Appendix B.

By analyzing the framing of issues from nomination to the conclusion of POPRC's evaluations of both dead and live chemicals, this research addresses one of the issues at the heart of strategic issue framing: the interests of those employing the frames. This range of meetings spans the shift in consideration of dead to live chemicals, which for the purposes of analysis of issue framing (and particularly consideration of the interests and policy preferences of scientists), represents a critical turning point in POPRC's work. As previously noted, comparing the use of strategic issue framing in evaluation of dead chemicals with its use in evaluation of live chemicals provides insight into the motivations of those using the frames, because it helps to identify the influence of socioeconomic interests in regulatory decision-making. If external interests are not influencing decision-making, there should be no significant differences between debate about dead chemicals and that regarding live substances.

Step 2: Developing the coding framework

Prior to analysis of the ENB reports, a framework was constructed which delineated the expected codes that would be identified through content analysis of the ENB reports. This framework, which was loosely modeled on frameworks used in other issue framing studies (Nisbet et al. 2003, Jerit 2008), drew on observations of COP and POPRC meetings to develop five categories which were expected to capture the frames used by participants at POPRC meetings: evidence of harm, scientific uncertainty, socioeconomic impact, technical issues, and procedural issues. Each framing category comprises a consistent collection of individual frames with similar emphases. As noted by Chong and Druckman, "a frame in communication can only be defined in relation to a specific issue, event, or political actor" (2007a, p. 106). Given the lack of framing studies of science-based environmental policymaking, the expected frames for this research were based solely on observations of Stockholm Convention meetings, rather than being drawn from other framing studies.

ENB reports cover all items on POPRC's agenda, including issues unrelated to evaluation of potential POPS. Thus, certain sections of the ENB reports were systematically excluded from analysis, such as those covering issues such as development of a handbook on effective participation in the work of the Committee, establishment of procedures to notify the Committee of conflicts of interest, compilation of information on substitutions and alternatives to listed POPs, etc. While these issues comprise a substantial part of POPRC's work, the "core business"[5] of the Committee is to evaluate chemicals for possible listing in the Annexes of the Convention. Work the Committee takes on in addition to evaluation of chemicals does not affect its decision-making regarding nominated substances, and is not relevant to an analysis of the way scientists use issue framing to promote policy goals.

The framing typology set out in Table 4.3 below identifies the five categories of issue frames, plus a category labeled "other," which captures all interventions reflected in the ENB reports that cannot be categorized as issue frames (e.g., requests for clarification, statements regarding logistical or administrative issues, etc.). The frame names are followed by descriptions of the relevant themes within each framing category, including keywords and substantive points that are subsumed within each group. In contrast to development of a dictionary with keywords, as would be necessary for computer-assisted coding, this research relies on coding guided by archetypes, rather than specific terminology. This approach has been used in other framing studies (Chong and Druckman 2007b), and is particularly appropriate for coding of ENB reports, which predominately consist of summaries of interventions rather than direct quotes.

Table 4.4 The Coding Framework – definitions of frames

Frame category	Definition, keywords and themes
Evidence of Harm	These frames emphasize the sufficiency of scientific data which support progression to the next stage of decision-making and/or recommendation for listing. They de-emphasize any gaps or uncertainty in relation to the data. Category includes reference to: chemical meets the criteria for

[5] Description used by Reiner Arndt, POPRC Chairman, to distinguish between POPRC's chemical review responsibilities from the operational issues which it must address both during meetings and intersessionally. Quote recorded in personal notes taken during the sixth meeting of POPRC (14 October 2010).

	progression/listing; toxic interactions with other chemicals; negative impact on human health/environment; scientific research methods appropriate; precaution.
Scientific Uncertainty	These frames emphasize the gaps in data or knowledge and de-emphasize the strength of any data or evidence supporting progression to the next stage of decision-making. Category includes reference to: data unavailable; narrower focus necessary; one criterion or more may not be met; scientific research methods inappropriate; more detail needed; stringent analysis necessary; standards for harm unmet; science is uncertain.
Socioeconomic Impact	These frames emphasize the potential socioeconomic impact of listing a chemical. Category includes reference to: poverty/hardship; negative socioeconomic implications.
Technical Issues	These frames emphasize the technical issues related to evaluation and listing. Category includes reference to: regulation/action under other conventions; implementation problems; disposal issues; preventing reintroduction; polluter pays principle; advantages/disadvantages of listing dead chemicals; availability of alternatives; technological disadvantages of developing countries; strict control needed (e.g., disposal of stockpiles, etc.).
Procedure	These frames emphasize the rules of procedure and processes by which decisions are made. Category includes reference to: obstruction; bias; grouping chemicals to ease analysis; inappropriately strict analysis; transparency; time for discussion needed; move discussion forward; importance of consensus; correct procedure followed; incorrect procedure.
Other	Non-substantive interventions, including: requests for clarification; administrative points relevant to the issue; etc.

These framing categories are exhaustive and mutually exclusive. Every intervention made by participants at POPRC fits into a single category. Subsumed within these categories are 40 themes identified during analysis of the meetings. For the purposes of carrying out the content analysis, each theme was given a specific code marker to ensure that it was correctly placed within the database of frames used by POPRC participants. While the categories of frames are the primary units of analysis in Chapters 6 and 7, identification and recording of these themes allowed for a more precise analysis of patterns within the discourse regarding individual chemicals, both during individual meetings and throughout the stages of chemical review. Furthermore, delineating the themes clearly and precisely prevented ambiguity in application of framing codes to each piece of text included in the analysis. A full list of the codes and the frequency with which each appeared in the coded text is presented in Table 4.4 below. Given the inevitable identification of new themes as coding progressed, it was particularly important to conduct formal analysis of the entire data set repeatedly; thus, each meeting report was coded twice in order to ensure consistency of coding. Coding of the reports progressed sequentially, and upon completion of the fourth report, each report was coded a second time, starting from POPRC-2. This approach ensured that the coding scheme was applied consistently to all of the texts in the data sample, and did not unintentionally evolve as the coding progressed.

The interventions and codes were recorded in a database constructed for this research using the software program Microsoft Access. While multiple computer-assisted qualitative data analysis software packages, including Alceste and AtlasTi, were trialed for use in this research, manual coding proved to be the most effective and appropriate means of analysis for this project. This was largely due to the nature of ENB reports, which present statements from multiple speakers in a summary format. Unlike campaign speeches, for example, in which text is attributable to a single speaker, or studies of media presentations of issues, in which the news source itself is the object of analysis, the subjects of this research project were the statements made by individuals in the context of a discussion with multiple participants. As previously noted, records of these interventions are available only through ENB summaries, and statements are not necessarily reported verbatim. No software packages were identified which would be capable of the careful parsing and analysis necessary to correctly attribute and code the statements provided in this particular format; to the contrary, manual coding was the only possible approach which would allow for the fine-textured analysis necessary to ensure accuracy in coding. To this end, Microsoft Access provided the most flexible and useful software for recording and analyzing data, and was ultimately selected in place of more complex but less flexible programs such as AtlasTi. Significant advantages provided by Access include: 1) the ease of creating subsets of data that can be stored in tables linked to the larger database; 2) the flexibility with which data can be reorganized across multiple categories of information (e.g., by chemical, meeting, code, speaker, etc.); and 3) the speed with which new categories of information can be added.

Step 3: Identifying frames

The Access database, entitled "Numerical Summary of Frame Use," includes the following categories: ID (a unique number automatically assigned to each row of data), ENB Summary (POPRC -2, -3, -4, or -5), chemical, live chemical (box checked for yes), dead chemical (box checked for yes), framing code (one of the 40 codes in the framework), speaker(s) (including those whom ENB recorded as "supporting" the intervention), summary of intervention, support by other members (the total number of people speaking in support of this intervention), category to which the speaker belongs (boxes which could be checked to identify each speaker as a(n): POPRC member, country observer, industry observer, public health/environmental NGO observer, invited expert, or member of the secretariat), decision (for each chemical at every stage of review), and notes. Due to the size of this database and the amount of information it contains, it is impossible to reproduce it in a readable format within the constraints of this document; however, almost of the information has been included in this document in tables derived from the larger database (the only exception is the information contained in the notes category, which was used for contextual references during analysis. All relevant information has been included in this thesis).

In order to facilitate evaluation of the data, tables linked to the database were created for the purposes of running queries and otherwise analyzing the data. Of these, the broadest is a table that delineates the five categories of issue frames, the codes/themes that fit into these categories, their definitions, and the frequency with which these codes appeared in the final database. This table, which is presented below (Table 4.4), provides an overview of the frames and the frequency with which they were used during POPRC meetings. It is important to recognize that this presentation of information illustrates frames and their frequency of use across the entire timeline of meetings being analyzed for this research. Closer examination of frequencies of frame use within meetings and with regard to particular substances is essential before inferences can be made regarding the relative importance and effectiveness of frames in discussions. Such analysis will follow in the next two chapters.

Table 4.5 Frequency of Frames Used in POPRC-2 - POPRC-5

Frame	Frame Code (as recorded in the database)	Description of Issue Frame	Frequency Count
Evidence of Harm	BD	Broaden description	1
	EH	Clear evidence of harm	107
	HI	Human/environmental health impact	3
	MA	Methods appropriate	4
	PRE	Precaution	12
	Total		**127**
Scientific Uncertainty	DU	Data unavailable/needed	3
	IMD	Include more detail	19
	MI	Methods inappropriate	16
	NH	Chemical doesn't meet standards for harm	25
	NS	Narrower specification	6

	SA	Stringent analysis needed	20
	SC	Strict control important	11
	SDN	Some data indicate chemical does not meet one or more criteria for regulation	6
	SU	Scientific uncertainty	59
	Total		**165**
Procedure	AUS	Analysis inappropriately strict	8
	B	Bias	4
	CP	Correct procedure followed	43
	GC	Group chemicals for efficiency of analysis	7
	IC	Importance of consensus	22
	IN	Indispensability of chemical	5
	NTD	Need time to discuss	16
	OB	Obstruction	2
	OFT	Concern about scientific practices/transparency	11
	P	Procedural	67
	WPT	Move discussion forward	41
	Total		**226**
Technical Issues	AA	Alternatives available	12
	BDC	Little benefit to listing a dead chemical	3
	DD	Developing countries at a technical disadvantage	7
	DP	Disposal possible	2
	EF	Environmentally friendly, compared to alternatives	2
	IMP	Implementation problems	1
	OC	Chemical is regulated by other conventions	1
	PP	Polluter pays principle	3
	PRDC	Prevent reintroduction of dead chemical	1
	ROC	Regulation unnecessary due to regulation of related chemicals	2
	ROCN	Regulation of other chemicals helpful, but regulation still necessary	1
	TU	Technical uncertainty	7
	Total		**42**
Socioeconomic Impact	NE	Negative economic impact	3
	PSE	Positive socioeconomic impact	1
	SEI	Negative socioeconomic impact	5

	Total	**9**
	Grand total	**569**

In total, 569 interventions were recorded in the database, and reflect ENB's coverage of the plenary discussions between POPRC-2 to -5 (2006-2009). Notably, procedural frames were used most often (226 times). Scientific uncertainty frames were used 165 times, and frames which emphasized evidence of harm were used 127 times. The least frequently used frames were those which emphasized technical issues (42) and socioeconomic impact of listing (9). The breakdown of these frames by chemical and meeting will be analyzed in chapter 6.

Step 4: Analyzing use of frames by POPRC members

As noted above, the database entitled "Numerical Summary of Frame Use" served as the basis for analysis of the way scientists used frames during POPRC meetings. Like other framing studies (see, for example, Miller 1997; Wang 2004), this research uses frequency counts as one way of identifying the ways in which participants utilize frames to promote their preferred outcomes, as well as the relative success or failure of these frames (as previously noted, the second means of analyzing framing used in this thesis focuses on the strength and weakness of frames, as explicated by Chong and Druckman, 2007b). The relative success of frames can be measured by the extent to which they are adopted and repeated by other participants. Frequency counts provide a simple and accessible measure that can identify the framing strategy employed by individual participants, as well patterns within communication (for example, by scientist, across chemicals, or across meetings).

The steps in the analysis were designed to test the hypotheses and explore the causal model set out earlier in this chapter. The following section provides a description and rationale for each step. The results are presented in Chapters 6 and 7.

First, in order to identify differences in the participation among scientists within POPRC, the total number of interventions made by POPRC members was tallied and broken down according to the economic status of the country with which each scientist is affiliated. Because of POPRC's membership rotation policy, the composition of the Committee changes every year, so tallying individual interventions across meetings would not accurately reflect the level of participation of particular countries or regions. Some regions and countries repeatedly nominate the same members, which means that some individuals have held seats on POPRC from the POPRC-1 to present (e.g., Reiner Arndt, Germany), while other regions have offered the position to new countries (e.g., the representative of the European Union has changed three times). In other cases, countries have retained seats but have changed representatives due to the personal circumstances of their representatives (for example, the original representative from India retired between POPRC-5 and 6, and was replaced by a new government scientist). The purpose of this analysis was to understand whether the income-level of the country made a difference to the quantity of interventions made by scientists. The importance of this comparison is discussed in Section 5.3.2. To ease analysis (because a large number of countries made very few substantive interventions) countries were grouped based on income, using the World Bank's classification system of high, medium and low income groups based on gross national income. The Stockholm Convention does not officially classify countries based on economic development, so for the purposes of comparing the number of interventions made by participants in developing and developed countries, the World Bank classification was used.

Second, individual frequency counts of the frames used by each POPRC member were conducted in order to identify patterns in interventions across chemicals and meetings. According to the causal model, a scientist's affiliation is one of the antecedent variables which may affect the selection of the frames (the independent variable). This step facilitated analysis of the frames used by particular scientists, and allowed comparison of the frames used by individual scientists with the socioeconomic interests of the countries with which they are affiliated. The role of external socioeconomic interests in scientists' preference formation is tested by Hypothesis 3, which was included in order to establish whether scientists use issue framing to support their policy preference. For example, if scientists were affiliated with countries which supported the regulation of a chemical, then, according to the hypothesis, the scientists would use frames which emphasized evidence of harm and deemphasized scientific uncertainty. This would be reflected in the frequency of the frames they used during discussion. The results of this analysis are considered in section 6.1.3, and are presented in Figure 6.1. The framing patterns that this analysis identified are analyzed in much greater detail in Chapter 7 which sets out the within-case analyses of the debates relating to three different chemicals.

Furthermore, Hypothesis 4 posits that the production and use status of a chemical under review (e.g., its economic importance, which is often captured by the distinction between live and dead chemicals) affects the policy preferences of scientists, and, therefore, the frames they use. Therefore a frequency analysis of the pattern of frames used within each meeting was carried out to identify any systematic differences in frames used in discussions of dead and live substances. The results of this analysis are set out in section 6.1.4. Furthermore, a detailed analysis of this issue is in Chapter 7, which presents a series of within-case analyses of POPRC's reviews of octaBDE (a dead chemical) and SCCPs and Endosulfan (both of which are live chemicals).

4.5.3 Within-case analyses of selected chemical reviews

The final part of the research design focused on conducting analyses of the framing strategies used during POPRC's evaluation of a small selection of chemicals. While the first two stages of analysis facilitated testing of the hypotheses and an analysis of the use of framing throughout all of POPRC's discussions between POPRC-2 and -5, analysis of the frame effectiveness and the links between the frames used and outcomes of the meetings requires closer examination of the individual discussions. A fine-textured analysis of individual cases provides a clearer picture of the strategies used by participants, the interplay of competing frames, and the context in which some frames succeeded while others failed to win support.

In keeping with the approach proposed by George and Bennett (2004), these within-case analyses draw on process-tracing methods that facilitate analytically rich and comprehensive explanations of multifaceted events within single-case studies (in this case, process-tracing facilitates analysis of both the science-based decision-making process of the Stockholm Convention and the variations in reviews of individual chemicals). Process-tracing involves the construction of a detailed analytical narrative that explain the outcomes of an “intervening causal process…between an independent variable (or variables) and the outcome of the dependent variable” (George and Bennett 2004, p.206). In this case study, the frames used by participants at POPRC meetings are independent variables, and the decisions taking by POPRC constitute the dependent variables. George and Bennett argue that process tracing is particularly useful in cases that have generated multiple observations (here, the numerous frames used by the many participants within the debate) but require that these be linked “in particular ways to constitute an explanation of the case” (2004, p.207). Process tracing does not rely on controlled comparison between different cases where (ideally) the cases are similar in all respects but one. As a within-case method of causal interpretation, all of the steps within a causal chain must be set out in order for a theory to be developed or tested (George and Bennett 2004). It is therefore particularly useful for research designs that (as here) involve a single case but more than one part to the research design.

Within this research, the causal pathway is illustrated in Figure 4.1 and discussed in section 4.3.4. The causal model delineates: the links between the variables that potentially shape scientists’ policy preferences; the frames and framing strategies scientists employ to support their preferences; and the effect of these frames on the decisions taken by POPRC. The purpose of conducting the within-case analyses was to construct a narrative that provides an analytical explanation by converting description of a process into an explicit causal explanation of outcomes (George and Bennett, 2004). These analyses differ substantially from the material provided by other sources (e.g., ENB or UNEP-produced meeting reports) because they evaluate the debates from the point of view of the hypotheses and causal model.

How the within-case analyses were constructed

Three chemicals – octaBDE, SCCPs, and Endosulfan – were selected for inclusion in the within-case analyses. The section below describes the criteria for selecting these case studies.

The content analysis of the ENB reports (described in section 4.5.2) explains how the frames used by participants within the debate were identified. The analytical narratives associated with the three sub-cases build on data gathered for the larger analysis (see Section 4.4) to identify and evaluate:

- the current use and production of the chemical (e.g. including its status as a “dead” or a “live” chemical);
- the participants with socioeconomic interests in continued production and use or elimination of the substance;
- the main proponents or opponents of regulation;
- the framing strategies used during the review;
- the effectiveness of frames (high, medium, low, or ineffective);
- the possible reasons for the relative effectiveness of frames; and
- the impact of different framing strategies on POPRC’s decision.

The selection of ENB reports, the database of frames, and the interview transcripts were carefully reviewed to analyze the frames used, patterns of interventions/frame use by scientist, the effects of individual frames on the course of discussion, and how the discussion led to the decision taken at each stage of POPRC's review. Furthermore, as George and Bennett (2004) note, when using process-tracing methods to develop analytical explanations, it is crucial to ensure openness to competing explanations of variance in the dependent variables; in other words, to minimize the risk of confirmation bias. Thus, throughout the analysis multiple sources were used to support understanding of participants' interests, the process by which POPRC moved through each stage of review, and the resulting inferences about the importance of framing in debate.

Selection of chemicals for the within-case analyses

Reviews of three chemicals – octaBDE, SCCPs and Endosulfan - were selected for within-case analyses. These substances were selected because they were all introduced either during POPRC-2 or -3, which meant they could, theoretically, pass through all three stages of POPRC's review during the timeframe of this analysis. Furthermore, given the nature of the research question and casual model, the subset of chemicals represents one dead and two live substances, and one pesticide and two industrial chemicals. Different types of chemicals or chemicals used for different purposes might attract different configurations of interests in their continued use and/or regulation. These details are outlined in Table 4.5 below.

Table 4.6 Selection of chemicals for within-case analyses

Characteristic	Chemical		
	OctaBDE	SCCPs	Endosulfan
Production status (dead or live)	Dead	Live	Live
Use	Industrial	Industrial	Pesticide

Introduced for review	POPRC-2	POPRC-2	POPRC-3
Current stage of review	Listed	Still in risk profile stage	Recommended for listing

4.6 Conclusion

The approach adopted to answer this research question is designed to illuminate the role of science and scientists in policymaking under the auspices of the Stockholm Convention, and to explore the ways in which strategic issue framing can be used in the earliest stages of policymaking to promote pre-existing political agendas. Achieving this research goal requires investigation into several different but closely related points. First, the motivations of scientists who participate in POPRC must be identified and explored. Are these scientists members of epistemic communities, with agendas derived from their technical expertise? Or, alternatively, are POPRC members (and the scientists who participate as country observers) subject to pressure from external actors, such as the national governments with which the scientists are affiliated? If the latter, it is important to consider the implications for the role of science in the Stockholm Convention, particularly given that the Convention is designed to maintain a clear distinction between scientific evaluation and policymaking. Secondly, are participants in POPRC using strategic issue framing to support their policy preferences? If so, it is necessary to determine who is using the frames, which frames are successful, why some are and others are not, etc. These questions have served as the guide for the research methods described above.

The design of this research makes use of a variety of methods and data sources in order to clarify the role of scientists within the Stockholm Convention, their policy preferences, and their use of strategic issue framing to support these preferences. Using a variety of methods facilitates exploration of the possible role of epistemic communities in the work of the Stockholm Convention, as well application of framing theory to live, science-based technical discussions which form the basis for policymaking. The power of frames to shape the way an issue is understood and addressed is worthy of critical analysis, as these mechanisms could have decisive influence within the policymaking process. The methodology outlined in this chapter is designed to consider the way various actors in the process use strategic issue framing tactics, the influence of different types of frames, and the nature of successful and unsuccessful frames. Furthermore, this analysis will shed some light on the way science is politicized by rational actors who are pursuing policy goals. The behavior and influence of scientists is of particular interest, given their authority and associated power over policy choices. This analysis should determine whether scientists actually have influence, and if they do, the extent to which such influence stands up to countervailing forces such as the socioeconomic considerations which may be raised later in the policymaking process (as well as during POPRC's discussions).

The next three chapters present the findings of the research design outlined above. Chapter 5 sets out an account of the policy process within Stockholm Convention, clarifying the role of scientists and the key points at which they have the opportunity to use framing tactics to influence discussions. Chapter 6 presents the results of the analysis of issue frames used by scientists during POPRC's reviews, focusing primarily on the results of the content analysis of ENB reports, and drawing on interviews for additional insight. This chapter provides critical tests of the research hypotheses that are set out earlier in this chapter. Chapter 7 presents the within-case analyses, which provide detailed explanations of decisions relating to three chemicals that have been evaluated by POPRC. These analyses also provide an additional means of testing the causal model. Together, the findings in these chapters demonstrate how frames are used as heresthetical tactics designed to influence decision-making within POPRC. The results presented in these chapters contribute a new and important dimension to our understanding of the process of global policymaking to regulate POPs, and answer the question guiding this research: why are some chemicals regulated with broad support from participants, while proposals to list similar chemicals are met with strong opposition from many of the same actors?

Chapter 5: The Role of Science and Scientists in the Stockholm Convention

In the previous chapters, this thesis presented the foundation for analysis of strategic issue framing in science-based decision-making under the auspices of the Stockholm Convention. These foundational elements include literature reviews of strategic issue framing and the epistemic communities approach, as well as a discussion of the methods used to analyze the use and influence of strategic issue framing on POPRC's evaluations of substances nominated for listing in the annexes of the Convention. This chapter will begin the analysis by elucidating the role of science and scientists in work of the Convention. Specifically, this chapter will: 1) explore the assumptions about science that are formally embedded in the division of labor between POPRC and the COP, 2) describe the decision-making process by which chemicals are added to the Convention, from proposal of a substance to listing, 3) classify participants and explore systematic differences in participation, and 4) identify points at which framing could be used to influence discussion, as a basis for analysis in the following chapters. This chapter is structured in the order of these points.

5.1 The role of Science in the Stockholm Convention

The Stockholm Convention's aim to protect human health and the environment from POPs dictates that scientists will play a crucial role in the decision-making process, as they are responsible for providing the technical advice bureaucrats rely upon as they formulate policy to control these global transboundary pollutants. When a chemical is nominated for potential listing in the Annexes of the Convention, it must pass through three stages of scientific evaluation before POPRC recommends it for listing. While POPRC is responsible to the COP, POPRC's role as gatekeeper to the Convention invests its work with significant responsibility for the policies that are instituted under the auspices of the Convention. Thus, pinpointing the role of scientists in policymaking is a critical task, as doing so contributes to a more comprehensive and accurate analysis of the way technical information influences decision-making. It also illuminates the relative importance of the socioeconomic issues associated with possible listing of various substances. Global environmental policymaking often involves trade-offs between socioeconomic and environmental concerns (as in the case of DDT, which has been listed as a POP but is still the most affordable and accessible means of controlling malaria in sub-Saharan Africa). While these issues are formally separate from the scientific evaluation of chemicals, stakeholders whose interests may be affected by regulation of a substance may seek to influence the decision-making process of POPRC in a way that supports their policy preferences.

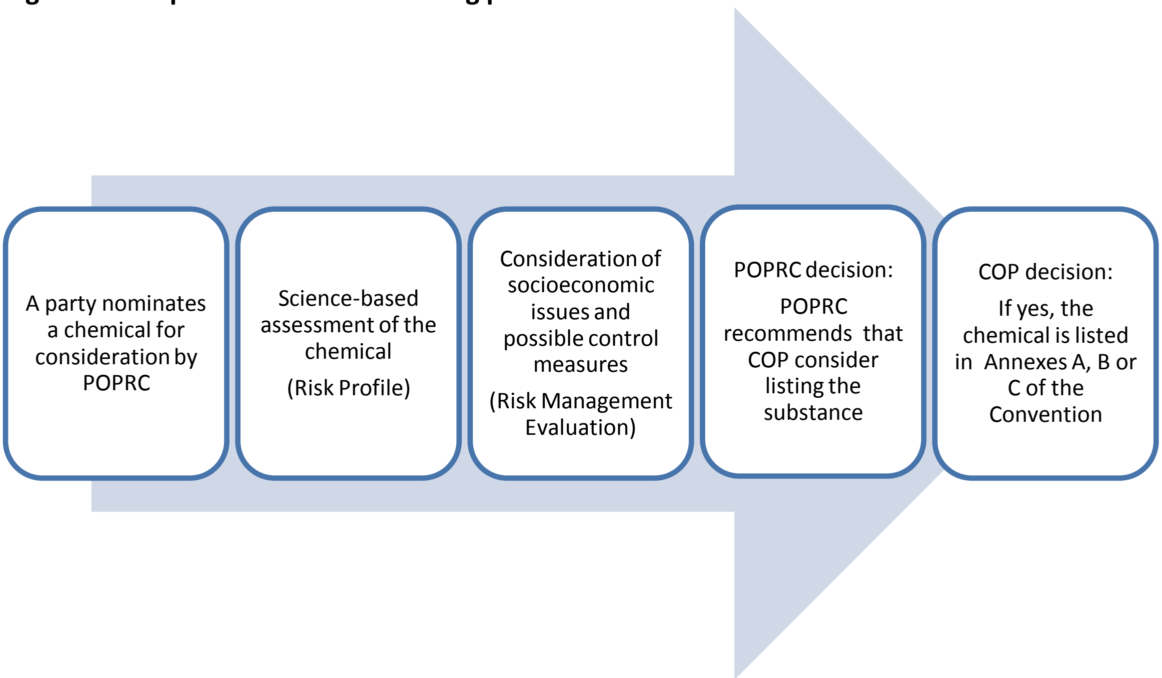
Furthermore, as discussed in the methodology chapter, this research hypothesizes that analysis of POPRC's work will reveal groups of scientists with values-based agendas promoting policy goals derived from their scientific expertise. This hypothesis is partially based on the role specified for POPRC by the COP in Decision SC-1/7, which states that POPRC must bring together scientists from multiple disciplinary backgrounds to provide their expert assessments of nominated chemicals, and to provide input to help the committee decide whether the proposed substances meet the criteria for regulation set out in the Annexes to the Convention. This elucidation of POPRC's role embodies the notion that science can be held apart from politics, and is predicated on the idea that scientists derive their recommendations from objective research, the production of which is unconstrained by issues like availability of research funding, the interests of sponsors of studies, the interests of the parties which send scientists to participate in the work of Stockholm, etc.

In fact, however, the findings of this research indicate that not only are scientists influenced by politics and other non-academic external pressures, but strategic, savvy political actors recognize that the stage of policymaking in which scientists evaluate the qualifications of chemicals for regulation is an ideal point at which to attempt to exert influence over decision-making. In short, POPRC meetings are prime time for political lobbying couched in scientific language and discourse, and the scientists who hold seats on POPRC are working in an atmosphere charged by conflicting political interests and socioeconomic concerns. Uncertainty about the risks posed by some chemicals to human health and the environment compounds the difficulties of decision-making, and creates multiple opportunities for both proponents and opponents of regulation to call for action that is based not on evidence, but on guesswork. Opponents of regulation may exploit uncertainty to undermine the case for listing a chemical or to create time delays in the decision-making process. Such delays may be of significant economic value to actors with an economic stake in the production or use of a particular substance. Analysis of the interventions made by participants in four consecutive POPRC meetings, as well as interviews with POPRC members and observers, indicate that scientists are often working to represent the agendas of their employers, and that political and economic interests play a significant, yet largely unacknowledged, role in POPRC's deliberations.

5.2 The Decision-Making Process: Scientific Review in the Stockholm Convention

Responsibilities for administering the Stockholm Convention are divided among several committees and working groups. As previously noted, scientific analysis is handled by the POPs Review Committee (POPRC), which evaluates the qualifications of chemicals that have been proposed for regulation. Once POPRC has decided that a chemical meets the criteria for regulation, it makes a recommendation to the COP, which then determines what action should be taken. The steps in this process are outlined below in Figure 5.1, which is followed by detailed explanation of each stage of evaluation, the range of possible decisions, and discussion of their implications for policymaking. It is important to note that POPRC may decide to "set aside," or reject, a proposal for nomination at any stage, if it determines that the criteria for that particular stage are unmet. To date, no proposed chemical has been rejected by POPRC.

Figure 5.1 Steps in the decision-making process



5.2.1 Step 1: The nomination

Any party to the Convention may nominate a chemical for listing in the Stockholm Convention. To start this process, a party wishing to nominate a chemical for evaluation must submit a detailed proposal to the Convention Secretariat. The Secretariat reviews the proposal to ensure that all of the necessary information has been included, and then forwards the proposal to POPRC. According to Annex D of the Convention, proposals must include several pieces of information, including:

1) the identity of the chemical:
    a) including trade names and synonyms, the Chemical Abstracts Service (CAS) registry number, and
    b) information about the structure of the chemical, including the number of isomers and the structure of the chemical class. (This point is often hotly debated in subsequent

discussions about whether and how to regulate a particular substance, because different mixtures of the same chemical may pose different levels of risk to human health and the environment.)

2) persistence:
   a) evidence that the chemical in question has a half-life of at least two months in water or six months in soil or sediment, or
   b) evidence that the chemical's persistence is long enough to justify its inclusion in the Convention. (Arguably, this point is intentionally vague, as it allows chemicals which cause harm in less time than specified in the previous point to be included. Many of these standards have been established because criteria were needed for policymaking, rather than because they reflect scientific standards for harm or risk. Thus, this is one of many points designed to allow policymakers the flexibility to incorporate chemicals which come close to, but do not quite meet, the political criteria established for decision-making.)
3) bio-accumulation:
   a) evidence that the chemical increases in concentration in aquatic or other species. (Again, there are three standards of evidence which could be met to show that bioaccumulation is a problem: one is highly technical (evidence that the "bio-concentration or bio-accumulation factor is greater than 5,000, or in the absence of such data, that the log Kow factor is greater than 5"); another is slightly less technical ("evidence that a chemical presents other reasons for concern, such as high bioaccumulation in other species, high toxicity or eco-toxicity"), and the third is the most flexible of all ("monitoring data in biota indicating that the bio-accumulation potential of the chemical is sufficient to justify its consideration within the scope of this Convention") (Annex D, p. 31).
4) potential for long-range transport:

a) evidence that chemicals are accumulating in locations which are "distant" from the points at which they have been released

b) data showing that chemicals have been transported to these distant locations "via air, water, or migratory species," and that the chemicals may be transferred to the environment in these locations, or

c) either a model or evidence which shows that the chemical has potential for long-range transport and can be transferred to the environment

5) adverse effects:

a) evidence that the chemical could have adverse effects on human health or the environment, or

b) toxicity or eco-toxicity data which demonstrate that the chemicals have the potential to cause harm to human health or the environment.

Furthermore, the party that submits the proposal must provide a statement explaining its reasons for concern, along with supporting evidence, and a statement indicating that global regulation is necessary. To date, 12 chemicals have been nominated for consideration by POPRC (the first 12 substances listed in the Convention were not considered by POPRC; rather, they were decided upon by a subgroup of the intergovernmental negotiating committee which crafted the Convention; see Vanden Bilcke 2003). The full list of chemicals which have been nominated and listed is available in Appendix B of this thesis. Interestingly, while all Parties are invited to submit nominations, to date, only one substance, Lindane, has been nominated by a developing country (Mexico).

5.2.2 Step 2: The Annex D screening criteria

The second step in the regulatory process occurs when POPRC evaluates the proposal to determine whether the Annex D screening criteria (points 1 through 4, above) have been met. Substances are subject to comparatively light scrutiny at this point, as the criteria listed in Annex D are designed to weed out those substances which clearly cannot be categorized as POPs under the terms of the Stockholm Convention. Article 8.3 of the Convention states, "the Committee shall examine the proposal and apply the screening criteria specified in a flexible and transparent way, taking all information provided into account in an integrative and balanced manner." A more detailed analysis of substances occurs in the next stage of evaluation, when the risk profile is drafted and the evidence is subjected to close review to ensure that chemicals meet very specific criteria for regulation.

Despite the comparatively low standards, this stage of evaluation is the first opportunity for opponents of regulation to challenge the qualifications of a nomination, as will be illustrated particularly clearly by the cases of Endosulfan and short-chained chlorinated paraffins (SCCPs), both of which led to controversy within POPRC. These cases will be explored in detail in Chapter 7. Opponents of regulation may attempt to discredit evidence that supports regulation, and will point to uncertainties or gaps in knowledge. Opponents of regulation may also argue that the evidence applies to only a limited number of mixtures of a particular chemical (e.g., pentaBDE), and that the entire category of mixtures should not be banned. Such discussions can take up a substantial amount of time during POPRC meetings, both in working groups and in plenary sessions.

5.2.3 Step 3: The Risk Profile – Annex E

Once POPRC has agreed that a nominated substance meets all of the screening criteria, the Secretariat will invite parties and observers to submit technical comments for the risk profile, the information requirements for which are outlined in Annex E of the Convention. The risk profile is designed to allow other stakeholders to add information to that which is provided in the initial proposal, and to allow scientists to conduct a more stringent evaluation of the evidence to determine whether the nominated substance poses a significant threat to human health and/or the environment. Crucially, proponents of listing must show clear evidence of long-range environmental transport (LRET), or make a convincing case for its likelihood, before regulation can proceed. If a chemical does not exhibit this property, it cannot be categorized as a persistent organic pollutant. Again, it is important to note that the concept of a POP arose from a need to address a physical problem in a political context. As Noelle Eckley Selin explains:

> While policymakers point to 'scientific' definitions of criteria as defining POPs, scientists are more likely to view the category as a convenient political construct around a class of particularly dangerous chemicals. In negotiating a global agreement on these substances, therefore, the category of POPs served to bound the scope of the discussion (Eckley Selin 2006, p. 180).

Thus, while a chemical may pose a clear threat to human health and environment, if it does not exhibit all of the qualities of a POP, the Stockholm Convention does not have the authority to regulate it. Long-range environmental transport is a key characteristic of a POP, because if a substance does not exhibit this property, arguably it could be dealt with effectively on a regional or local basis. Global regulation would be unnecessary.

In order to provide a complete picture of a chemical, the risk profile includes the following information:

1) sources:
    a. production data (the amount of chemical being produced, and the location of its production
    b. uses
    c. releases (including intentional discharges, losses, and emissions)
2) hazard assessment:
    a. the risks posed by the chemical to human health and the environment at the points at which the chemical is transferred to the environment. (This assessment may

include consideration of the possible effects of the interaction of multiple chemicals.)

3) environmental fate:
4) information on the physical properties of the chemical, its persistence, how it is transferred to the environment, degradation, and whether it breaks down into other chemicals. (For example, decaBDE is widely considered to be a "safe" chemical, but there is some evidence that this substance breaks down into the less stable and significantly more harmful pentaBDE upon exposure to the environment.)
5) monitoring data
6) exposure in particular areas, especially due to long-range transport
7) evaluations and assessments conducted nationally and internationally, outside the work of the Stockholm Convention, including hazard classifications, profiles, and labeling information
8) status of the chemical under international conventions

Many of the chemicals which have been proposed for regulation under the auspices of the Stockholm Convention have already been addressed by regional agreements. For example, the EU has banned a number of chemicals which have been addressed by the Stockholm Convention, including Endosulfan and PFOS. Consequently, the European Union has been accused of expecting the Stockholm Convention to "rubber stamp" its proposals, which has led to some tension between developed and developing countries. This significant issue will be discussed in greater detail in Chapter 7.

Once all of the necessary information has been gathered and the risk profile has been compiled, POPRC must decide whether the chemical in question meets all of the criteria for listing. This stage of the policymaking process can be particularly contentious, because opponents of regulation will want to stop the proposal from progressing to the stages in which action is officially recommended by POPRC. By recommending a chemical for listing, POPRC affirms that there is a scientific rationale for taking global action to regulate the chemical. While socioeconomic interests have the potential to outweigh the scientific case for action, POPRC's recommendation establishes a masterframe that declares the chemical to pose significant risks to human health and the environment. Before POPRC will allow a chemical to proceed to the next stage of its evaluation, during which a risk management evaluation is prepared, it must agree that the substance in question "is likely as a result of its long-range environmental transport to lead to significant adverse human health and/or environmental effects such that global action is warranted" (Article 7.7a). Thus, in this stage of evaluation POPRC decides whether or not to recommend a chemical for listing; the next stage focuses on possible control measures that could be implemented if the chemical is listed. Therefore, this is a critical stage in the decision-making process; it is in the best interests of opponents of listing to prevent a chemical from proceeding beyond this stage. If POPRC were to decide that a chemical did not meet the Annex E criteria for listing, information in the risk profile would be made available to all parties and observers, and the proposal would be set aside (i.e., removed from POPRC's agenda).

5.2.4 Step 4: The Risk Management Evaluation – Annex F

If POPRC decides that a chemical poses a significant threat to human health and the environment and should proceed through the next stages of regulation, they begin to work on a risk management evaluation (RME). The RME is used to outline a plan for measures which could be taken (pending approval by the COP) to control the chemical in question. Again, the Secretariat invites Parties and Observers to submit "technical comments and socioeconomic information," as specified in Annex F. This information includes:

1) the technical feasibility and costs of the control measures which may be employed to reduce the risk posed by a chemical

2) the feasibility of replacing the chemical with an alternative. Issues to consider include cost, availability, accessibility, and risk
3) possible implications of regulation, with emphasis on health, agriculture, biodiversity, economics, sustainable development, and social costs
4) the technical feasibility and costs of disposing of waste, including stockpiles of obsolete chemicals and clean-up of contaminated sites
5) access to information and public education
6) status of capacities for control and monitoring
7) any actions taken nationally or regionally, including provision of information on alternatives and other information which is relevant for risk management

Development of the risk management evaluation offers the first procedurally acceptable opportunity for discussion of socioeconomic issues. This is one of the ways in which a division between science-based evaluation and discussion of political implications are formally separated by the structure of the Committee's decision-making process. All of the elements listed above may play a crucial role in the success of the risk management plan, and the scientists and observers who participate in the work of POPRC must evaluate their importance and, if necessary, incorporate them into their recommendation to the COP. While the COP is supposed to deal with most of the socioeconomic considerations, it is impossible to separate them entirely from scientific analysis. As long as scientists propose a management plan to the COP, they must also spend some time considering the non-scientific implications of that plan. This risk management profile is submitted by the Secretariat to the COP for consideration and approval. By ensuring that important socioeconomic considerations are addressed in the risk profile, stakeholders can ensure that these issues will be dealt with as fully as possible.

5.2.5 Step 5: Listing a chemical in an Annex of the Stockholm Convention

In the fifth and final step of the process, the COP must decide whether to adopt POPRC's recommendation, and in which Annex(es) substances should be listed. If a chemical is still in use in parts of the world (i.e., it is a "live" chemical), this decision is likely to carry significant political, social and economic implications. If a chemical is added to Annex A, it is slated for elimination. Exemptions may be requested for specific uses; if granted, these exemptions will expire after a set period of time. During this time, countries will be expected to actively seek alternatives to the POP.

If a chemical is added to Annex B, production and use of the chemical will be restricted to an acceptable purpose or exemption. The terms of these restrictions will be clearly specified in the Annex. To date, DDT and PFOS are the only chemicals listed in Annex B, as alternatives are not available for some uses which the COP has deemed to be critical. Continued use of DDT is permissible for control of malaria in sub-Saharan Africa, and PFOS may be used for a number of purposes, including, among others, photo-imaging, semi-conductor or aviation hydraulic fluids, and in coatings for certain medical devices. As illustrated by the inclusion of PFOS in this Annex, it is likely that the number of substances listed in Annex B will increase as POPRC and the COP consider listing additional live chemicals.

Annex C is designated for those POPs that are unintentional by-products of other chemicals or processes. For example, polychlorinated biphenyls (PCBs) and hexachlorobenzene (HCB), among other chemicals, are unintentionally created and released during thermal processes such as waste incineration, copper smoldering, and cremation. Because it can be difficult to ban these by-products outright, given the importance of the functions that inadvertently led to their creation, the Convention seeks to promote the development and use of new technological methods that do not lead to creation of POPs. This work falls within the purview of a subcommittee called Best Available Techniques/Best Environmental Practices, which seeks to help Parties transition from banned POPs to their substitutes, and to employ the latest technologies and practices which will help them reduce their overall contribution to POPs creation/emission.

The process by which chemicals are evaluated by POPRC is set out in seemingly straightforward detail in the text of the Stockholm Convention, and the Terms of Reference for POPRC are specified in COP Decision SC-1/7. However, the relative ease with which the first chemicals were listed in the Annexes of the Convention has given way to more controversial deliberations as POPRC has shifted its focus from consideration of dead to live substances. As nominated substances' socioeconomic importance has risen, so has the controversy regarding the process by which POPRC conducts its evaluations. Growing criticism of POPRC's decision-making process, particularly with regard to Endosulfan (which will be discussed in detail in Chapter 7) indicates the importance of analyzing the interface between science and policy to explain why some chemicals are regulated with ease while proposals to list others are controversial. The following sections will explore the nuances of the procedure and the growing interconnectedness of science and politics in POPRC's decision-making process, first by classifying participants and exploring systematic differences in their roles in POPRC's decision-making, and then by identifying points at which framing could be used to influence discussion.

5.3 Science and Policymaking: The Roles of Participants

While the steps in the policymaking process described above emphasize scientific analysis of technical evidence, political interests can play a significant role throughout the stages of decision-making. Issues are defined and framed as participants nominate chemicals, outline the risks they pose to human health and/or the environment, debate the validity of supporting evidence, and consider the implications of regulation. Once a masterframe has been established, changing people's perceptions of an issue may be difficult. Thus, strategic actors have an interest in establishing their preferred framing of an issue at the earliest stage possible. As representatives of governments, companies, or advocacy groups, if not all, of the participants in POPRC are inherently political actors, and have interests in achieving particular outcomes. The political preferences of some of the actors are explicit, given their affiliations (as is the case with industry or environmental/public health advocacy group observers), but POPRC members are expected to ignore the political interests of their governments in favor of scientific evaluation. However, as the following analysis will illustrate, Committee members' interventions rarely contradict, and frequently support, the political interests of the nations which have sent them to POPRC. The preferences of many members and parties can be verified using written materials such as position papers, government statements, etc. Identifying actors' interests is not always easy, however, especially when participants attempt to hide their interests in a particular substance while actively campaigning (sometimes in a subtle way) for particular regulatory decisions.

Before moving to a more detailed discussion of the way scientists may use strategic issue framing to promote political goals, it is necessary to take a closer look at the participants in POPRC. Who are the members? How are they selected? Who are the observers that participate in the meetings? What are their qualifications? In the next section, these questions will be addressed in order to clarify the official role scientists play in the policymaking process.

5.3.1 Categories of participants

POPRC participants fall into one of three categories: members, observers, and invited experts. The participants in each of these categories play different roles in the work of the Committee. Most significantly, members have decision-making authority, while observers are allowed to contribute their views, data, etc., only at the discretion of the Committee Chair. The following section will describe the ways in which participants in each of these categories contribute to POPRC's work.

The 31 members of POPRC are drawn from countries around the world and have expertise in a wide range of scientific disciplines. A list of current and former POPRC members is included in Appendix E. The Stockholm Convention requires POPRC to maintain a "geographically equitable distribution" of seats (Article 19, paragraph 6[a]); thus, the Asian/Pacific and African States each have eight, the Central and Eastern European States have three, the Latin American and Caribbean States have five, and the Western European and Other States have seven. Parties within each region must work together to designate representatives who, together, will have expertise in a variety of fields. Members retain their seats for a period of four years (with the exception of the first members of the Committee, some of whom held their seats for only two years in order to allow for an even rotation of members in the future). As noted above, members are responsible for making all of the formal decisions for the Committee, including drafting text, voicing opinions during decision-making phases of Committee meetings, etc.

The second category of participants consists of invited experts, or those specialists with expertise in areas relevant to specific chemicals under discussion. These experts are chosen by parties to the Convention on the basis of their substantive knowledge, and are listed in a roster for reference by POPRC members. POPRC may invite individuals from this roster to assist the Committee with its work during meetings and intersessionally. For example, during POPRC-3, invited experts from four countries (China, Switzerland, South Africa and Sweden) provided information about chemicals that were being reviewed by the committee.

The third, and largest, category of participants consists of observers. The process by which chemicals are considered for regulation is designed to be open and transparent, and observers are invited to participate in almost all stages of the evaluation process, including intersessional working groups, contact group meetings, and plenary discussions. Observers frequently submit information (e.g., scientific studies, evidence drawn from their own experience as producers/users or as representatives of those who are affected by chemical pollution, etc.) and offer opinions or advice to POPRC members. The degree to which observers are allowed to participate in meetings depends in part on the preferences of the Chair of the Committee. Generally, observers are invited to speak after all members of POPRC have finished their discussions. They are also allowed to participate in working groups, many of which conduct their work intersessionally, to which observers contribute information about chemicals (uses, effects on humans and the environment, etc.), position papers, academic studies supporting their agendas, and other evidence which they wish to be considered by the Committee. If a debate becomes unruly, the participation of observers can be strictly limited by the Chair. As noted above, observers are not given equal standing to the members, and are not allowed to participate in any activity that involves formal decision-making.

The category of observer includes a wide range of organizations, companies, interest groups, and associations. Environmental and human health advocacy groups such as the International POPs Elimination Network (IPEN), Pesticide Action Network International (PAN International), Indigenous Peoples and Nations Coalition (IPNC), and Environmental Health Fund (EHF) are regular participants in meetings both of POPRC and the COP, and their contributions invariably focus on strengthening cases for regulation of individual chemicals. These organizations form a tight network within POPRC, and they tend work closely together to advocate for an agenda that emphasizes the need for precautionary, aggressive action to protect human health and the environment from POPs.

Chemical producers and users are represented by industry associations like CropLife International, Bromine Science and Environmental Forum (BSEF), European Semiconductor Industry Association (ESIA), and World Chlorine Council (WCC). Individual companies with interests in specific chemicals under review also send representatives to meetings of POPRC and the COP. The relationships among industry associations and companies are less clearly established than those among the environmental NGOs, not least because there are more representatives with a substantially wider range of interests. According to a member of CropLife International, the European and North American industry associations concentrate on monitoring the process to ensure that decision-making is conducted according to the terms of the Convention.[6] In other words, these industry associations are focused on ensuring that the decision-making is carried out with clear reference to the rules of procedure and the mandate given to POPRC by the COP, with no steps being skipped or loose interpretations going unremarked. Individual companies, on the other hand, tend to focus on advocating for or against regulation of the specific chemicals under review. It is important to note that the interests and agendas of industry representatives do not always overlap, and may even conflict. Relationships among industry representatives can be cooperative, competitive, or neutral, and may be influenced by commercial interests, geographic ties, etc.

In addition to the NGOs, the category of observers includes parties that do not have a seat on POPRC. Despite their status as parties, these “country observers” are expected to abide by the same rules of procedure as the NGOs. Other country observers include nations that are not parties to the Convention. Most significantly, this category includes the United States, which is a very active participant in meetings. The role of the US in POPRC’s work merits particular consideration because it works closely with both members and observers to support its agenda. Among developed countries, the EU and the US particularly stand out as leaders in shaping POPRC’s agenda, although the US is constrained by its status as an observer. As the analysis in Chapter 7 will demonstrate, the EU’s interventions demonstrate strong preferences for action to list substances under review (most

[6] Trewhitt, Mark. Chair, CropLife International POPs Project Team. Interview conducted by telephone. 18 November 2009.

of which have been nominated by the EU), while the US tends to focus on ensuring that the decision-making process reflects a strict interpretation of Convention text.

5.3.1a The role of the United States in POPRC's review process

As one of the earliest advocates for and top financial supporter of the negotiations to develop the Stockholm Convention, the failure of the US to ratify the Convention was a tremendous surprise and disappointment to many. However, representatives from the US Environmental Protection Agency (US EPA) and/or Department of State actively participate in every meeting of the COP and POPRC as observers. In addition to providing written evidence prior to POPRC meetings, these representatives offer opinions regarding both the procedural aspects of administering the Convention and the technical evidence that is evaluated by the Committee. As Jim Willis, US EPA and former member of the Stockholm Convention Secretariat,[7] explained in an interview:

> We have a tremendous amount to offer in terms of technical input to the Convention. Because so far if you look at all the POPs out there, we have undertaken pretty robust action. So, good risk assessment information, good exploration of alternatives, both alternative processes and practices, and alternative chemicals and the risks of alternatives, and so forth. … Plus our industry remains, although just barely, the top chemical industry in the world. And so there is an awful lot we can offer.[8]

While the US has not ratified the Stockholm Convention, it will be directly affected by decisions to reduce or eliminate chemicals that are produced or used in products manufactured by US companies. For example, perfluorooctane sulfonic acid (PFOS) is used in a vast array of American products, including Scotchgard (produced by 3M) and other stain repellents, anti-reflective coatings

[7] At the time of this interview, Jim Willis was representing the US Environmental Protection Agency, and his insights reflect both the US policy positions and his experience as a former Executive Secretary of the Stockholm Convention Secretariat and Director of the UNEP Chemicals Branch. On 18 April 2011, Willis took up the newly created position of Executive Secretary of the Secretariats of the Basel, Stockholm, and UNEP-part of the Rotterdam conventions. However, footnotes citations refer to the position held by Willis at the time of the interview.

[8] Willis, Jim. United States Environmental Protection Agency. Interviewed in Washington, DC. 29 October 2007.

on windshields and other glass surfaces, textiles, coated paper, paints, and cleaning products. Because this chemical has been banned under the terms of the Stockholm Convention (as of COP-4 in 2009), US manufacturers will no longer be able to export their products to countries that are parties to the Convention. The US government has a significant economic stake in many of the regulatory issues which are currently being considered by POPRC. Willis said that the US wants to make sure its economic interests are represented, and it also wants the Convention to be viable as an instrument for ongoing regulation of chemicals:

> We are really interested in this treaty, in making it a success. We want to make sure that the documents are right, are technically sound. … Because we also have a number of firms here involved in possibly the continued production and use of some of these chemicals, we have an important input on the economics that may not be as readily understood by all of the other countries. And then, of course, we have some preference as to how it all turns out. The political aspect, because we have an economic stake. [9]

In the case of PFOS, the US particularly wanted to influence the level of regulation chosen by the COP. According to Willis, banning most uses would be acceptable, but the US felt strongly that an exemption would be necessary for the use of the chemical in photo-resistant computer chips. Given the country's significant economic stake in this issue, delegates from the US attempted to convince POPRC that it was in the Convention's best interest to take very measured steps to regulate PFOS. According to Willis:

> Now, if the Parties of the Stockholm Convention willy-nilly decide to ignore the US and ban all uses of PFOS, … you will either have countries out of compliance, mixed compliance where some countries comply and others don't, or a huge negative impact on industry and our ability to take advantage of computer technology, because it will just stop everything. Or, fourth, a silly Convention.[10]

[9] Willis, Jim. United States Environmental Protection Agency. Interviewed in Washington, DC. 29 October 2007.
[10] ibid

Ultimately, POPRC recommended listing PFOS in the Annexes of the Convention, and at COP-4, Parties to the Convention decided to adopt POPRC's recommendation, but only with a lengthy list of exemptions for continued production and use (Ashton et al. 2009).

Despite the US economic interests in Convention decisions and its stated desire to ensure that the Convention is sustainable, as a non-party, the nation's influence is limited. If the US does ratify the Convention in the future, it will be able to exert more authority within POPRC decision-making (during its period of membership on the Committee) and in meetings of the COP. Some participants believe this would be beneficial to the process. For example, in an interview, a representative of the agricultural chemical industry association CropLife International stated:

> The US delegation has always been very pragmatic in their approach, neither pro nor anti the chemical under discussion, mainly focused on process. If the US ratified and were at the table then I feel that the POPRC would be more balanced. The EU ride roughshod over the smaller countries who find it difficult to articulate a cohesive argument in an unfamiliar language. The US would not allow that to happen. They have always intervened with [questions and comments about procedural validity], which, because they are not POPRC members, are largely ignored. The EU have an agenda and they don't mind bending the process to support that agenda. Like I said, this generally goes unchallenged and I would think the US would not put up with that, especially on issues of process.[11]

This comment underscores three important points: first, that some participants believe the process must be protected from manipulation by well-resourced Parties such as the EU, which is perceived by some to be using the Stockholm Convention to impose its own agenda without regard for procedural legitimacy or the interests of others; second, that CropLife International attempts to play the role of a "legal watchdog," and would like assistance from a party in this role; and third, that the US is perceived to value the legitimacy and transparency of process in much the same way that Willis emphasized in his interview on this subject. As previously noted, many developing countries argue that the EU is using the Stockholm Convention to "rubber stamp" its agenda and pressure other

[11] Trewhitt, Mark. Chair, CropLife International POPs Project Team. Interview conducted by telephone. 18 November 2009.

countries to support its comparatively pro-listing agenda. Industry representatives interviewed for this project emphasized this point repeatedly and highlighted what they consider to be multiple problems with the EU's use of the decision-making process, including omission of critical evidence. This will be discussed at length in the next chapter.

5.3.1b The influence of observers

While the formal influence of observers is limited in comparison with that of the members, many POPRC members expressed appreciation for their participation. Leena Ylä-Mononen, the former POPRC member from the United Kingdom, said that the input of NGOs, in particular, often helps POPRC better understand the implications of proposed actions:

> Some of the observers offer a cautionary note. Agriculture had one in a conservative way, the environment representatives would offer one in a more progressive, if not to say emotional, way, but I thought hearing those before we made the decisions was actually quite helpful. Just as sort of stimulus to say, "Hey, wait a minute, think carefully about this."[12]

Reiner Arndt, POPRC Chair, emphasized that he is careful to ensure that observers are given a chance to express their views, but only after POPRC members have had the opportunity to speak and to respond to one another:

> It is perhaps critical that observers should only make observations and should refrain from "this is all nonsense" or "I don't know what you are discussing." … I as a Chair normally allow only the members to speak, but when they are exhausted … then if observers want to make observations, I invite them. But if no member of the Committee takes up the point, then I don't take up the point. If I as the Chair think one should take up the point then I would repeat this, but normally I just wait to see whether a member of the Committee takes this up, and if no one takes this up, then everybody has heard it, and it didn't have an impact. If a member of the Committee takes it up … we discuss it until everybody is satisfied.[13]

[12] Ylä-Mononen, Leena. POPRC member from United Kingdom. Interviewed by telephone. 8 May 2008.
[13] Arndt, Reiner. Chair of POPRC from Germany. Interviewed by telephone. 8 April 2008.

In this way, the Committee can ensure that its decision-making process is open and inclusive and yet maintain a distinction between the contributions of explicitly politically-motivated actors and the supposedly more objective opinions of the scientific experts responsible for making decisions which uphold the goals of the Stockholm Convention. Chairman Arndt emphasized the importance of such a balance:

> So the decision is taken by the experts. The final discussion is mainly between the experts, but … in the preparatory process, observers, they are the same, they just speak and they bring their arguments, and they will they be put in or not, and so on. And so, it is a very transparent and open process.[14]

Observers are given many opportunities to contribute ideas, data, experiences, and opinions to the decision-making process, but they are systematically excluded from the process during the points at which decisions are actually made. In this way, POPRC seeks to separate science from politics while allowing scientists to consider all available evidence, as well as the potential implications of their decisions. This approach is based on the assumption that the members of POPRC are politically neutral scientists who are motivated by their professional commitment to objectivity, which, as indicated by the analysis of interventions during the last four meetings of POPRC, is not always the case. This division also affects the role of frames in debate; by requiring POPRC members to formally take up the points made by observers before those points will affect decision-making, Chairman Arndt has created a procedural barrier to the influence of frames in discourse, and ensured that, in this context, frames can only be effective if they are adopted by POPRC members.

5.3.2 Imbalances in participation of members and observers

Given the disparity in resources available to countries around the world, the expertise, experience and training of members of POPRC can vary significantly. While many members have multiple

[14] ibid

academic degrees in relevant fields, others have more limited formal education. Analysis of interventions made during POPRC-2 through -5 reveals a clear imbalance in contributions to discussion; the debates were heavily dominated by members representing developed countries. Bo Wahlström, the former POPRC member from Sweden, noted after POPRC-3, "You would have seen how many people contribute to the debate in a substantial way. There are 31 members, and I would guess ten or twelve really made the running. Mostly Europeans."[15] Wahlström suggested that this imbalance could be due to the fact that some members simply are not invested in the proceedings of the Convention, as their countries do not have significant socioeconomic stakes in the regulatory decisions being made at the meetings. Notably, this comment suggests that members are representing the interests of the countries with which they are affiliated, and are not acting as purely objective, disinterested assessors of scientific data, as suggested by Hypotheses 1 and 2 of this research. This will be discussed in much greater detail in the next chapters.

Wahlström noted that not all scientists are equally interested in or capable of participating in the Committee's work, and emphasized that some countries send scientists to POPRC meetings because they have been given a seat on the Committee and must meet regional obligations. Many of these scientists merely observe the proceedings, and do not attempt to exert significant influence over discussions or decision-making. One interviewee, who preferred to remain anonymous, described a delegate from Eastern Europe who was regularly seated next to him at meetings, saying:

> She was more attentive this time around, but she used to go out and come back with shopping bags full of clothes. This was a big deal for her. … She is a very capable person; she just wasn't taking any part in POPRC. She had to go to POPRC, so she did.[16]

Wahlström noted that lack of resources to support scientists could contribute to the disparity in participation, and offered the following explanation:

[15] Wahlström, Bo. POPRC member from Sweden. Interview conducted by telephone. 12 December 2007.
[16] Anonymous Interviewee B. Interview conducted by telephone. January 2008.

> Sometimes [a POPRC member from a developing country] is the only person in their country who deals with chemicals. And so it is quite a strain on them to participate in this exercise. I mean…where I work is amazing. We have about 200 people, and we have an international secretariat of about ten people, so I don't come to these meetings based only on my own work. … It probably is the same in other developed countries.[17]

The Secretariat is working to remedy this imbalance by developing a financial support mechanism to improve participation among individuals from countries that lack the resources to employ people to focus specifically on chemical regulation. POPRC has also published a handbook on effective participation in its work (an abridged version of which has been published in the six UN languages) and is holding regional workshops to help members learn about their responsibilities to the Committee, the rules of procedure, current issues, etc. Currently, however, influence over decision-making is clearly skewed toward individuals from countries that are developed or that have significant economic or other interests in the chemicals being discussed (e.g., newly industrialized countries such as India and China).

A bias toward academic degrees in scientific disciplines is apparent in some of the interviews conducted for this research, as well, which means that POPRC members who lack certain qualifications are afforded less credibility in the eyes of those who have recognized academic credentials. One interviewee from a developed country described a disagreement he had with a government observer from a developing country (who was expected to join the Committee at the next meeting), saying:

> You might remember quite a nasty exchange between me and [another participant] who was spouting on about the chemistry showing us this and that, and I said something like, "I want you to hear from a real chemist; here is the situation." And she came up to me afterward and said, "I am a real chemist, too. I've worked in the chemical industry for fourteen years." And so we agreed to differ on that subject.[18]

[17] Wahlström, Bo. POPRC member from Sweden. Interview conducted by telephone. 12 December 2007.
[18] Anonymous comment from Interviewee B. Interview conducted by telephone. January 2008.

As this anecdote illustrates, tension can exist among POPRC members who value different types of expertise, and some members may attempt to use such differences to strengthen their own arguments while discrediting others. Additionally, sentiments such as the one expressed above could heighten the sense of intimidation individuals may feel when they join the committee, particularly if they come from countries with limited resources devoted to helping them prepare for POPRC. Ian Rae, the former POPRC member from Australia, noted that some members may feel less sure of themselves and, consequently, may be quieter throughout the meetings: "If you go down the table you could see it was only maybe every second or third person who really seemed to know what was going on, or at least feel confident enough to contribute their point of view."[19]

Validating these observations by identifying patterns in participation is a crucial first step in assessing the use of framing in policy discourse, and more specifically, determining which participants are able to frame issues effectively. To achieve this, the coded text taken from the ENB reports was analyzed to determine whether a relationship exists between number of interventions and economic status of the countries with which POPRC participants are affiliated. For the purposes of this analysis, all countries that send delegates to POPRC, including countries with representatives participating as observers, have been divided into categories which reflect their economic resources. As noted in Chapter 4, divisions were made according to the World Bank's categorization of countries as high, middle, or low income countries. The countries represented at meetings of the Stockholm Convention are listed in Table 5.1, below, according to income level.

Table 5.1 World Bank income groupings of countries that participated in POPRC-2 - POPRC-5

High Income	Australia, Austria, Canada, Czech Republic, European Union, Finland, France, Germany, Japan, Norway, Republic of Korea, Slovenia, Spain, Sweden, Switzerland, Trinidad and Tobago, United Kingdom, United States

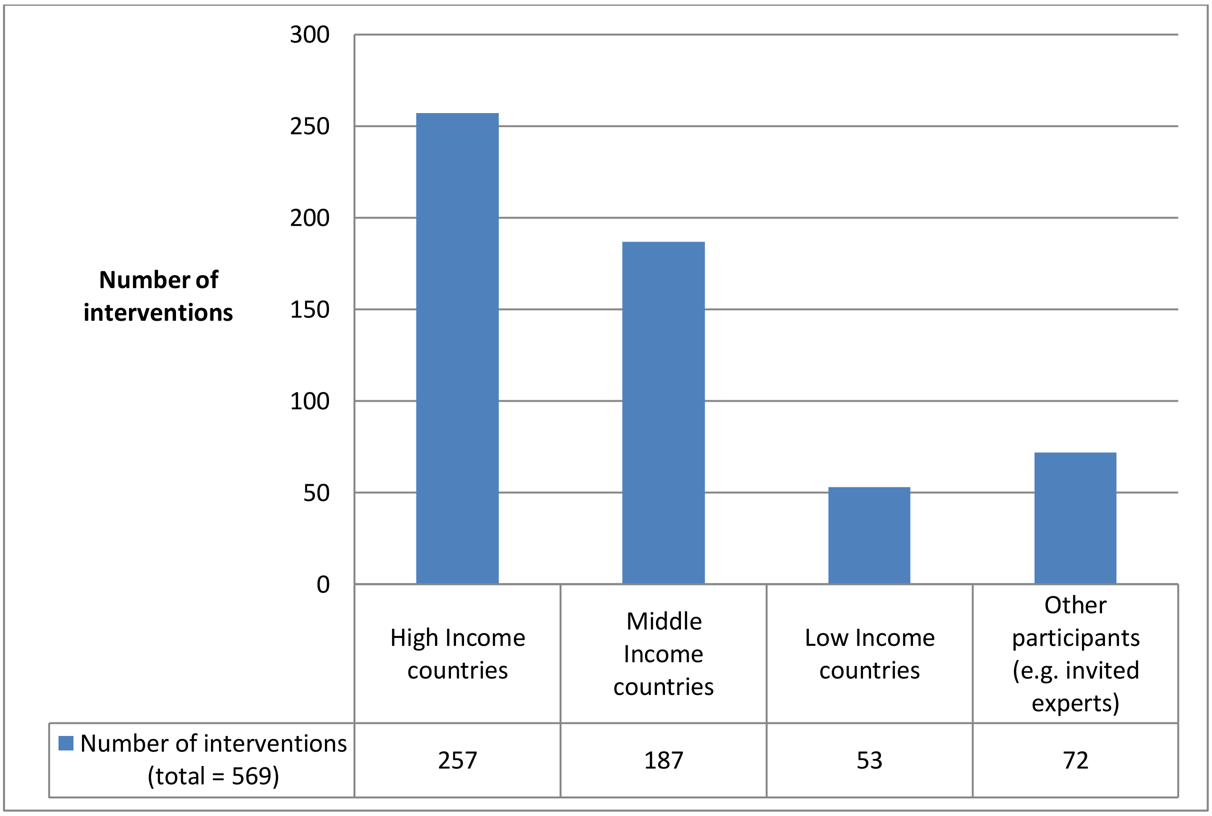
[19] Rae, Ian. POPRC member from Australia. Interview conducted by telephone. 29 January 2008.

Middle Income	Chile, China, Ecuador, India, Mexico, Philippines, Russian Federation, South Africa, Syria, Thailand, Uruguay
Low Income	Burkina Faso, Ethiopia, Ghana, Honduras, Jordan, Mauritius, Morocco, Qatar, Sierra Leone, Togo

Source: The World Bank, <http://data.worldbank.org/country/>. Accessed 15 November 2010.

As Figure 5.2 below illustrates, using frequency counts of coded interventions made by POPRC members and country observers from POPRC meetings 2 through 5, the number of interventions made by participants declines in relation to the economic status of the nations with which speakers are affiliated.

Figure 5.2 Total number of interventions based on income level of POPRC participant's country



Between POPRC-2 and -5, participants from high income countries made 257 interventions, those from middle income countries made 187 interventions, and those from low income countries made

53 interventions. The stark difference between the interventions made by the developed and the least developed countries indicates that POPRC discourse is dominated by countries with more economic resources to support participation, as suggested by the interviewees in the above comments. This disparity in participation suggests that the views of participants from wealthier countries drive POPRC's discourse, to the exclusion of participants from those least-developed countries which may not produce the chemicals in question, but are likely to face exposure to potential and confirmed POPs through use of agrochemicals and as recipients of electronic and other waste from developed countries. Furthermore, the interventions of middle income countries are dominated by India and China, both of which have significant economic interests in some of the chemicals that were being evaluated by POPRC during this time period (e.g., SCCPs and Endosulfan). The correlation between interventions and socioeconomic interests in chemicals under review will be analyzed in greater detail in the next chapter, but at this stage it is worth noting that contributions to discussion are heavily skewed toward scientists affiliated with countries with the resources to support active participation.

5.4 Conclusion

The process by which chemicals are listed provides multiple opportunities for participants to engage in strategic issue framing. Parties that nominate a substance for listing (Step 1) automatically frame the chemical as a threat to human health and the environment. Proponents of regulation have the opportunity to reinforce this frame during consideration of the Annex D screening criteria (Step 2), and again during the drafting and consideration of the risk profile (Step 3). Opponents of regulation can raise concerns about validity of evidence, scientific uncertainty, etc., throughout these stages, thus introducing doubt about the strength of the case for listing. Once POPRC has adopted a risk profile on a substance, opponents of listing may concentrate their efforts on highlighting socioeconomic concerns about the impact of listing a chemical; such issues will be captured in the risk management evaluation and subsequently addressed by the COP.

The rules of procedure that govern POPRC's evaluations give greater weight to the opinions of members than to observers, which means observers seeking to frame an issue must ensure that their frames are adopted, and repeated, by one or more POPRC members. The structure of the Stockholm Convention emphasizes openness and transparency of decision-making, and enables observers to participate in most stages of POPRC's work, which increases the opportunities of observers to promote their policy preferences. The effectiveness of observers' participation is enhanced by their ability to offer useful information to members, as indicated by the comments noted above, which highlights the importance of credibility for successful framing. If observers are perceived to offer useful information to members, they are more likely to be drawn into policymaking by POPRC members, both during plenary sessions and in working groups.

The observation that levels of participation decline in relation to the economic status of the country with which scientists are affiliated indicates that members and observers are affected by external factors; not all scientists do, or are able to, participate equally in the Committee's work. This suggests that scientists from wealthier countries are setting the agenda for the Stockholm Convention, in spite of the fact that the impact of regulation will be felt by all parties to the Convention. While POPRC is working to remedy imbalances in participation among delegates, to date, participants with access to greater resources have dominated the policymaking discussions.

While the structure of the Stockholm Convention formally separates science from policy, implementation of the Convention provides multiple points of access for members and observers to attempt to influence discourse in ways that will support their social, economic, or political interests.

The next chapter will draw upon the coded ENB reports, as well as interviews with participants, to examine the way science is used in the Stockholm Convention to promote policy goals.

Chapter 6: Results and Analysis

This is the second of three chapters that elucidate the findings of this research. This chapter presents the results of the hypotheses set out in Chapter 4 (section 4.3.3), and evaluates these results to determine whether they support the causal model posited in Chapter 4 (section 4.3.4). The following analysis identifies patterns of frames used by participants during successive stages of the policy process, and establishes links between the frames selected by some participants and pre-determined policy agendas that are shaped by participants' affiliations. The analysis is based on observation of meetings (POPRC-3, -4, and -5, and COP-3 and -4), formal and informal interviews with participants, and content analysis of the ENB coverage of POPRC-2 through -5. (The steps by which this analysis was conducted are delineated in sections 4.4 and 4.5.) Together, these three methodological approaches provide critical insights into the roles of science and scientists in the Stockholm Convention, the ways that participants use strategic issue framing to support their policy goals, the success of some framing strategies and the equally intriguing failure of others.

This chapter is structured as follows. The six hypotheses are presented in the order in which they were tested. Each hypothesis is followed by a summary of the key result. This summary is followed by an explanation of the hypothesis and its significance, the methods used to test the hypothesis, detailed explanation of the results, and discussion of their implications.

6.1 Hypothesis 1

Scientists have policy preferences that they seek to promote during science-based evaluations of chemicals proposed for listing.

6.1.1 Result

Analysis of ENB reports and interviews with participants indicate that, to varying degrees, scientists demonstrate preferences for particular policies. Preferences for policies are most clearly demonstrated by those scientists whose interventions are frequent and consistently support a particular course of action (either for or against continued review of a chemical and eventual recommendation for listing).

6.1.2 Explanation and significance of hypothesis

This hypothesis, which posits that scientists have policy preferences and that they support these preferences during POPRC's evaluations of nominated substances, is based on the argument that scientists working in policymaking contexts are not strictly disinterested observers of the process; rather, in the role of technical advisors to policymakers, scientists are in a unique position to advocate for policies which they believe to be the most effective responses to the problems policymakers are attempting to address (Jasanoff 1990). This research reinforces the validity of this premise by demonstrating not only that scientists are interested in the policies created on the basis of their technical expertise, but that separating science from policy is virtually impossible when scientists are working within the policymaking process.

This hypothesis was tested during interviews, both formal and informal. However, given the norms of scientific objectivity guiding scientists' behavior and statements, interviewees rarely acknowledged pre-determined policy agendas that were based on non-scientific considerations (a notable exception is provided by the member from Sierra Leone, who noted during both a formal interview and a plenary session at POPRC-4 that his preferences were often heavily influenced by socioeconomic considerations). However, in several cases, analysis of interventions suggested clear preferences for or against advancing the chemical to the next stage, or recommending the substance for listing. In some cases, these patterns correlated with the external socioeconomic interests of the governments or organizations with which the scientists were affiliated. Thus, this hypothesis serves as a foundation for Hypotheses 2 through 6, and the findings associated with each of these contributes to a comprehensive test of Hypothesis 1.

6.1.3 Findings

As illustrated in the causal model, scientists' preferences influence the framing approach they take during debate. In order to achieve an outcome that is consistent with their preferences, rational actors will select frames they expect to be most effective at winning the support of other participants. During the meetings, the interventions of pro-regulatory participants emphasized the availability of scientific data (evidence of harm) or, in the absence of data, invoked the precautionary approach. Scientists who opposed listing consistently used frames that emphasized scientific uncertainty as an obstacle to continued evaluation or eventual recommendation of a substance for listing. The frames selected by participants with clear preferences are comprehensively evaluated in sections 6.3 – 6.5 below, which present the results of the content analysis of the ENB reports. The consistency and frequency of use of frames that supported or opposed listing by these participants strongly supports the hypothesis that the preferences of some scientists are determined by factors other than the scientific evidence presented to the Committee for review. Some scientists made few interventions in plenary discussions, or made interventions which can be categorized as neutral (e.g., interventions which seek clarification about particular points raised in discussion, etc.). While these scientists may have preferences for particular outcomes, such preferences were not identifiable, and were not supported in discussion.

In the context of the Stockholm Convention, scientists are embedded in a politically-charged atmosphere. Many of the decisions made by POPRC have significant socioeconomic implications for producers and users of chemicals, as well as health consequences for populations that are involuntarily exposed to the chemicals (e.g., people living near the Arctic Circle). Scientists participating in the work of POPRC are responsible for evaluating existing data in order to recommend some form of political action (specifically, to regulate a chemical or to set it aside); thus their work has direct, observable, and significant policy implications. Furthermore, the possible socioeconomic and other implications of POPRC scientists' decisions are often explicitly addressed during Committee discussions, both during and prior to the drafting of the risk management evaluation (which is designed to serve as an information document highlighting the possible consequences of regulation. Importantly, these possible consequences should not factor into POPRC's decision to recommend a chemical for listing; rather, the document serves as information which is presented to the COP along with POPRC's science-based recommendation for listing).[20] Scientists' unique positioning in the Stockholm Convention policy process gives them the opportunity to define problems and to suggest what they perceive to be appropriate action.

The epistemic communities approach is a natural extension of the premise that scientists have asymmetric control over the policymaking process, as this approach suggests that scientists' policy preferences will be derived from their technical expertise. This approach, which is the basis of Hypothesis 2, goes hand-in-hand with Hypothesis 1. Determining whether scientists have policy preferences inevitably involves investigation into the source of any preferences which may be identified; thus, the two hypotheses are linked. The results of the test for Hypothesis 2 are discussed in the next section.

[20] See Chapter 5 (especially sections 5.2.3 and 5.2.4) for an analysis of the relevant stages of the policy process.

6.2 Hypothesis 2

One or more epistemic communities of scientists and technical experts working within the context of the Stockholm Convention engage in coordinated action to promote their values-based agendas.

6.2.1 Result

Epistemic communities of scientists have not formed within the context of the Stockholm Convention.

6.2.2 Explanation and significance of hypothesis

The epistemic communities approach provides an analytical tool for aggregating the preferences of scientists, and assumes that these preferences are derived from scientists' technical expertise. As illustrated by the causal model, these preferences will determine the frames used by participants in POPRC's review. The approach allows us to consider the ways in which scientists might engage in coordinated action to promote policy preferences grounded in their advanced understanding of the mechanics of a problem like POPs pollution. Crucially, the epistemic communities approach assumes that the policy preferences of scientists and technical experts are derived from their understanding of the problem. Their expert interpretation of data directly informs their views about how problems may be addressed most effectively. This approach distinguishes scientists and technical experts from other participants in policymaking by recognizing their unique expertise and the resulting asymmetric control of the way problems are defined and understood. The power to interpret data and define problems allows scientists and technical advisors to frame issues for policymakers and other laypeople, who lack scientific expertise and the ability to interpret data and other knowledge related to environmental and public health issues.

Identification of epistemic communities working within the Stockholm Convention would indicate that science plays a significant role in the policy-making process. Because epistemic communities have normative, values-based agendas derived from their understanding of the causes of a problem, advocacy for a given policy outcome would be fundamentally rooted in scientific knowledge. This would indicate that science is driving at least the early stages of policymaking, to the exclusion of factors such as economic interests, the availability of substitutes and alternatives, etc. This does not mean that the preferences of epistemic communities would prevail over competing interests introduced later in the process; rather, it would invite scrutiny of the extent to which science-based preferences, and arguments rooted in evidence and data, affect decision-making in the later stages of the Stockholm Convention's policymaking process.

Two means of gathering data, interviews and participant observation, were used to test this hypothesis, which is based on the predictions of epistemic communities approach (as set out in Chapters 3 and 4). In order to demonstrate that epistemic communities are operating within a given policymaking environment, evidence of coordinated action among scientists and technical experts must be identified. Furthermore, coordinated action among scientists and technical experts would need to fulfill the four criteria identified by Haas: i) shared normative beliefs that provide a rationale for action; ii) shared beliefs about the causes of a problem, iii) internally defined criteria for establishing validity; and iv) a common policy enterprise (Haas 1992, p.3). In the context of POPRC, such evidence could take the form of a shared approach to framing an issue by scientists who share a particular disciplinary background, competition among sub-groups of experts to advance a 'common policy enterprise', or the explicit acknowledgement of cooperative efforts to support or oppose continued review of a chemical on the basis of shared understanding of key elements of the issue. As discussed in Chapter 3, it is possible that POPRC itself, as an expert committee, could constitute an epistemic community. Alternatively, it is possible that one or more subgroups within this policymaking context could form epistemic communities, possibly as a result of competing perspectives and understandings of the causes of a problem (e.g., chemicals managers and toxicologists). These two possibilities will be explored below.

6.2.3 Findings

The possibility that POPRC itself represents an epistemic community is unlikely, as the committee does not fulfill all four criteria established by Haas. First, interviews with participants, and analysis of interventions, provided no evidence that the committee as a whole has a shared set of normative beliefs that provide a "values-based rationale for the social action of community members" (Haas 1992a). While most interviewees expressed general support for protecting human health and the environment, not all interviewees agreed that recommending various chemicals for listing was either necessary or warranted by the data. Furthermore, as will be discussed in Chapters 5 and 6 , both interviews and analysis of the discourse between POPRC-2 and -5 indicated significant differences among members on the value of POPRC's work, the motives, and the interests. The interviews and discourse analysis do not support a conclusion that members share a values-based agenda at more than a superficial level. The actions and interventions of members of POPRC indicate that there were more interests at play than just protecting human health and the environment. Notably, at least two delegates questioned POPRC's authority and decision-making process, suggesting that POPRC was actually driven by the political interests of developed countries and were failing to represent sincere concern for the welfare of farmers and other groups in developing countries . This indicates that even if all POPRC members broadly supported the aims of the Committee, not all members agreed that POPRC's actual work contributed to achieving these aims.

Second, while members of an epistemic community would have a shared set of causal beliefs about the roots of a problem, in the case of POPRC, this was again only evident at a superficial level, and did not apply to every chemical being reviewed. While the Committee has agreed that POPs are defined by certain characteristics (long-range environmental transport, persistence, bioaccumulation and toxicity), reviews of individual chemicals to determine whether substances met these criteria were often contentious. In the case of Endosulfan, the disagreement was resolved by a series of votes on whether the threshold criteria had been met. In the case of SCCPs, the committee is (to date) deadlocked, unable to agree that the criteria are either met or unmet. Thus, while one could argue that members of POPRC broadly agree that POPs are harmful to human health and the environment, this does not mean that the preferences of every POPRC member are predominantly shaped by concern for reducing the risks of exposure to POPs.

Third, Haas specifies that epistemic communities should have shared notions of validity. POPRC fulfills this criterion, as the committee works according to an established set of rules for evaluating the strengths and weaknesses of data, and uses agreed-upon criteria at each stage of review to determine whether nominated substances can be categorized at POPs. These criteria are set out in Annexes D, E and F of the Stockholm Convention. However, the internally-defined standards for validity were not universally approved by POPRC members, and were contested repeatedly by a small sub-group of members over a series of meetings. Such arguments were made most vehemently and frequently during the review of Endosulfan, by two members from countries with economic interests in the continued production and trade of this substance. This is discussed in detail in sections (INSERT SECTIONS). These repeated objections suggest that the committee as a whole does not constitute an epistemic community, and also suggest that the fourth criterion, a shared policy enterprise, is unfulfilled.

Again, on a superficial level, one could argue that POPRC is defined by a common policy enterprise: the evaluation of chemicals with the aims of identifying POPs and recommending appropriate regulatory action. However, as Chapter 7 illustrates, the interventions and actions of a minority of POPRC members suggest that they were motivated less by concern for preventing harm to humans and the environment and more by government-imposed pressure to prevent economically-valuable chemicals from being recommended for listing in the Annexes of the Convention. While these actions were taken most clearly and consistently by a small group of members (affiliated with China, India, Argentina and Sierra Leone), they preclude categorization of POPRC as an epistemic community. The objections of a minority do not mean that an epistemic community has not formed among other members, but it does indicate that the expert committee itself does not constitute an epistemic community.

Given that POPRC itself does not demonstrate the characteristics of an epistemic community, it is necessary to explore the possibility that one or more subgroups have formed such communities. In order to identify evidence of such coordination, a number of steps were taken. First, using the curricula vitae (CV) for each member, as submitted to the Stockholm Convention Secretariat, the disciplines of POPRC members were recorded and categorized to identify possible sub-groups within the Committee. This information is set out in Table 6.1, below. Of the 59 individuals given a seat on POPRC between the first and fifth meetings, the CVs of three members were unavailable. Individuals were categorized according to the highest degree attained (which ranged from BSc to PhD, or the equivalents), or, when the degree was not specified, to the listed area of expertise. The disciplines for the 56 members who submitted CVs are listed below, and are divided according to POPRC meeting.

Table 6.1 The disciplinary backgrounds of POPRC members (POPRC-2 - POPRC-5)

Discipline	Number of committee members, by meeting			
	POPRC-2	POPRC-3	POPRC-4	POPRC-5
Agronomy	1	1	1	
Biology		4	3	3
Chemical engineering			3	3
Chemistry	16	16	12	13
Environmental engineering	3	3	2	2
Environmental management	3	1	1	1
Environmental science	1	1		1
Microbiology	2			
Physics	1	1		
Toxicology	3	4	6	6
Zoology	1	1	1	1
Zoophysiology	1	1		
Total	**32**	**33**	**29**	**30**

Note: A total of 59 members participated in POPRC meetings 2 to 5. Since most members attended more than one meeting, the total of the columns in Table 6.1 add to more than 59. The table does not include the three members whose CVs were unavailable.

As Table 6.1 demonstrates, a majority of POPRC members at each meeting have some level of expertise in chemistry, while the numbers of members who list other areas of expertise are significantly smaller. Toxicologists make up the second largest disciplinary sub-group within each meeting, but toxicology is a specialist strain of chemistry. Most of the other disciplines are also closely related to the broader discipline of chemistry (chemical engineering, environmental science, etc.). The predominance of individuals with some level of training in chemistry or closely-related fields suggests that members may share a common scientific language, view evidence from the same perspective, share preferences for types of evidence presented, etc. The predominance of experts in chemistry does not, in itself, preclude the possibility of an epistemic community in this context; while Haas notes that such a community *may* include members from a range of disciplinary backgrounds, interdisciplinarity is not required (Haas 1992a). Furthermore, discipline-based epistemic communities have been identified in recent research on environmental policymaking (see, for example, Meijerink 2005). Thus, if one or more epistemic communities had formed within

POPRC's work, it is possible that these communities could have consisted of a large community of individuals with expertise in chemistry, or competing sub-groups with specialist expertise in fields such as toxicology or chemicals management.

The issue of relationships among scientists was explored during the formal and formal interviews with POPRC members and observers. (Sample interview schedules are provided in Appendix D). Specifically, interviewees were questioned about relationships among participants, their views about the possible existence of sub-groups within the committee, and whether the interviewees tended to work more closely with participants with similar expertise than they did with participants from different disciplinary backgrounds. The analysis of the interviews, as well as observations of working group and plenary discussions, indicate that scientists tend to work cooperatively with one another, explaining implications of studies to one another and deferring to participants who are perceived to have expertise in a particular area. For example, the current POPRC member from Japan (Professor Matsuri Kitano) is regarded by many POPRC participants as an authority on issues related to bioconcentration, and is often called upon both in plenary and in working groups to give his opinion on data related to bioconcentration and bioaccumulation. In an interview, Reiner Arndt, POPRC Chair, noted that many members have specialist technical knowledge which can be drawn upon by POPRC, and cited Kitano as an illustration of this point. According to Arndt:

> Professor Kitano is an extraordinary expert on bioaccumulation and other issues. So there is always someone who is really a specific expert in a certain field, and there are more generalists like me who have worked scientifically but also work on policy … so it is a good balance.[21]

Crucially, there was no evidence to suggest that individuals with expertise in particular areas are part of larger, discipline-based subgroups within POPRC; rather, they are often acknowledged to be the sole authorities within the committee on specific issues. There are no indications that they have

[21] Arndt, Reiner. POPRC Chairman. Interview conducted by telephone. 8 April 2008.

distinctive relationships with others of their disciplinary background, as would be required to support a premise that one or more discipline-based epistemic communities have developed within this policy context.

During the interviews conducted for this research, several POPRC participants addressed the issue of relationships among scientists during formal interviews, and all referred to what they perceived to be the broad range of disciplinary backgrounds of POPRC members. None of the interviewees indicated that they had developed distinctively close working relationships with other members of the same disciplinary backgrounds, and some rejected the idea that discipline-based sub-groups had formed, or could form, within the Committee. According to Ian Rae, the former POPRC member from Australia:

> There is a range of people around the table. Some are, indeed, chemists like me, with quite a deep understanding of the numbers. Others are toxicologists. Jose Tarazona from Spain is a toxicologist, and so he has to understand at least the chemical nature of the substances, but is much more concerned with their toxicology. And so it is nice to have him there when you work with the chemistry. You say, "What about it, Jose, is this really toxic or not?" There are some pretty good people there.[22]

Rae's comments illustrate the perceived interdisciplinarity of the committee, as well as the collegial, cooperative atmosphere which prevails at POPRC meetings. Scientists tend to defer to each other's expertise in particular areas and incorporate all types of relevant evidence into reports and evaluations, including evidence produced by scientists from disciplines which differ from their own. There is no evidence of systematic bias toward particular types of data; rather, scientists work to meet the data requirements outlined in the Convention, and rely on experts (including invited experts who are not members of the Committee) to provide specialist information or interpretation as required. This co-operation and complementarity that was referred to during interviews and observed at meetings suggests that this hypothesis should be rejected – epistemic communities

[22] Rae, Ian. POPRC member from Australia. Interview conducted by telephone. 29 January 2008.

based on disciplinary background have not formed within the Stockholm Convention. However, the interviews did reveal some interesting insights into the relationships between members. These are explored below.

Academics and chemicals managers

While no interviewees identified any subgroups approximating an epistemic community, several pointed to other sources of division among participants; specifically, a divide between participants from countries that are well-resourced and those that are not, as well as a divide between scientists who come from academic backgrounds and those who work as chemicals managers, and are, therefore, accustomed to using science to construct policy. Bo Wahlström, the former POPRC member from Sweden, rejected the notion that scientists might form distinctive relationships with others of the same disciplinary background, and in an observation which builds upon Chair Arndt's comments about the mix of scientists with and without policy backgrounds, noted:

> I think there is a slight divide between people who are what I call "pure scientists," people who come from academia … or people who have a scientific background and work with agencies, work for the government and so on. … Because then you realize that yes, science is one thing, but there is also something you could call science policy. I mean, how do you handle scientific results, particularly if they are…conflicting or if they are too vague…then you need some overriding scientific policy that bridges the gap between the data you have and what you actually need to do. [23]

Wahlström's comment highlights the tension inherent in scientific evaluation of chemicals for purposes of crafting policy responses. This task is particularly challenging in a global context, when a range of economic and social issues are at stake, and a decision to list a substance globally could have significant consequences for nations that produce or use the chemical in question. Wahlström's statement reflects the view that even in the face of scientific uncertainty, policy decisions must be made, and suggests that scientists from academic backgrounds will be less willing

[23] Wahlström, Bo. POPRC member from Sweden. Interview conducted by telephone. 12 December 2007.

to take action in the absence of full scientific certainty than will scientists who work as chemicals managers (e.g., for governments). While Wahlström emphasizes the value of a "science policy" approach which can bridge the gap between evidence and action, other participants in POPRC see such action as a means of promoting politically-motivated, aggressive environmental action that is not justified by the available evidence. Although proponents of precautionary action are comfortable with taking action in the absence of full scientific certainty, as sanctioned by the Convention in Article 8, paragraph 7(a), some participants argue that this position is taken too far by some Committee members – and particularly by chemicals managers – who prioritize policy agendas over thorough scientific review of data. According to one interviewee, chemicals managers are more concerned with politics than with science, and cannot be viewed as "real" scientists:

> If the POPRC was the scientific advisory body to the COP it was first envisaged to be, then it would be made up of experts in their respective fields of LRET, [persistence, bioaccumulation, and toxicity] from around the world, such that when some contentious issue arose in the data they could make a scientific judgment as to whether the [bioaccumulation] criteria are satisfied, for example, based on their years of experience, their knowledge of how much weight to give to certain data, etc. etc. Not someone with a "political" motive behind them trying to persuade [POPRC] to accept a "worst case" value because it is over a trigger value, which in most scientific fora would not be an acceptable approach. It brings politics to the table, where politics, according to the [Stockholm Convention text], should not be present. The politics should be left to the COP. The recommendation to COP should be made on sound science and not have its waters muddied by politics. There'd be no voting, as a scientist wouldn't be bothered if they took an extra year to gather more data so they could be sure of their recommendation. The only members that are bothered by delays are the politically driven members of the POPRC (as an example, the little pact between Sweden, Switzerland and the EU to vote [Endosulfan] through at POPRC-4).[24]

This statement highlights the tension between scientific evaluation and the external factors which can influence policymaking. According to this interviewee, many of the decisions made by POPRC are inherently unsound because they prioritize political agendas over objective scientific review. Such decisions, in the interviewee's opinion, have not been justified by thorough review of the data by members who are completely disinterested in the policy implications of the results. Both this

[24] Anonymous Interviewee A. Comment received via email. 25 November 2010.

statement and Wahlström's comment indicate that policymaking is not a "purely" scientific endeavor, nor is it perceived as such by participants with very different interests in the outcomes of regulation. These comments highlight the need for further scrutiny of the role of external interests, such as political agendas, economic concerns, etc., in POPRC's decision-making process.

Despite the fact that both of these interviewees seem to draw a bright line between POPRC members who are academics and those who are chemicals managers, placing these individuals into distinct, mutually exclusive categories is a highly subjective process which, in many cases, fails to capture the variety of experiences and responsibilities of POPRC members. For example, some members who identify themselves as academics, rather than chemicals managers, have worked for governments on a consulting basis for many years, serving as delegates to meetings of the Stockholm Convention and other global environmental agreements, such as the Montreal Protocol, the Basel Convention, etc. Classifying such individuals as strictly academic scientists would not acknowledge their extensive experience in policymaking environments. Furthermore, many of the POPRC members who have worked in government roles for most of their careers would object to a characterization of their expertise or conclusions as being "less" scientific than those of academics.

Another important factor is the degree of freedom scientists are given to act autonomously by the governments they represent. In order to emphasize the independence of POPRC members from the political interests of governments, POPRC members are not formally referred to as "representatives" of or "delegates" from the nations with which they are affiliated. This is just one way of highlighting the independence of scientists, and underscoring the objectivity and credibility of POPRC as a scientific review committee. However, POPRC members are frequently accompanied by government representatives, who sit behind the members in plenary sessions and actively participate in all of the phases of decision-making that are open to observers. The relationship between POPRC members and these government representatives is highly individualized. While some members are given freedom to act autonomously, others consult with these government representatives regularly, particularly when they feel that the discussion is likely to have political or socioeconomic consequences for the countries with which they are affiliated. Thus, while it is useful to identify the tension between government representatives and academic scientists, the evidence presented thus far indicates that political and socioeconomic factors play a more significant role in decision-making than is commonly acknowledged. The influence of political, social, and economic factors in the earliest stages of policymaking could preclude the formation of epistemic communities, as these factors could act as constraints on the ways in which scientists participate in the work of POPRC.

The fact that epistemic communities have not formed in this context is surprising, given that POPRC is a committee which has been designed to bring together experts in an objective, scientific, politically-neutral setting to evaluate technically complex data and information. Because many of the live chemicals under review are comparatively new, uncertainty about their possible long-term effects on human health and the environment could lead to conflicting interpretations of data and a range of conclusions about whether chemicals meet the criteria for regulation. In a competitive science-based discussion, it would be natural for differences of opinion to fall along disciplinary lines, thus creating opportunities for the development of epistemic communities. The evidence presented above indicates that shared disciplines have little effect on the relationships among scientists and the preferences they express. However, the reasons why epistemic communities have not formed in the context of Stockholm when many of the conditions favoring their appearance are present will be discussed in Chapter 8.

POPRC's discussions have been contentious on a number of occasions, and, as noted in both the ENB and official meeting reports, between POPRC-2 and -5 the Committee was repeatedly unable to reach consensus on substantive issues. In order to understand the roles of science, politics, and socioeconomic interests in POPRC's decision-making process, it is important to identify the causes of these disagreements. As discussions of Endosulfan at POPRC-4 and -5 illustrate, a small number of scientists rejected the conclusions reached by the rest of the Committee. Analysis of the debates leading up to decisions on Endosulfan is presented in Chapter 7 (section 7.2.3). In this case, one scientist argued that the substance failed to meet any of the criteria for regulation. The claim that a substance failed on all counts was unprecedented in POPRC's work, and was also rejected by 29 of the 31 Committee members who participated in a vote on the issue. Notably, Endosulfan is a live chemical which is of significant economic importance to two of the three countries whose scientists opposed every attempt to attempt to evaluate the chemical, from nomination onward. The case of Endosulfan is one of the most striking examples of a correlation between the political or economic interests of a country and its scientist's opposition to advancing the chemical through the stages of evaluation. Such correlations suggest political and economic interests may outweigh science-based analyses, thus precluding the development of epistemic communities. At the very least, such correlations invite further analysis of the role governments play in shaping scientists' preferences. This is examined directly in the tests relating to Hypotheses 3, 4 and 5 below.

6.3 Hypothesis 3

Scientists' policy preferences reflect the socioeconomic interests of their countries and determine their approaches to debates within the policy process.

<u>6.3.1 Result</u>

Where countries have a strong socioeconomic interest in regulation or opposition to the regulation of a chemical, these interests shape the policy preferences of scientists from those countries and therefore determine the approach they take within the policy process.

6.3.2 Explanation and significance of the hypothesis

As noted in Chapter 4, this is an alternative hypothesis to Hypothesis 2, which posits that affiliation with an epistemic community will determine scientists' policy preferences. In contrast, this hypothesis posits that such preferences are heavily influenced by the interests of the national governments with which the scientists are affiliated.

This hypothesis was tested using evidence from interviews, analysis of interventions, and data on the socioeconomic interests of countries that produce or use the chemicals under review. The interviews provided particularly interesting information about the relationships among scientists participating in POPRC, as well as the relationships between scientists and the governments with which they are affiliated. Several interviewees highlighted the pressure governments place on scientists to represent country interests during debate. The patterns of frames used by scientists is fully presented in the results relating to Hypotheses 4 and 5 (sections 6.4 and 6.5), as the preferences of scientists tended to be revealed most clearly analysis of the frames that they used during debate.

6.3.3 Findings

The relationships between scientists and their employers were explored during the interviews, which provided substantial insight into the reasons why scientists working on POPRC sometimes have difficulty reaching agreement on issues. Specifically, these interviews indicate that the development of epistemic communities has been precluded by the political pressures placed on scientists by the governments with which they are affiliated. This finding is even more interesting than if epistemic communities had formed as predicted, as it suggests that participants in POPRC's work are superficially behaving in accordance with broadly accepted norms of scientific objectivity and disinterest, but are actually motivated by externally-imposed pressures which are deliberately and systematically unacknowledged in formal discussions. If addressed, these pressures – the political and economic interests of those governments which employ the scientists with seats on POPRC – could undermine the credibility of the scientific decision-making being carried out by the Committee, and in turn undermine the credibility of the Stockholm Convention as a transparent, fair, and objective international mechanism for addressing a global environmental problem.

Political interests manifest themselves in numerous ways in the work of POPRC. Officially, as discussed in Chapter 5, the process is intended to proceed in discrete stages, with socioeconomic concerns being addressed for the first time during the third step of POPRC's evaluation: preparation of a risk management evaluation (see section 5.2.4). These evaluations are submitted to the COP along with a recommendation for listing the chemical, and are designed to provide information about possible implications of banning or limiting the use of a substance. Such concerns are expected to be addressed in more detail during meetings of the COP, by the national delegates whose responsibilities and areas of expertise encompass politics and policy, rather than science. This formal division of labor is designed to separate science from the social, economic, and political issues associated with listing substances, thus protecting the objectivity of the scientific review process. In practice, however, some POPRC members interviewed for this project admitted to being under pressure to represent the interests of the nations with which they are affiliated. Several noted that separating science from politics is difficult, particularly in the context of a multilateral environmental agreement under which regulatory decisions may set precedents for the listing of other chemicals are economically important to stakeholders.

Developed and developing countries: the role of socioeconomic status in POPRC discussions

States may have political or economic interests in regulation, and to date, these interests have often manifested themselves in a stark division between developed and developing countries. For example, at COP-4, developing countries refused to consider the proposal to list the nine new substances recommended by POPRC until after agreement was reached on the package of financial and technical assistance. In this way, developing countries used their cooperation as a tactic for leveraging political pressure on developed countries to increase their technical and financial commitments. In POPRC, the division is less overt, but concerns about conflicting interests between developed and developing countries still arise.

A source of tension which pervades all levels of decision-making is the widely-held perception that the EU is using the Stockholm Convention as a mechanism for global advancement of the regional body's political interests. One interviewee characterized the EU's agenda as "regulatory imperialism."[25] Ian Rae, Australia, gave a more measured account of the leadership role the EU has taken on in POPRC, explaining that:

> We are approaching many of the decisions we have to make against the background of decisions that have already been made by some regions or some countries. So, the European Union are leaders in this respect, and they are some years ahead of the POPRC in considering substances and recommending that they be phased out. So we are not coming in with a clean slate. We have got behind us this experience of experts in Europe judging that this substance, whatever it is, was not to be used anymore.[26]

Rae went on to explain that this issue has caused some degree of conflict in each of the POPRC meetings to date, noting:

> [Some are] saying that … the Europeans more or less expected the POPRC to rubber-stamp what they had done. And this led to arguments with people who said, "Well, I don't think the evidence is very strong. I understand that the Europeans felt strongly about it, and strongly enough that they had a consensus and they could move forward,

[25] Anonymous Interviewee A. Communication sent via e-mail. 20 May 2010.
[26] Rae, Ian. POPRC Member from Australia. Interview conducted by telephone. 29 January 2008.

> but I don't think that the evidence required by the POPRC was the same evidence that the Europeans considered." So there was a bit of skirmishing that went on.[27]

This issue has increased in intensity with the shift from dead to live chemicals, and has become particularly acute with reference to Endosulfan. Following POPRC-5's decision (by vote) to move Endosulfan to the third stage of evaluation (drafting of a risk management evaluation), the Indian Chemical Council released a document entitled "Deceitful Decisions at the Stockholm Convention." On the first page of the document, the ICC includes the following statement, which, in strikingly undiplomatic terms, argues that the EU is dominating the Stockholm Convention's decision-making process[28]:

We solemnly declare and assert under the Stockholm Convention that….
We have the rights to submit a proposal
Supply a self-made review of our own proposal
Sit in judgment on the self-made review and
Finally deliver decisions..!

Under the Stockholm Convention
We are the alpha
We are the omega
We are the EU..!

The document goes on to assert:

> In the world of trade and commerce, for every move there will be a motive. Industry observers feel that to run around the strict WTO rules, the Europe [*sic*] is increasingly using the Stockholm Convention to apply trade restrictive measures on certain high volume, low priced generic chemicals manufactured outside the Europe. Eliminating the use of generic chemicals and pesticides helps in sustaining the Europe's supremacy in the chemical trade.[29]

This statement elucidates the ICC's view of the EU's motives, and highlights the perspective from which some stakeholders view the conflict between developing and developed countries. It also

[27] Ibid.
[28] Ganesan, Shunmugam. 2010. "Deceitful Decisions at the Stockholm Convention." Distributed by the Indian Chemical Council via email.
[29] Ibid.

supports the hypothesis that scientists have policy preferences which are not derived from their expertise, but instead are shaped by non-scientific economic and political concerns. In an interview, Thomas Yormah, the former POPRC member from Sierra Leone, suggested that European members of POPRC are more concerned than their southern counterparts about POPs because these substances are attracted to the colder climates in which these countries are located, and therefore pose more serious health and environmental risks to the countries which are pushing hardest for regulation. Yormah also suggested that the EU is willing to manipulate scientific evidence in order to promote its green agenda. In a conference room paper submitted at the end of POPRC-5, Yormah noted:

> …it is understandable that our European colleagues are more concerned/vigilant about POPs because the longer presence of these chemicals in their very own environment causes very adverse effects on the human population and the environment. If the table were to turn and I find myself in their predicament I would most certainly be as vigilant as they are on POPs-related matters – even to the extent of putting a spin on the science.[30]

The representatives of the EU have refused to issue a formal response to accusations that it is dominating the agenda of the Stockholm Convention, manipulating data in order to promote a predetermined political agenda, violating the rules of procedure, or otherwise abusing the Convention for political purposes. One POPRC participant affiliated with the EU agreed to speak "off the record," and said that the EU will not respond to the accusations of the Indian Chemical Council or other non-governmental entities because they do not want to legitimize such arguments. This interviewee flatly denied that the EU is manipulating the process, and joked that the level of planning necessary for such a scheme would be beyond the EU's capacity for coordination. The interviewee emphasized the transparency of the process by which the EU decides to nominate substances for evaluation under the Stockholm Convention, and noted that the chemicals ultimately nominated by the EU are selected during a series of meetings which are open to state delegates,

[30] Yormah, Thomas. POPRC member from Sierra Leone. Statement submitted to POPRC-5 (UNEP/POPS/POPRC.5/CRP.12). 16 October 2009.

industry representatives, and advocacy groups. Furthermore, he argued that the EU does not put a "spin" on science, saying that the data presented in support of nominations is taken from a range of credible sources, including peer-reviewed academic journals, and that all POPRC participants are invited to submit evidence during the committee's review process.[31] The interviewee underscored the transparency and inclusiveness of the POPRC decision-making process, and said that it would be difficult to manipulate science that is being evaluated by such a diverse committee of experts.

Separating science from politics in POPRC's decision-making process

Other participants acknowledged that maintaining a distinction between science and politics can be difficult, and emphasized that not all POPRC members are comfortable with the policymaking aspects of the committee's work. Wahlström suggested that there is a difference between scientists with policy backgrounds and those who come from academia, referring to the latter as "pure scientists." He also highlighted the role played by government delegates who attend as observers:

> …you can look at China, for example. The representative in the committee is a professor. And you might you have noticed that he went off quite frequently to discuss with the observers from China, from the Chinese EPA and the Environment Ministry. Because, I think he felt in many cases that his expertise was on the science, but when we talked about PFOS and the possible exemptions and so on, he needed to consult with them.[32]

The presence and active participation of government observers in POPRC discussions indicates that members' contributions are considered to be of importance to stakeholders; the science-based decisions of POPRC have political and economic implications that are relevant and important to many of the countries with seats on the committee. As previously noted, Ian Rae, Australia, also emphasized the influential role played by government observers, and referred to the government observer from Australia as his "minder." Both of these comments underscore the tension between

[31] Anonymous interviewee E. POPRC member. Interview conducted during POPRC-6. 15 October 2010.
[32] Wahlström, Bo. POPRC member from Sweden. Interview conducted by telephone. 12 December 2007.

science and politics in the work of the POPRC, and indicate that governments recognize the importance of ensuring that "their" scientists contribute to POPRC's work in ways that are consistent with the governments' political goals. Henk Bouwman, the former POPRC member from South Africa, suggested that these expectations are often addressed by governments before scientists are sent to POPRC meetings, noting that scientists from academic backgrounds, in particular, must "negotiate" their roles with governments before taking their seats on POPRC:

> Most of [the members of POPRC] are not government scientists. They are mostly coming from academia, and they sort of independently negotiate how they are going to deal with the countries and how the countries are going to deal with them. And most of them operate independently, so they speak their mind, but also will give information regarding the country's position.[33]

All of these comments underscore the tension between science and politics in POPRC's work. While the process is designed to keep the two separate, in reality, countries with stakes in POPRC's recommendations seek to influence the decision-making process in the earliest stages. Rae, Australia, emphasized that while the socioeconomic implications of listing are not fully addressed until the COP considers POPRC's recommendations, countries which oppose regulation often make their views known early in the process. In reference to Lindane, Rae noted that prior to POPRC-4 (when the committee decided to recommend the substance for listing), "there were already people whispering behind their hands…'don't waste your time with this stuff on Lindane; we are going to block it when it gets to the COP."[34] (Ultimately, Lindane was listed at COP-4, with no exemptions for continued production or use. The only country which voiced strong opposition to listing, Kenya, rescinded its objection after its socioeconomic concerns were addressed through bilateral negotiations.) Presciently, Rae noted that a similar campaign was underway regarding Endosulfan:

> The same thing happened with Endosulfan, but in a grander way. Did you see that little farce that went on with Endosulfan? It had been recommended for consideration and before we got to consider it, a group of people, I think it was India and China and

[33] Bouwman, Henk. POPRC member from South Africa. Interview conducted by telephone. 22 January 2008.
[34] Rae, Ian. POPRC member from Australia. Interview conducted by telephone. 29 January 2008.

> somebody else, circulated a document that said 'look, it really didn't meet the criteria, and you are wasting our time considering it.' … There will be a knock-down drag-out about that, because those people who want to keep using Endosulfan will fight like hell at the first hurdle to knock it out.[35]

This comment, which foreshadows the highly contentious debates about Endosulfan that took place at subsequent meetings, supports the hypothesis that political preferences play a significant role in POPRC negotiations from the moment a chemical is nominated for review. As Rae notes, the conference room paper objecting to Endosulfan was circulated by the POPRC members from India and China – not by observers from these countries, who are free to play a more explicitly political role – which indicates that the members themselves take positions which align with the interests of the governments with which they are affiliated.

In sum, all of the POPRC members interviewed for this research indicated that scientists are under some degree of pressure to represent the interests of their countries. The governments that have seats on POPRC have the greatest access to decision-making, in that they can pressure "their" POPRC members to represent the government's preferences by highlighting evidence of harm or scientific uncertainty, as it suits the governments' interests. The degree to which a scientist may represent the views of a government may depend on the preferences of the individual scientist; as several interviewees noted, some members feel uncomfortable when they perceive themselves to be crossing a line from evaluation of data to discussion of socioeconomic or political issues, while others regularly work in science-based policymaking. Furthermore, as noted, interviews and observations of the proceedings indicate that many governments – particularly those with significant economic or political stakes in the process – have representatives attend the meetings as observers and provide explicit instructions to scientists to ensure that the their interests are being supported.

[35] Ibid.

6.4 Hypothesis 4

Scientists who seek to promote their preferred policy agendas will use strategic issue framing to emphasize certain facts and considerations while deemphasizing or ignoring others.

6.4.1 Result

Hypothesis 4 posits that scientists with preferences for certain policies will use strategic issue framing to garner support among POPRC members and observers for decisions aligned with those preferences. Analysis of the ENB summaries of interventions made in POPRC-2 to -5 supports this hypothesis, and yields some unexpected insights into the ways in which some scientists use issue framing to support their agendas. These patterns and insights are discussed in detail below.

6.4.2 Explanation and significance of hypothesis

Whereas the previous hypothesis focused on the relationship between governments and the scientists they delegate to POPRC, this hypothesis facilitates evaluation of the ways in which scientists use strategic issue framing to support their policy preferences during POPRC's discussions. If scientists are using strategic issue framing as heresthetical tactics designed to win the support of other participants, the following patterns are likely to emerge: scientists who support regulation are likely to use frames which emphasize evidence of harm, while scientists who oppose regulation are likely to call attention to scientific uncertainty and gaps in knowledge about the substances in question. Furthermore, while proponents of regulating a particular substance are likely to emphasize precaution and the need for action, opponents are likely to emphasize the need for careful consideration, with the committee taking as much time as necessary to gather evidence before moving to the next stage of review. The frequency with which scientists participate in debate is one indicator of their levels of interest in the issue; scientists with strong preferences for or against listing a substance are likely to intervene in discussions more frequently than scientists who are less interested in the outcome of discussions. However, this is not the only indicator of a scientist's interest; analyzing the substance of scientists' interventions is another crucial indicator of scientists' preferences.

This hypothesis was tested by analyzing the coded ENB reports, in accordance with the steps set out in section 4.5.2, to identify patterns of frames used by participants during each stage of discussion. An important component of this test was determining which countries had identifiable policy interests in the substances under review. Following the steps outlined in section 4.4.5, it was possible to establish the economic and political preferences of many of the countries, industry associations, and environmental and public health NGOs with representatives participating in POPRC's work. These interests were identified using a variety of sources, including position papers, documents prepared for POPRC's review process (e.g., the risk profile) and production/usage information published by governments, industry, academics, and the media. These political and economic interests were compared with the interventions scientists made to support or oppose advancing a chemical through the review process. If scientists were disinterested participants working independently of the political agendas of the countries with which they are affiliated, there should be little correlation between a country's policy preferences and the interventions made by scientists.

As previously noted, the frames used by scientists to support these preferences were identified through systematic coding of the ENB reports for POPRC-2 through -5 (see section 4.5.2). Using the resulting database of interventions, it was possible to identify patterns of interventions made by members and observers. This was carried out by running a query in Microsoft Access that produced a cross-tabulation of POPRC members or other participants against the type of frames they used during the debates (the definitions of the five frames that were identified is set out in Table 4.3).

The overall pattern of frames used during these four POPRC meetings is delineated in Table 6.3 below. A total of 569 substantive interventions were recorded by scientists in the ENB reports, each of which was assigned one of 39 codes. Each of these codes falls into one of the following six categories: scientific uncertainty, evidence of harm, procedure, technical issues, and socioeconomic impact, or other. Table 6.2, below, identifies the frames used by each of the groups of POPRC participants (POPRC members, country observers, non-country observers, invited experts, and UNEP officials).

Table 6.2 Types and numbers of frames used by participants (POPRC-2 – POPRC-5)

Participant affiliation	Evidence of Harm	Scientific Uncertainty	Procedure	Technical Issues	Socioeconomic Impact	Total
Country participants						
Australia	6	3	4	2		15
Austria		1				1
Burkina Faso	2		1			3
Canada	10	6	2			18
Chile			1	1		2
China	1	17	20	4	2	44
Czech Republic	2		4			6
Ecuador	2	3	15	1		21
Ethiopia			1			1
European Union	4					4
Finland		1				1
France	7		7			14
Germany (Chair)	3	4	30	1		38
Ghana		1				1
Honduras	1		1			2
India		28	34	1		63
Japan	5	14	13	2		34
Jordan		1	2	1	1	5
Mauritius	5	1	4			10
Mexico	5		2	2		9
Morocco			2	1	1	4
Netherlands	1					1
Norway	5	4	3	2		14
Philippines	1		2	2		5
Qatar	1	1		2		4
Republic of Korea	2	2	1			5
Russian Federation		1	1			2
Sierra Leone		12	7	3		22
Slovenia		1				1
South Africa	1	1	6	3		11
Spain	16	8	6			30
Sweden	5	4	4	2		15
Switzerland	6		8			14
Syria			1			1
Thailand	3	2	6			11
Togo	1					1
Trinidad and Tobago			1			1
United Kingdom	8	6	4	4	1	23
United States	1	7	6	2	1	17
Uruguay		2	1			3
Observers						
Argentina (Observer)		1		1		2
China (Observer)		2				2

India (Observer)		2	2			4
Japan (Observer)		4	2			6
Invited experts						
China (invited expert)		1		2	2	5
South Africa (invited expert)				1	1	2
Alexandria University and Egyptian State Ministry of Environmental Affairs		1				1
Department of Fisheries and Oceans Canada	1					1
Norwegian Institute for Public Health	3					3
Non-country participants (e.g. NGOs, industry representatives)						
Alaska Community Action on Toxics	3	2				5
BSEF	1	5				6
Chlorinated Paraffins Industry Association		1				1
CropLife International		2				2
Environmental Health Fund	2					2
Indigenous Environmental Network and Alaska Community Action on Toxics	2					2
IPEN	2	4		1		7
Pesticide Action Network				1		1
University of Philippines		1				1
World Chlorine Council		9				9
Other participants						
UNEP Legal Advisor			5			5
UNEP Secretariat			1			1
Unidentified participants	9		16			25
Total	**127**	**165**	**226**	**42**	**9**	**569**

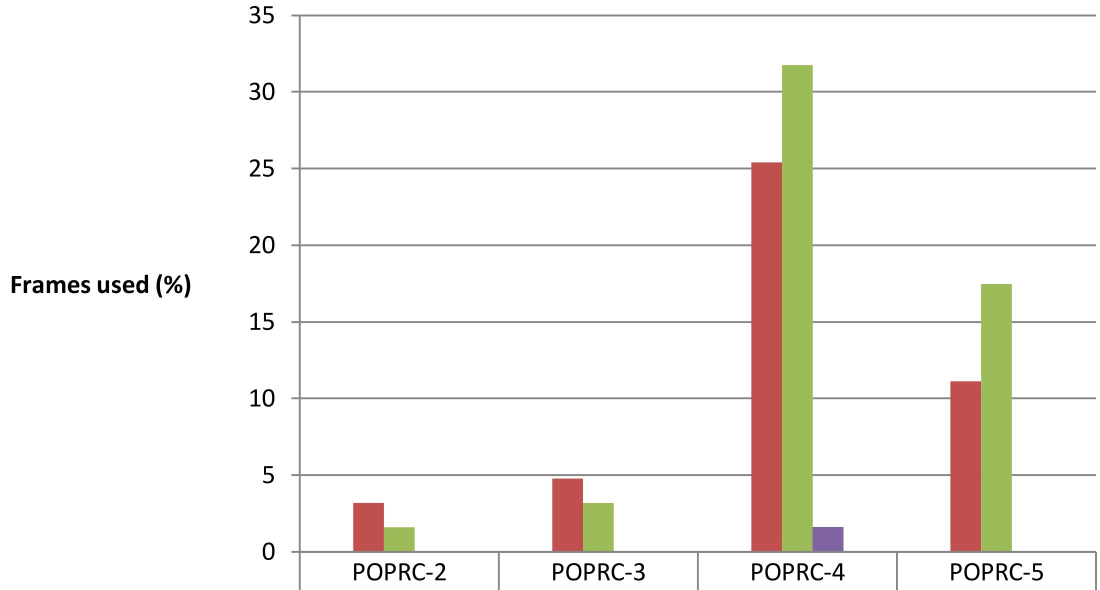
This table reveals some interesting framing patterns. While one might assume that most interventions made in the context of technical evaluations would refer to scientific uncertainty or evidence of harm, the table indicates that the category of interventions most commonly used over the course of the POPRC-2 through -5, with relation to all chemicals evaluated by the Committee, is "procedure," with a total of 226 interventions that refer to these issues. The second most commonly used frame was "scientific uncertainty," with 165 interventions. Interventions referring to “evidence of harm” were made 127 times, 42 interventions referred to “technical issues” and 9 referred to “socioeconomic impact.” Closer scrutiny of individual meetings is required in order to draw conclusions about the influence of each of these framing categories, but this broad overview demonstrates that a great deal of POPRC’s time has been devoted to discussion of the decision-making process, rather than to the substantive issues involved in evaluation of nominated substances. Furthermore, the comparatively low number of interventions on socioeconomic issues reflects the lack of emphasis that participants put on these issues, and is in keeping with the expectation that socioeconomic issues should be confined to the third stage POPRC’s review – drafting of the risk management evaluation.

The information in the table above was used as a basis for comparing the framing patterns of individual scientists with the socioeconomic interests of the countries with which they were affiliated. The parties with the clearest policy preferences were India, China, Sierra Leone, and the EU and its member states. The identification of these policy interests and the ways in which they shaped scientists’ approaches to framing are discussed in detail in the following sections.

India

The frames used by the scientists affiliated with India are listed in Figure 6.1, below. In order to facilitate comparison across meetings, the graph below represents all of the frames used by the Indian government delegates to POPRC between POPRC-2 and -5. The figures are percentages of the total number of interventions made by these delegates during this time period.

Figure 6.1 Frames used by India, by meeting



	POPRC-2	POPRC-3	POPRC-4	POPRC-5
Evidence of Harm	0	0	0	0
Scientific Uncertainty	3	5	25	11
Procedure	2	3	32	17
Technical Issues	0	0	2	0
Socioeconomic Impact	0	0	0	0

The interventions made by the delegates from India (as an observer during POPRC-2 and -3, and as a member during POPRC-4 and -5) demonstrate consistent use of anti-regulatory frames. Only two percent of these interventions referred to technical concerns; the rest emphasized either scientific uncertainty or procedural issues. Fifty-four percent of the total number of interventions emphasized procedural issues, and most of these were made during POPRC-4 and -5. The second most common category of frames used was scientific uncertainty, which accounted for 44% of the interventions made during this time period. The member from India made more procedural interventions than any other member, and over 60% of his interventions were made during discussions of Endosulfan (see table 6.3 below). These interventions consistently raised obstacles to advancing Endosulfan through the review process by questioning the validity of the POPRC's procedures. While POPRC members ultimately rejected these procedural frames, they have the potential to undermine the credibility of the Committee's decision-making in the eyes of the COP and others who have not participated in POPRC's work. The next chapter explores these issues with a review of POPRC's evaluations of Endosulfan, and an analysis of their implications for the work of the Committee and, potentially, the future of the Convention.

Table 6.3 shows a breakdown of interventions made by delegates from India according to chemical.

Table 6.3 Percentages of frames used by the member from India, by chemical

Frame	Dead chemicals				Live chemicals				
	Chlor-decone	HBB	octa-BDE	PeCB	Endo-sulfan	HBCD	Lindane	PFOS	SCCPs
Scientific Uncertainty (%)	1	1	3	1	22	3	0	0	12
Procedure (%)	0	0	0	0	42	0	4	3	4
Technical Issues (%)	0	0	0	1	0	0	0	0	0
Total (%)	**1**	**1**	**3**	**3**	**64**	**3**	**4**	**3**	**16**

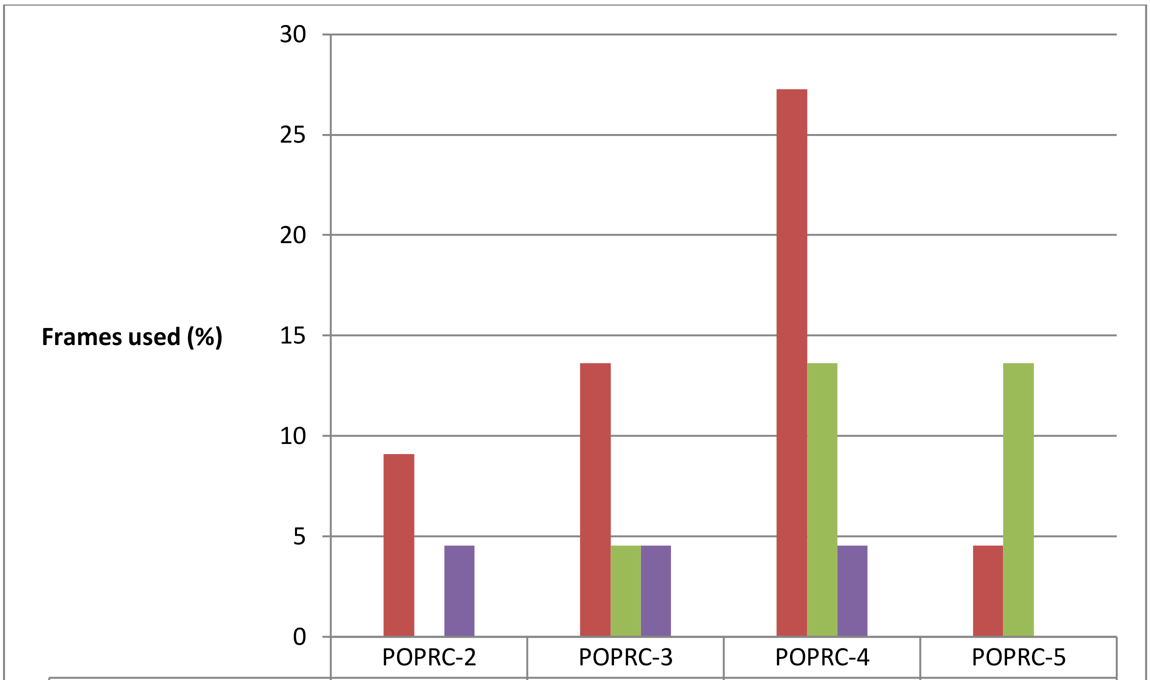
The pattern of interventions made by the member from India provides strong support for Hypothesis 4, which posits that scientists use strategic issue framing to support their policy goals. As Table 6.3 shows, most of the member's interventions focus on Endosulfan. As the world's largest producer of this insecticide, India has significant economic stakes in the continued production and use of this substance (UNEP/POPS/POPRC.5/10/Add.2). Three companies working within India produce the chemical, including Bayer CropScience, Makhteshim Agan, and, notably, the Indian government-owned Hindustan Insecticides Limited. Sixty-four percent of the interventions made by delegates from India referenced Endosulfan, with 22% highlighting concerns about scientific uncertainty and 42% challenging the validity of the decision-making process. In comparison, the second-most important issue to the member from India, based on frequency of interventions, was SCCPs, which constituted 16% of the member's interventions. Twelve percent of these referenced scientific uncertainty, and 4% referenced procedure (again, all questioning the validity of the decision-making process). Notably, the government of India also has economic interests in the continued production of SCCPs (Jabr 2010). The delegates from India made no interventions regarding evidence of harm between POPRC-2 and -5. Together, these interventions demonstrate strong opposition to listing Endosulfan and SCCPs, and a lack of support for listing the other substances reviewed during this time period. The member did not block consensus to advance any of the other substances, but did not offer any support for listing.

Every intervention made by the member from India has been negative, either falling into the category of procedural issues or scientific uncertainty. The member from India often received support from China and, to a lesser degree, from Sierra Leone, but his interventions received little or no support from other POPRC members. The uniformly negative pattern of interventions is extreme, and suggests that his agenda is policy-driven, and not science-based. While it would be unsurprising if a scientist occasionally disagreed with the majority of the committee, interventions made by the member from India indicate that he categorically disagrees with every piece of evidence that supports moving forward with any chemical nominated for review by POPRC. Most importantly for this research, he has intervened most frequently during discussions of the two chemicals which are of most economic importance to the country with which he is affiliated.

China

The frames used by the scientist affiliated with China are listed in Figure 6.1, below. As above, in order to facilitate comparison across meetings, the graph below represents all of the frames used by the member from China between POPRC-2 and -5. The figures are percentages of the total number of interventions made by the member from during this time period.

Figure 6.2 Frames used by China, by meeting



	POPRC-2	POPRC-3	POPRC-4	POPRC-5
Evidence of Harm	0	0	0	0
Scientific Uncertainty	9	14	27	5
Procedure	0	5	14	14
Technical Issues	5	5	5	0
Socioeconomic Impact	0	0	0	0

Figure 6.2 illustrates the patterns of frames used by the member from China through successive meetings. Fifty-five percent of the frames used by the Chinese delegate were scientific uncertainty frames, with a particular jump in POPRC-4. Thirty-three percent of his interventions emphasized procedural issues. Notably, he made no interventions which emphasized evidence of harm or otherwise supported advancing a chemical through the review process. With one exception, his interventions were either negative or neutral (neutral frames neither support nor oppose the case for listing a substance in the Annex; for example, information regarding a country's use of a particular substance would be categorized as neutral, because such information neither supports nor undermines a risk-based case for regulation). In only one case, regarding HBCD, did the member from China make an intervention that fell into the category of "evidence of harm;" in this instance, he noted that although there were uncertainties associated with HBCD, he could accept that the

substance met the Annex D criteria. This intervention did not support the case for listing HBCD, but it signaled that China would not oppose moving the substance to the next stage of evaluation. Most of the interventions made by the member from China referred to three chemicals which are of significant economic importance to China. As set out in Table 6.4 below, 23% of the member's interventions were related to SCCPs, 34% were related to Endosulfan, and 18% were related to PFOS. Together, these account for 75% of all the interventions made by the member from China. China is one of the world's top producers and users of each of these substances. The scientist's increased rate of participation with regard to chemicals which are of significant economic importance to the country with which he is affiliated supports the premise that scientists are influenced by externally-driven policy agendas, as does the content of the interventions, which uniformly supported China's economic interests in opposing regulation of those chemicals which are of economic value to the country.

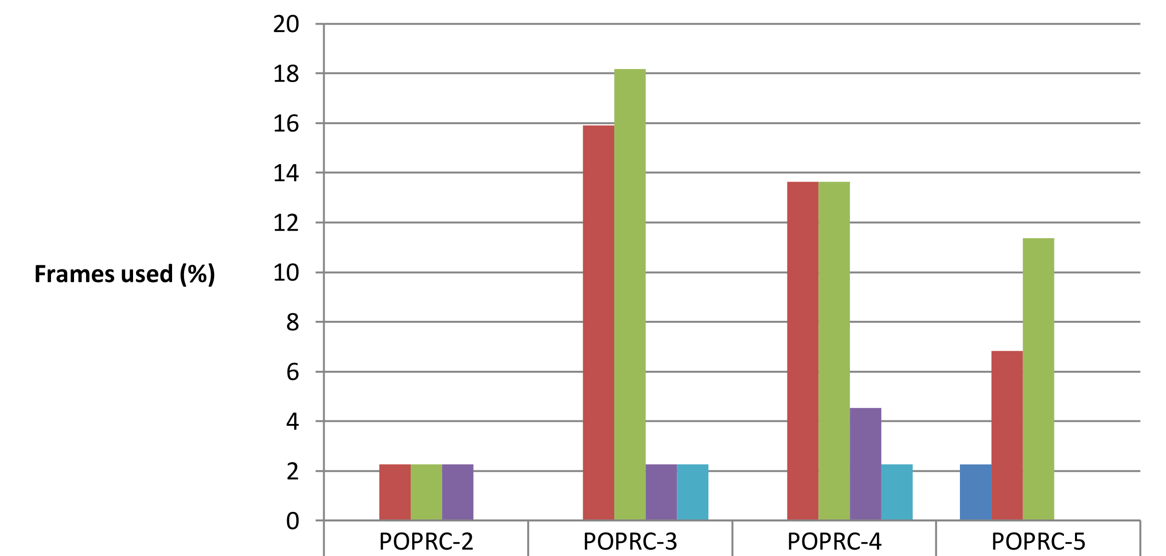
Table 6.4 Percentage of frames used by the member from China, by chemical

Frame	**Dead chemicals**				**Live chemicals**				
	HBB	OctaBDE	PeCB	PentaBDE	Endosulfan	HBCD	Lindane	PFOS	SCCPs
Evidence of Harm (%)	0	0	0	0	0	2	0	0	0
Scientific Uncertainty (%)	0	0	0	2	16	2	0	5	14
Procedure (%)	2	0	0	0	18	5	0	11	9
Technical Issues (%)	0	5	2	0	0	0	0	2	0
Socioeconomic Impact (%)	0	0	2	0	0	0	2	0	0
Total (%)	**2**	**5**	**5**	**2**	**34**	**9**	**2**	**18**	**23**

India and China's common economic interests with regard to a number of chemicals suggests that the two countries could engage in a joint effort to oppose listing, and indeed, the scientists from these two countries seem to work cooperatively to promote shared goals. This is exemplified by the submission of a joint statement on what they argued were procedurally invalid decisions on Endosulfan (POPRC-3), as well as verbal expressions of support for one another's statements between POPRC-3 and -5. Their patterns of interventions were also similar; both made extensive use of procedural frames. During the Endosulfan discussions, the member from China made eight interventions regarding procedure, and seven regarding uncertainty. This pattern was almost the same for SCCPs, with the member from China making four interventions regarding procedure and five regarding uncertainty. In the PFOS discussions, which concluded at POPRC-4, he made three interventions regarding procedure, two regarding technical issues, and one regarding scientific uncertainty.

Sierra Leone

Figure 6.3 Frames used by Sierra Leone, by meeting



	POPRC-2	POPRC-3	POPRC-4	POPRC-5
Evidence of Harm	0	0	0	2
Scientific Uncertainty	2	16	14	7
Procedure	2	18	14	11
Technical Issues	2	2	5	0
Socioeconomic Impact	0	2	2	0

As is illustrated in Figure 6.3 above, the member from Sierra Leone made a high number of interventions which emphasized procedural issues and scientific uncertainty: 45% of his total interventions between POPRC-2 and -5 emphasized procedural issues, and 39% of his interventions emphasized scientific uncertainty. Notably, the member from Sierra Leone joined the members from China and India in submitting a joint conference room paper at POPRC-3 which concluded that Endosulfan does not meet the criteria for categorization as a POP. While Sierra Leone does not produce Endosulfan, the country does import and use the insecticide for agricultural purposes. Following an interview at the end of POPRC-4, the member from Sierra Leone provided a written statement for this research. In this statement, Yormah explained that his opposition to listing the chemical arose from socioeconomic concerns about the potential expense of alternatives. An excerpt from the statement follows:

> When Sierra Leone initially teamed up with China and India to oppose the listing of Endosulfan as a POP, it was with a deep non-scientific sense of concern for the poor farmers in Africa whose livelihoods are critically dependent on the use of this chemical. It is an uncomfortable fact that although Endosulfan can and does kill, extreme hunger and poverty are far more deadly – and quicker, too.[36]

This statement demonstrates that the policy preferences of the member from Sierra Leone were unrelated to scientific evidence on which POPRC is expected to base its decisions. This is supported by analysis of Yormah's interventions, which consisted of only two statements which referred to socioeconomic issues. Instead of addressing these concerns directly, he attempted to prevent further evaluation of Endosulfan by invoking frames which emphasized procedural issues and scientific uncertainty. Analysis of Yormah's interventions indicates that he attempted to undermine the case for listing Endosulfan by making four interventions which emphasized issues related to scientific uncertainty; for example, Yormah questioned the evidence for persistence of Endosulfan, and called on the Committee to defer the discussion for another year to allow more evidence to be gathered. Yormah also made three interventions which referred to procedural concerns; for example, he noted the lack of consensus in the committee and suggested consulting the COP for guidance on how to handle the seemingly intractable disagreement among members on this issue. Unlike the procedural interventions made by the members from China and India, the interventions

[36] Yormah, Thomas. POPRC member from Sierra Leone. Written statement received during an interview conducted in London, United Kingdom. 21 October 2008.

made by the member from Sierra Leone never suggested impropriety on the part of the Committee. This difference is significant, as it suggests that his use of procedural frames was motivated by an interest in slowing the process, rather than undermining the case for listing a particular chemical. With reference to all chemicals being evaluated, Yormah's interventions indicate that he generally concerned about not rushing to list substances, taking time to fill data gaps, and ensuring that all members of POPRC can reach consensus before taking a decision. This interpretation is supported by his frequent comments, both in POPRC plenary sessions and informal interviews for this research, about the financial and technical difficulties many developing countries face in implementing the restrictions imposed by the Stockholm Convention. Meeting these obligations is often particularly demanding for least-developed countries such as Sierra Leone, which lack the infrastructure to easily adapt existing agricultural practices to employ new, more expensive chemicals throughout the country. As table 6.5, below, demonstrates, the member from Sierra Leone was most concerned about live chemicals; 90% of his interventions concentrated on these substances, whereas 10% focused on HBB and octaBDE – two substances that were being phased out of production globally.

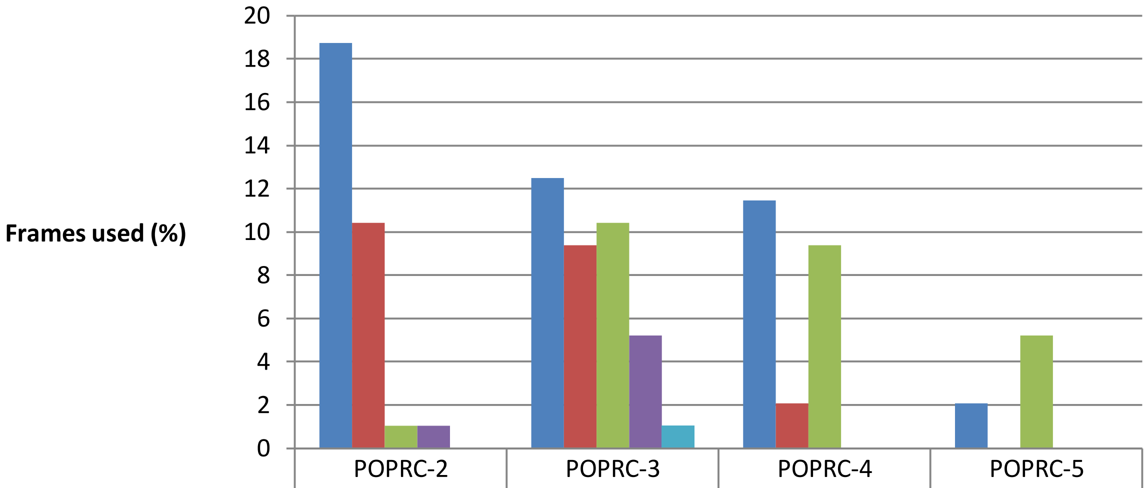
Table 6.5 Percentage of frames used by the member from Sierra Leone, by chemical

Frame	**Dead chemicals**		**Live chemicals**				
	HBB	octaBDE	Endosulfan	HBCD	Lindane	PFOS	SCCPs
Evidence of Harm (%)	0	0	0	0	0	0	0
Scientific Uncertainty (%)	0	5	18	14	9	5	5
Procedure (%)	0	0	14	5	0	0	14
Technical Issues (%)	5	0	5	0	5	0	0
Socioeconomic Impact (%)	0	0	0	0	0	0	0
Total (%)	**5**	**5**	**36**	**18**	**14**	**5**	**18**

The European Union and its Member States

In contrast to the frequent use of procedure and scientific uncertainty frames by India, China, and Sierra Leone, the interventions made by EU countries tended to focus on evidence of harm and the appropriateness of taking action to list each of the substances under review. This is illustrated in Figure 6.4 below. The interventions by the member from Germany were excluded from this analysis. As Chairman of POPRC, the member from Germany facilitates discussion, frequently repeating themes mentioned by others without endorsing a particular position. Thus, his interventions are not representative of particular views on the substances and review, and inclusion of his statements would have distorted the patterns of frames used by the members from the EU and its member states.

Figure 6.4 Frames used by the EU and its Member States (excluding Germany), by meeting



	POPRC-2	POPRC-3	POPRC-4	POPRC-5
Evidence of Harm	19	13	11	2
Scientific Uncertainty	10	9	2	0
Procedure	1	10	9	5
Technical Issues	1	5	0	0
Socioeconomic Impact	0	1	0	0

Figure 6.4 above illustrates the pattern of frames used by the EU and its member states throughout POPRC meetings. There was a sharp decline in the rate of interventions made by members from the EU in POPRC-5, which accounts for only 7% of the interventions made between POPRC-2 and -5. This meeting involved discussions of Endosulfan and SCCPs, and as the within-case analyses will demonstrate, plenary discussions of these chemicals were dominated by opponents to listing these substances.

The interventions charted above demonstrate a strong tendency to emphasize evidence of harm over scientific uncertainty: 45% of all interventions between POPRC-2 and -5 emphasized evidence of harm, and 21% highlighted scientific uncertainty. While the numerical analysis indicates that EU members made a significant number of interventions related to procedure, review of the substance of those interventions reveals that almost all referred to the appropriateness of the procedure which has been followed by the Committee, and were defensive responses to interventions made by India, China, and Sierra Leone during discussions of Endosulfan. Overall, the EU's interventions favored advancing chemicals through each stage of POPRC's evaluation.

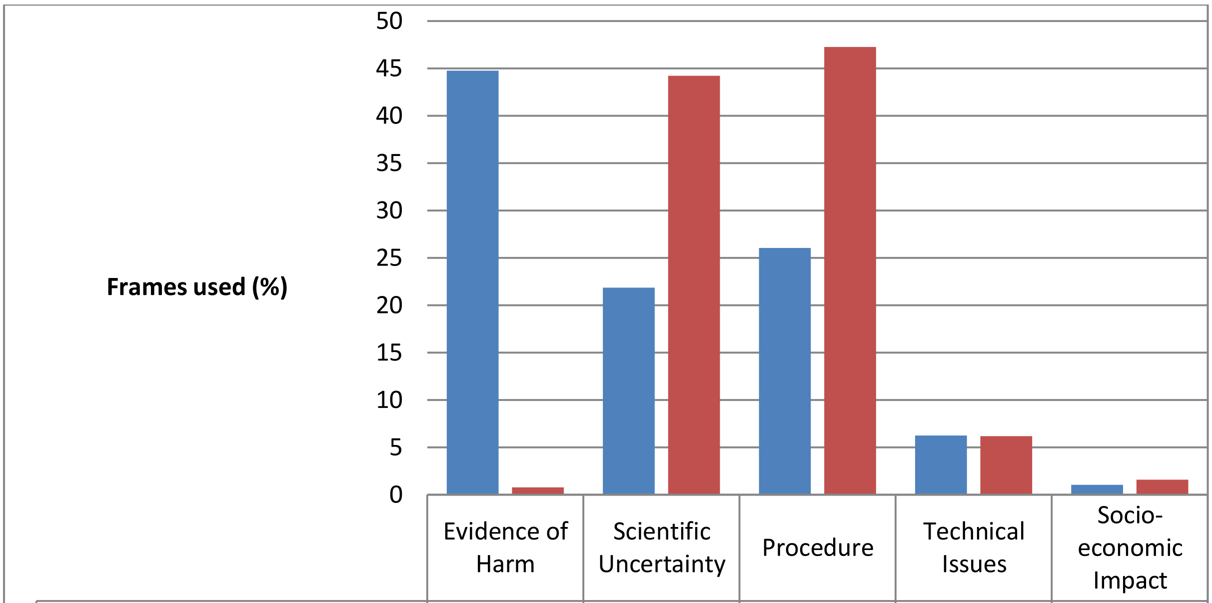
As noted above, many participants perceive the EU as having a pro-regulatory bias (see section 6.3.3), and the frames used by members affiliated with the EU from POPRC-2 to -5 support this assertion. This conclusion is hardly surprising, however, as the EU and its member states have nominated all but one of the substances reviewed by POPRC since its first meeting. Nominating a substance demonstrates an explicit preference for listing, assuming the Committee agrees the criteria are met. However, the interventions of members from the EU do include statements which highlight scientific uncertainty, which demonstrates that scientists from these countries are focusing their interventions on the scientific evidence for and against listing. This balance suggests that POPRC's evaluations are grounded in legitimate scientific analysis and inquiry, and are not simply political exercises masquerading as science-based evaluations. Table 6.6, below, demonstrates that members from EU countries consistently utilized more evidence of harm frames than frames highlighting scientific uncertainty. Notably, however, these members did raise concerns about scientific uncertainty in several cases.

Table 6.6 Percentage of frames used by the members from the European Union, by chemical

Frame	Dead chemicals						Live chemicals			
	Alpha and BetaHCH	Chlor-decone	HBB	Octa-BDE	PeCB	Penta-BDE	Endo-sulfan	Lindane	PFOS	SCCPs
Evidence of Harm (%)	2	5	3	9	5	0	10	2	2	7
Scientific Uncertainty (%)	5	0	2	1	2	2	0	2	3	2
Procedure (%)	2	0	0	1	1	0	15	1	1	5
Technical Issues (%)	0	1	3	0	0	0	0	2	0	0
Socioeconomic Issues (%)	0	0	1	0	0	0	0	0	0	0
Total (%)	**10**	**6**	**10**	**11**	**9**	**2**	**24**	**7**	**6**	**15**

Individually, the patterns of frames used by scientists from these countries, all of which have explicit preferences for or against listing one or more of the chemicals under review, offer insights to the ways in which strategic issue framing is used to support those preferences. Comparing these patterns side by side reinforces the view that strategic issue framing is a tactic actively adopted by scientists with policy preferences during debate. In Figure 6.5 below, the frames used by the EU and its member states are compared to the frames used by the members from India, China and Sierra Leone. This graph shows that the patterns of frames used by those who were proponents of regulation were markedly different from opponents of regulation. As with Figure 6.4 above, interventions of the member from Germany are excluded.

Figure 6.5 Frames used by countries with explicit preferences for or against listing, POPRC-2 - POPRC-5



	Evidence of Harm	Scientific Uncertainty	Procedure	Technical Issues	Socio-economic Impact
European Union and its Member States	45	22	26	6	1
India, Sierra Leone and China	1	44	47	6	2

The graph above includes all of the interventions made members from the EU, India, China and Sierra Leone, and provides a side-by-side comparison of the way these members have used frames to support their preferences. Notably, the opponents to listing have made slightly more interventions highlighting procedural issues than scientific uncertainty, suggesting that they view the use of procedural frames as more likely to gain the support of other committee members than frames which emphasize scientific uncertainty. By using introducing doubts about the validity of the procedure, opponents of listing may be able to gain the support of participants who agree that there is evidence of harm, but who would also be concerned about ensuring that the rules of procedure are being followed, and that the Stockholm Convention is being implemented in way that will ensure its long-term sustainability as a global regulatory mechanism which maintains the confidence and support of participants with diverse technical viewpoints and political, social, and economic interests. Thus, the use of procedural frames could be a tactic to prevent further consideration of particularly important chemicals, such as Endosulfan and SCCPs. The dramatic differences among the interventions made by countries which generally support regulation and those which stand to suffer economically if substances are listed suggests that scientists do make interventions which support policy agendas derived not from science but from economic interests.

6.5 Hypothesis 5

Systematic differences will exist between discussions related to dead chemicals (the 'legacy POPs') and live chemicals (substances which are currently produced and used by one or more countries).

6.5.1 Result

Systematic differences between discussions of dead and live chemicals are evident in the discussions of chemicals reviewed by POPRC between its second and fifth meetings. Discussions of dead chemicals were dominated by frames emphasizing either evidence of harm or scientific uncertainty, while discussions of live chemicals have been dominated by procedural frames.

6.5.2 Explanation and significance of hypothesis

This hypothesis builds on previous hypotheses, particularly Hypotheses 3 and 4, which posit that states' interests influence scientists' policy preferences, and that scientists use strategic issue framing to support these goals. If scientists have policy preferences that are shaped by their nations' interests, they will support those preferences during evaluations of relevant substances. This hypothesis encapsulates the central question guiding this research: why are some chemicals regulated without controversy while others, which pose similar risks to human health and the environment, are not? The explanation suggested by this research is that regulatory decision-making is heavily influenced by the frames used by scientists to support their policy preferences in the earliest stages of the decision-making process. If those scientists are representing external policy preferences, such as the socioeconomic interests or political agendas of the governments with which they are affiliated, there will be substantial differences in the discussions of live chemicals, or those chemicals for which socioeconomic concerns would be relevant, and dead chemicals, which will be of little importance to chemical producers and users. If policy preferences play no part in scientists' evaluations, there will be no systematic differences in discussions of live and dead substances. In this case, scientists' interventions will be determined entirely by the scientific evidence for or against listing nominated substances.

This hypothesis was tested by analyzing the coded Earth Negotiations Bulletin reports to identify patterns in scientists' contributions to discussions. This hypothesis was tested in two ways, both drawing on the coded ENB reports. First, the frames used by each scientist between POPRC-2 and -5 were identified (see Figure 6.6, below). Second, the frames used with reference to dead chemicals were compared with frames used in discussions of live chemicals.

6.5.3 Findings

Analysis of the ENB reports indicate that the types of interventions made during evaluations have changed as the focus of POPRC's work has shifted from dead to live chemicals. In its first meetings, POPRC addressed what some participants referred to as "low-hanging fruit"[37]: chemicals that were of little economic importance to countries, and could be listed with broad political support and little or no controversy. Taking action to list dead chemicals was necessary both to preclude future production and to facilitate the safe disposal of products containing dead chemicals. The Stockholm Convention provides financial and technical assistance for disposal of stockpiles, as well as products

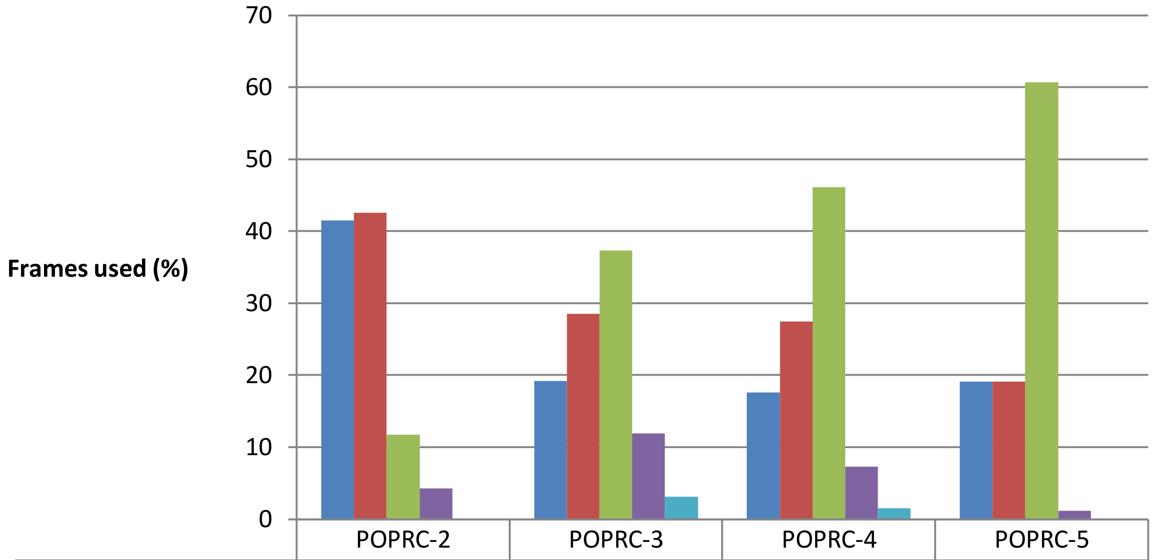
[37] Rae, Ian. POPRC member from Australia. Interviewed during POPRC-4, Geneva, Switzerland. 14 October 2008.

that are still in use (e.g., refrigerators which contain PCBs). Thus, exposure to dead chemicals is ongoing, and the Stockholm Convention COP's decision to list the dirty dozen and other obsolete substances is widely seen as an important step toward reducing exposure to these POPs.

As noted in the table entitled "Persistent Organic Pollutants" in Appendix A, dead chemicals (excluding those which are unintentionally produced) discussed since POPRC-2 include: chlordecone, alpha- and betaHCH, PeCB, HBB, octaBDE, hexa- and heptaBDE, and tetraBDE and pentaBDE. Substances currently under review that are considered to be live chemicals include: PFOS, Lindane, Endosulfan, HBCD, and SCCPs. The economic importance of these chemicals varies; for example, affordable alternatives are available for Lindane, and this substance was listed with comparatively little controversy at COP-4 (only one country, Kenya, raised objections to listing Lindane, noting the higher costs of substitutes; these concerns will dealt with in bilateral negotiations, and Kenya withdrew its objections) (Ashton et al. 2009). PFOS was also listed, but with an extensive list of exemptions for continued production and use. Endosulfan, HBCD, and SCCPs are currently under review. As the Committee has moved into discussions of live chemicals, discussions have become contentious. The growing disagreements about appropriate action have taken the form of challenges to the validity of evidence, and more strikingly, arguments that POPRC's decision-making process is biased and procedurally invalid. The use of procedural frames represents a shift in strategy by those scientists affiliated with countries with economic interests in continued production and use of nominated substances (this is analyzed in detail in the within-case analyses presented in Chapter 7). The associated rise in tension among POPRC participants is reflected in ENB reports, as well as in the comments shared by interviewees for this research.

The following graph highlights the changes in framing over the course of meetings, from POPRC-2 to POPRC-5.

Figure 6.6 Frames used in POPRC-2, -3, -4, and -5

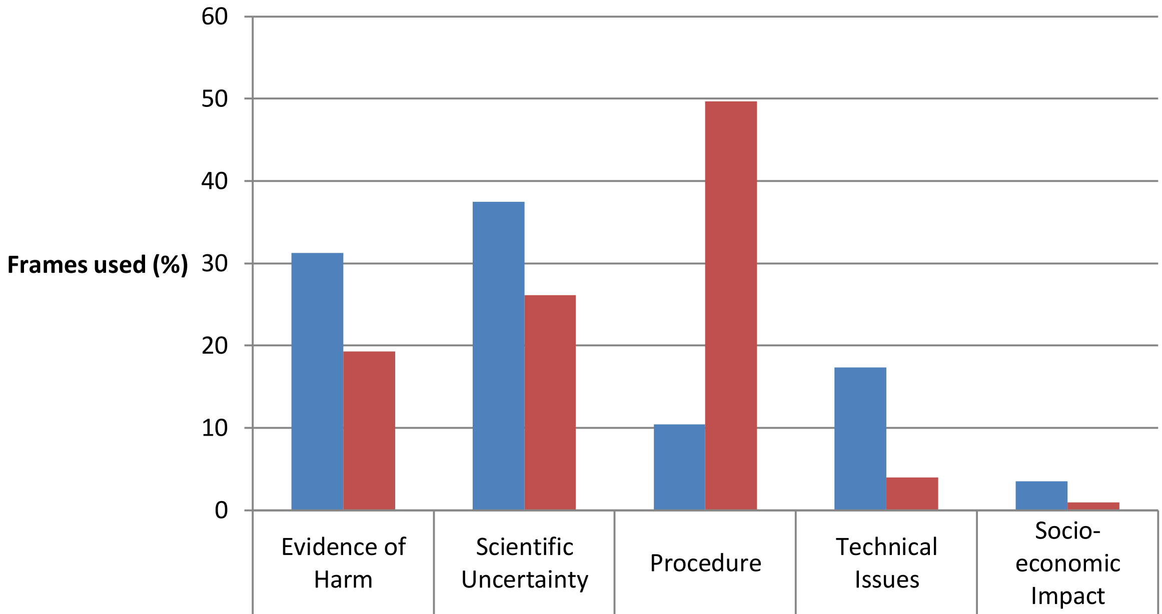


	POPRC-2	POPRC-3	POPRC-4	POPRC-5
Evidence of Harm	41	19	18	19
Scientific Uncertainty	43	28	27	19
Procedure	12	37	46	61
Technical Issues	4	12	7	1
Socioeconomic Impact	0	3	2	0

The most striking feature of Figure 6.6 is the substantial and consistent rise in the use of procedural frames after POPRC-2. At POPRC-2, 84% of frames emphasized evidence of harm or scientific uncertainty (the sum of 41% and 43%, respectively). However, following this meeting, the number of procedural frames steadily increased. The use of procedural frames was particularly high during POPRC-4 and -5 (46% and 61% of frames used at those meetings, respectively), when most of the chemicals on POPRC's agenda were live substances of significant social or economic importance for some countries.

The different approaches taken by participants in discussions of dead and live chemicals are illustrated clearly in Figure 6.7 (below), which compares the way chemicals in these categories are framed. Procedural frames made up only 10% of the discussion of dead chemicals, but constituted 50% of the discussion of live substances. Interestingly, the evidence and scientific uncertainty were used in approximately the same number of times for both dead and live chemical discussions. In discussions of both dead and live chemicals, scientific uncertainty was highlighted 7% more often than evidence of harm. This suggests that participants used procedural frames to block further consideration of chemicals, instead of attempting to challenge the case for regulation on scientific grounds. This represents a clear and unexpected change in framing strategy, and is evaluated through the within-case analyses presented in Chapter 7. While one might expect opponents of regulation of live substances to emphasize gaps in data and other issues related to scientific uncertainty as a means of ending review, or at least delaying decision-making while additional data is gathered, opponents to listing have instead chosen to challenge the decision-making process itself. This strategy represents a shift from science-based evaluation of chemicals to a more overtly political approach in which opponents are using the decision-making process itself to support their predetermined policy goals.

Figure 6.7 Comparison of framing of dead and live chemicals, POPRC-2 - POPRC-5[38]



	Evidence of Harm	Scientific Uncertainty	Procedure	Technical Issues	Socio-economic Impact
Dead Chemicals	31	38	10	17	3
Live Chemicals	19	26	50	4	1

As Figure 6.7 above illustrates, the frames in discussions of dead chemicals differed substantially from those which were used most frequently in discussion of live chemicals. Concerns about scientific uncertainty constituted 38% of the frames used in discussions of dead chemicals, whereas they constituted only 26% of discussions of live chemicals. This difference may be explained by the substantial increase in the use of procedural frames during discussions of live chemicals. While only 10% of the discussions related to dead chemicals, these frames constituted 50% of the discussion of live substances. Interventions challenging the procedure by which POPRC makes its decisions dramatically increased with the introduction of proposals to nominate two live chemicals – SCCPs and Endosulfan – which are of significant economic importance to at least two of the Parties with seats on POPRC. Critically, the two POPRC members responsible for the vast majority of the procedural interventions are delegates of nations with significant economic stakes in continued

[38] As noted above, chemicals considered to be dead include: chlordecone, alpha- and betaHCH, PeCB, HBB, octaBDE, hexa- and heptaBDE, and tetraBDE and pentaBDE. Chemicals considered to be live include: PFOS, Lindane, Endosulfan, HBCD, and SCCPs. For additional information, see Appendix A.

production and use of the chemicals being discussed (as noted in the results presented earlier in the chapter). This is consistent with the findings of Hypotheses 3 and 4.

Given that POPRC meetings are time-limited (both in days and hours; translation services are available only until 6pm on each of the five days of the meeting), the use of procedural frames to challenge the decision-making process consumed time that would have otherwise been devoted to science-based evaluation. Concerns about time spent discussing procedural issues, rather than evaluating data, were expressed repeatedly by members throughout POPRC-4 and -5. The time element was also significant because the members who used these frames to challenge the process also repeatedly argued that if POPRC is unable to reach a decision about a substance by the end of its annual meeting, the proposal to list that substance must be permanently set aside (Kohler et al. 2008; Templeton 2009).

In summary, the substantial difference in discussion of dead and live chemicals supports the hypothesis that scientists use strategic issue framing to support the interests of the governments with which they are affiliated. The use of procedural frames, in particular, may have significant implications for the Stockholm Convention, as these frames deliberately undermine the credibility of POPRC and subsequently of the Convention itself. Even when procedural frames are overruled by other members, they challenge the credibility of POPRC by establishing written records of what can be interpreted as a controversial decision-making process. While participants in POPRC may be satisfied with the validity and transparency of decision-making, by repeatedly challenging the process, opponents of regulation are creating a foundation for a message which can be delivered to non-scientists and others who do not participate in POPRC's work, thus paving the way for a challenge at the COP level of decision-making. Thus, the use of procedural frames, in particular, may have significant implications for POPRC's ability to reach consensus to reach new chemicals, and may cost POPRC some support when its recommendations are forwarded to the COP.

6.6 Hypothesis 6

Elites with technical expertise will be affected only by strong frames, and will be able to identify and ignore weak frames.

6.6.1 Result

As elite actors, scientists do respond to strong frames (frames that emphasize or make use of available considerations) while ignoring weaker frames (frames that introduce irrelevant or non-credible considerations).

6.6.2 Explanation and significance of hypothesis

As explained in Chapter 4, "strong" frames, as defined by Chong and Druckman (2007b) are those which emphasize available considerations. Thus, rational actors attempting to create an effective rhetorical strategy will make use of frames that emphasize aspects of an issue which will resonate with the target audience, and will avoid highlighting considerations the audience in question are likely to dismiss as irrelevant. For example, an advocacy organization may emphasize civil injustice when building grass-roots support for a campaign against POPs, but would refer to data and evidence when interacting with members of POPRC. In the latter context, strong frames will appeal to the scientific expertise of POPRC members and other participants. Thus, strong frames are likely to consist of technical information which is directly relevant to POPRC's evaluation of a case for regulation; e.g., frames which emphasize evidence of harm or gaps in data. While non-technical frames, such as emotional appeals about the harm caused by chemical pollution, may be compelling to non-expert audiences with little technical understanding of chemicals, in the context of scientific review, participants are likely to be most responsive to those frames which appeal to their scientific expertise. Furthermore, strong frames will invoke scientific evidence which is considered to be credible by other scientists; for example, data gathered using widely accepted methods, as opposed to either very new or outdated techniques. Chong and Druckman (2007b, p. 109) argue that "motivation and ability…increase an individual's tendency to focus on the substantive merits of a frame in judging its persuasiveness." As highly motivated individuals with knowledge about chemical pollution, scientists are more likely to be influenced by strong frames, or those frames which use credible technical information to make compelling arguments, than by weak frames, or frames which emphasize information which is judged to be irrelevant or of little consequence. Not only will such frames fail to gain support, but Chong and Druckman (2007b) note that highly motivated individuals may actually react to a weak frame by moving away from the action it promotes, and increasing their support for the position advocated by a competing frame.

The credibility of the frame is also critical, and given the technical nature of the discussions, the credibility of frames might be considered to extend to the credibility of the frame initiator. In the context of POPRC, participants with scientific qualifications will be more able to employ relevant frames than non-expert participants. Individuals without the appropriate credibility and technical expertise would not be able to interpret and make use of highly technical information, and thus would be unable to use science-based frames in a way that would resonate with the scientists who participate in the work of POPRC.

Thus, this hypothesis accounts for the heresthetical choices rational actors make in employing framing strategies intended to support their policy preferences. Whereas the previous hypotheses have argued that scientists have pre-determined policy agendas and will use strategic issue framing as a tactic to support their policy preferences, this hypothesis makes a specific prediction about the nature of the framing tactics that rational actors are likely to adopt to achieve their preferred policy outcomes.

6.6.3 Findings

Evidence to support this hypothesis can be found in the discussions of Endosulfan which took place at POPRC-4 and -5. As the within-case analysis of the Endosulfan debate in the next chapter will illustrate, the procedural and scientific uncertainty frames used by the member from India, whose actions indicated that he strongly opposed any action which advanced Endosulfan toward potential listing in the Annexes of the Convention, gained reasonable traction at the start of the work, but declined considerably as he lost credibility in the eyes of other Committee members. While his procedural concerns were addressed with substantial time and debate initially, by the end of the week, a large subgroup within the Committee planned to overrule his objections with a vote. Similarly, his interventions relating to scientific uncertainty garnered some support and consideration early in the week, but by the end of the meeting even his formerly closest ally, the member from China, refused to offer public support for his interventions. Arguably, the member from India's loss of credibility was due in part to his antagonistic, uncooperative, and undiplomatic behavior, which created significant tension with other POPRC members. His credibility may also have declined because he refused to give ground on any point during the week, despite the efforts of other experts on the Committee to address his concerns, and he raised the same points repeatedly, ultimately demonstrating that his agenda was purely political and unscientific. Furthermore, he failed to disclose his government's ownership of a major manufacturer of Endosulfan. While scientists interviewed for this research often acknowledged the tension between science and politics that is inherent in global environmental policymaking, the member from India's inflexible commitment to promoting his agenda alienated him from other POPRC members and led them to use voting to override his objections. Arguably, India's declining credibility led others to view his frames as weak. As Chong and Druckman (2007) note, weak frames may actually cause listeners to move away from the actions advocated by the weak frame. POPRC's decisions to vote on the issue of Endosulfan at both its fourth and fifth meeting provide support for Chong and Druckman's assertion, as well as for this hypothesis.

Emotional interventions provide another example of weak framing. Some of the environmental and public health NGOs, in particular, have made interventions which have focused on graphic descriptions of the alleged effects of POPs on humans and animals. These frames are used by environmental and public health advocacy organizations to shift the focus of discussion from dry, technical information to the emotional, personal and visible effects of chemical pollution. For example, at POPRC-3, a representative from Alaska Community Action on Toxics described the "pus sacs" found in fish caught near the Arctic Circle, which are a primary source of food for local communities. The frame is used to send the message that no level of chemical is safe; chemicals are guilty until proven innocent. In an extension of this framing tactic, international NGOs often bring to meetings residents of areas which are particularly affected by POPs (the Inuit territories, sub-Saharan Africa, etc.). The presence of these individuals, who usually give non-technical statements to the Plenary asking POPRC or the COP to keep in mind the effects of POPs on humans in particular regions as they make their decisions, is intended to serve as a visual reminder to delegates of the human impact of chemical pollution. This type of frame can be categorized as emotional, as it is designed to appeal to listeners' imaginations and emphasize the "moral" dimension of chemical regulation.

The success of this frame in the context of POPRC discussions appears to be limited. In the case above, the Committee listened quietly to the intervention and then moved on to other topics, without acknowledging the concerns raised by the Observer. While such interventions may have reminded scientists of the objectives of the Convention, any shifts in scientists' feelings were not reflected in discussions. Thus, this type of framing cannot be considered to be influential within the context of science-based decision-making, as it does not change the focus of debate. The environmental and human health NGOs seem to be recognizing that such interventions have minimal impact on the discussions, however; at POPRC-4, IPEN's delegation included a professor of pharmacology and toxicology whose interventions focused on the technical aspects of the impact of these chemicals on human health and the environment. This representative was well-received by the members of the Committee, as illustrated by the frequency with which her points were taken up by other scientists both in the plenary sessions and in the work of a contact group. IPEN's deliberate shift in strategy was successful; while this woman's interests in promoting precautionary action and stricter regulation of the substances being evaluated were explicit, she was treated as an equal by other scientists. She framed her interventions by referring both to scientific data and to her experiences as scientist, working with chemicals and with the individuals who had been affected by them. For example, at one point she provided a detailed explanation of the neurotoxic effects of short-chained chlorinated paraffins (SCCPs) on humans. Afterward, one delegate noted that he really appreciated "having the perspective of a medical professional."[39] This comment underscores the importance of being able to "speak the language" of the scientists; being able to explain the problem in scientific terms gave the delegate credibility, and allowed her to contribute new information which was valued by other participants.

In contrast, the non-technical interventions of observers with similar political goals were largely ignored. Thus, while graphic descriptions of the effects of POPs on humans and other animals may be very effective in capturing the attention of the public, attempts to use such emotive frames in the context of scientific discussions met with little success. Over the four POPRC meetings, the relative weakness of such frames is demonstrated by the low number of socioeconomic impact frames used – Figure 6.6 above shows that only 5 per cent of frames used emphasized these considerations. This is even more interesting given that (as shown in sections 6.3, 6.4 and 6.5) economic and other interests played an important part in determining the policy preferences that a number of scientists

[39] Anonymous interviewee C. Interviewed at POPRC-4, Geneva, Switzerland. 16 October 2008.

brought to the meetings. This finding supports Druckman's theory that individuals are likely to be influenced by frames which are presented by sources which the individuals consider to be credible, while frames presented by individuals with less credibility will have little or no impact (Druckman 2001). It also supports the premise that elites actively and successfully engage in strategic framing of issues for other elites, and not just for individuals with less expertise or information (e.g., the general public).

6.7 Conclusion

The results presented above demonstrate strong support for the causal model and most of the hypotheses set out in Chapter 4 (the notable exception being Hypothesis 2, which posited that epistemic communities have formed in the context of the Stockholm Convention). These results suggest that scientists do have policy preferences regarding individual chemicals, and in some cases, these preferences are informed by external, non-science-based factors. In other words, their policy preferences are not derived from their technical expertise and unique understanding of the evidence; rather, socioeconomic and political interests also affect the interventions made by POPRC participants during the Committee's evaluations of nominated substances. The causal model and hypotheses posited that these policy preferences might be shaped by membership in an epistemic community; however, within POPRC, such communities have not formed. Rather, the preferences of those scientists who have dominated discussion of several key chemicals have made consistently framed issues in ways that support the preferences of the governments with which they are affiliated. This suggests that maintaining a practical distinction between science and politics, a goal which is built into the structure of the Stockholm Convention, is much more difficult than most participants are willing to acknowledge.

Interviews with POPRC members provide insights into the pressure scientists feel as they apply their expertise to the evaluation of data at the behest of actors with socioeconomic stakes in the conclusions reached by POPRC members. Multiple interviewees have stated that they have been instructed to represent their nation's interests in substantive technical discussions of chemical regulation (not just in discussions of socioeconomic interests). According to one delegate to the POPRC:

> I remember being told by the public servants, "Make sure you give the minister advice that he can accept. So no airy-fairy stuff and not too much deep green. You know, think about how it is going to be done and who is going to pay for it.[40]

This sentiment was echoed by several interviewees who have served on POPRC. While each of them expressed a preference for keeping science and politics separate, they also acknowledged that maintaining a division between the two is nearly impossible, as every member of POPRC is acting as a representative of his or her government. The extent to which scientists advocate for national interests varies from "neutral" (contributions to discussion do not support or contradict their national interests; in such cases, contributions tend to be limited) to "strong" (contributions to discussion are overtly linked to national interests). When asked about how scientists balance political interests with scientific analysis, most interviewees gave similar responses. According to one senior government scientist:

> Government scientists are going to promote the interests of the country that they serve. NGO scientists are going to serve the interests of the NGOs they represent. Industry scientists tend to serve industry. Because…you don't bite the hand that feeds you. And so country scientists are going to go to the POPRC representing their country. And the POPRC will try to negotiate that to the greatest extent possible, to find the right balance. But it may not always be able to do that. [41]

[40] Anonymous interviewee B. Interviewed by telephone. 29 January 2008.
[41] Willis, Jim. United States Environmental Protection Agency. Interviewed in Washington, DC. 29 October 2007.

The difficulty some scientists have in separating science from country-specific socioeconomic interests was highlighted in an interview conducted a few days after POPRC-4. This meeting of POPRC was dominated by a contentious debate about Endosulfan, which was nominated for review by the EU. At the close of POPRC-4, which was characterized by an unprecedented level of tension among POPRC members, Thomas Yormah, the member from Sierra Leone, was asked if he believed it is possible to separate science from politics in the early stages of policymaking. In a formal interview held four days later, he provided a written statement he had prepared as a conference room paper for POPRC but, notably, had been persuaded by others not to distribute. The statement included the following:

> When the POPRC started its deliberations in 2005 the chemicals we had on the table were mostly dead chemicals – chlordecone, PBB (polybrominated biphenyls), and to a very large extent, Lindane, were either no longer in production or have been banned or controlled in most parts of the world. Our work was therefore quite straightforward, which probably explains the rapidity with which the first set of chemicals was screened. … At [an intersessional POPRC workshop for developing countries] in 2008, I stated that this committee works "under the guidance of the Secretariat of the Stockholm Convention, using the Convention document as its Bible or Koran, etc., to which it religiously adheres" and its members are "scientists who dwell only on facts and science, especially at the screening phase, and are blind to all other emotions – ideological, social, economic, etc." That innocent statement perhaps did not take into account the fact that scientists are human and that it is not always possible to switch off all other emotions. Thus, as we come to deal with these living chemicals our humanity – perhaps, our human-ness – is bound to emerge and in some cases compete with the scientists in us.[42]

Yormah went on to explain that his initial opposition to regulation of Endosulfan was driven by "emotion/concern for the dire plight of the poor and vulnerable cotton and other farmers in Africa." [43] While not all POPRC members face similar problems, this unusually frank statement does indicate that scientists are both aware of the far-reaching consequences of their decisions and that they may allow these concerns to override the professional objectivity and detachment which supposedly characterizes their work. When questioned on this topic, however, other members emphasized

[42] Yormah, Thomas. POPRC member from Sierra Leone. Interviewed in London, UK. 21 October 2008.
[43] Ibid.

their commitment to maintaining a strict distinction between science and politics. As one member put it, POPRC "is a scientific committee and will come to scientific conclusions." [44] The difficulty of separating science from politics is a theme that will be revisited in the Conclusions chapter.

Another significant finding is that epistemic communities have not formed in the context of the Stockholm Convention. Other global environmental problems, such as ozone depletion and climate change, have attracted the interest of independent cadres of scientists and scholars who do not have direct ties to national interests. In these situations, scientists have worked closely together and have often provided a scientific viewpoint that appears to be motivated by technical expertise (Litfin 1994; Harrison 2004). Such a community has not developed in the context of the Stockholm Convention, however. While many scientists conduct research on POPs, and their work is used by members of POPRC to assess the qualifications of chemicals for accession to the treaty, independent scientists play virtually no role in the deliberations of the POPRC. As Jim Willis, US EPA, noted during an interview, "the scientific community, other than government scientists, is virtually absent."[45] Observations of the meetings of the COP and POPRC, as well as reviews of the participant lists for both meetings, support this statement. The reasons that epistemic communities have not formed in the context of the Stockholm Convention may be linked to the close relationships of many governments to the scientists they delegate to POPRC, which may constrain scientists' abilities to actively support preferences derived solely from their technical expertise. This issue is discussed more fully in the final chapter.

Another key result presented in this chapter is the finding that scientists use strategic issue framing tactics to promote their policy preferences. This was reflected in the distinctive framing patterns

[44] Barra, Jose. POPRC Member from Spain. Interviewed during POPRC-4, Geneva, Switzerland. 17 October 2008.
[45] Willis, Jim. United States Environmental Protection Agency. Interviewed in Washington, DC. 29 October 2007.

associated with dead and live chemicals; scientists affiliated with countries with socioeconomic interests in continued production and use of substances under review systematically used anti-regulatory frames. Interestingly, three of the participants with the strongest interest in challenging regulation employed dual framing strategies: in addition to framing the chemicals in question as unsuitable for listing due to scientific uncertainty, they also attempted to end review by challenging the validity of POPRC's decision-making process. However, the member from India – who used this strategy most fully – overplayed this approach, lost his credibility with other participants, and was subsequently overruled in a vote. This issue, which will be discussed in detail in Chapter 7, demonstrates the distinction between strong and weak frames, and underscores the importance of credibility to a successful framing strategy. This finding supports Chong and Druckman's (2007b) argument that, in competitive situations, frames that emphasize available considerations (strong frames) are likely to be more effective than frames which are introduced by individuals with low credibility and emphasize issues which are considered to be irrelevant or do not fit with the values which guide the group's behavior and work (weak frames). This distinction helps to explain the shift in strategy demonstrated by several of the environmental and public health NGOs during POPRC-5, when their interventions shifted from emotional, graphic descriptions of the effects of POPs on food and wildlife to more evidence-based interventions made by scientists and others with recognized technical expertise. This distinction also explains the low number of socioeconomic frames used through the POPRC meetings despite the fact that, particularly with respect to live chemicals, socioeconomic interests play a significant role in shaping the preferences of stakeholders even at this early stage of the policy process.

These issues will be explored in detail in the next chapter, which presents the within-case analyses of three chemicals reviewed by POPRC: octaBDE, SCCPs, and Endosulfan. The close analysis of the use of strategic issue framing to influence POPRC's evaluations of these substances contextualizes the above findings, and facilitates a clear, corroborative test of the causal model and hypotheses with reference to three substances that are of varying levels of importance to a range of stakeholders. These analyses provide a comprehensive account of the frames used by participants in POPRC's decision-making process.

Chapter 7: Framing in Action

The previous chapters have explored the role of science and scientists in the Stockholm Convention, and have tested the hypotheses using analysis of the coded ENB reports, interviews with participants, and position papers written by stakeholders. Thus far, this research has shown that some of the most active scientists participating in POPRC's work deliberately use issue frames that are consistent with the economic or political interests of the countries or organizations with which they are affiliated. The preceding analysis has also indicated that while evidence and uncertainty frames have been used at approximately similar rates throughout the POPRC meetings, the frequency with which procedural frames have been used has increased substantially in conjunction with POPRC's evaluation of live chemicals, and specifically in relation to the Committee's review of Endosulfan. As previously noted, Endosulfan is of significant economic importance to the two countries whose scientists have been responsible for most of the procedural interventions; thus, the change in framing strategies with relation to this chemical is particularly intriguing.

In order to explore and further clarify the way these frames have been used by scientists, this chapter analyzes three chemicals that have been reviewed by POPRC: octaBDE, SCCPs, and Endosulfan. Analysis of these sub-cases is necessary to contextualize the foregoing discussion of issue framing, and particularly to elucidate and corroborate the results of the hypotheses set out in Chapter 6. Tracing the use of frames from the nomination of a chemical for review to the conclusion of POPRC's work (or, in the case of SCCPs, to the current stage of review) illuminates the ways frames are used in technical, science-based discussions to support scientists' policy preferences (or the preferences of the countries or organizations with which they are affiliated). Most importantly, analysis of individual chemicals facilitates application of the causal model and comparison of the use of issue framing tactics in discussions of chemicals which represent different levels of socioeconomic importance.

7.1 Selection and Analytical Structure of Sub-Cases

The three substances chosen for within-case analysis represent different types of chemicals (two are industrial chemicals and one is a pesticide) and are produced and used in different, but sometimes overlapping, parts of the world. Endosulfan is an agricultural pesticide produced primarily in India and China, and it has been widely used throughout the world. SCCPs and octaBDE are both industrial chemicals which have been produced and used in many parts of the world, including Asia, North America, and throughout Europe. This selection of substances also represents both dead and live chemicals. At the time of POPRC's review, octaBDE was already being phased out of use production worldwide, and was considered to be a dead chemical. In contrast, both SCCPs and Endosulfan are live substances with significant economic importance to producers and users around the world. COP-4 agreed to list OctaBDE in Annex A (elimination) of the Stockholm Convention (Decision SC-4/18), and to the astonishment of most delegates, on the final day of its meeting in April 2011, COP-5 reached consensus to list Endosulfan, also in Annex A (Decision SC-5/3).[46] SCCPs have not progressed beyond the risk profile stage of evaluation, despite being reviewed during every meeting since POPRC-2.

The shift from POPRC's review of dead to live chemicals is a critical part of this analysis, because the socioeconomic implications of listing live chemicals should not affect the decision-making of a scientific review committee. If science is the primary influence on POPRC's decision-making, the

[46] More information about the negotiations which led to this agreement can be found in the coverage of the Earth Negotiations Bulletin, available online: <http://www.iisd.ca/chemical/pops/cop5/>

frames used in discussions should not change according to the production/use status of the chemicals under review (Hypothesis 4). SCCPs and Endosulfan were among the first live chemicals to be discussed by the Committee, and with their nominations, the tension between science and politics was starkly illuminated for the first time in POPRC's work. During POPRC-4, a minority of participants engaged in an unprecedented level of politically-motivated posturing and manipulation. This episode, which unfolded over the course of the five-day meeting, represented a significant turning point for POPRC, which had previously conducted its business with comparative goodwill among participants. In interviews held prior to this meeting, several participants claimed that differences of opinion in the Committee were focused on interpretations of scientific evidence and had little connection to the political interests of scientists' home countries. According to Leena Ylä-Mononen, POPRC member from United Kingdom:

> So far in these first three meetings where I have been a member, I think science was quite well distinguished from socioeconomic factors. Difficult bits in the discussion were really more about the science and especially how to interpret the criteria concerning the likely significant adverse effects as a result of the long-range environmental transport.[47]

The latter part of this comment refers to the case for regulating SCCPs, which, as the following analysis will show, opponents to regulation characterized as being fraught with scientific uncertainty. Reiner Arndt, POPRC Chairman (Germany), expressed similar views to those of Ylä-Mononen, saying:

> [POPRC] is not really political. I mean, I never know what people have in their heads, I mean in their brains, so one cannot look at this, but I am just talking about how this should be in principle. But it has been like this because up to now, I mean, I am quite sensitive to that and am always very careful and try to make sure that people give arguments for their positions, and do not just have positions in the committee. And up to now I don't think there has been what is called political interference.[48]

[47] Ylä-Mononen, Leena. POPRC member from the United Kingdom. Interview conducted by telephone. 8 May 2008.
[48] Arndt, Reiner. Chair of POPRC from Germany. Interviewed by telephone. 8 April 2008.

Arndt was formally interviewed approximately six months prior to POPRC-4, which turned out to be the most contentious POPRC meeting to date. This statement reflects the Chairman's concern about the politicization of POPRC's work, and the resulting importance of providing scientific evidence to support the positions taken by participants. The Chairman can also limit the participation of observers, thereby excluding explicit representation of non-science based interests and ensuring that the decisions taken by the Committee are based on the preferences of the Committee members alone. Upholding this standard is a means by which the Chairman can reinforce the validity of the Committee's decision-making process. However, the effectiveness of this approach depends on the independence of the POPRC members from the governments with which they are affiliated. As POPRC Chairman Arndt noted, it is impossible to know exactly what participants are thinking; however, it is possible to analyze their interventions to identify patterns which support particular goals. This analysis of strategic issue framing strongly suggests that some scientists use heresthetical tactics to support their policy preferences, and that these preferences are based not on science, as would be the case among epistemic communities, but on the external political and economic interests of the governments with which scientists are affiliated.

The next sections will analyze the Committee's reviews of octaBDE, SCCPs, and Endosulfan between POPRC-2 and POPRC-5. This will be followed by an analysis of the implications of this discussion, with particular regard to: 1) the role scientists play in the Convention, 2) the influence of framing as a tactic which may be used by rational actors to garner support, shape debate, and ultimately promote predetermined political goals, 3) the relationship between science and politics in global chemical regulation, and 4) the future of POPRC and the Stockholm Convention.

7.2 The Within-Case Analyses of octaBDE, SCCPs, and Endosulfan

7.2.1 c-octaBDE

Overview of the Substance

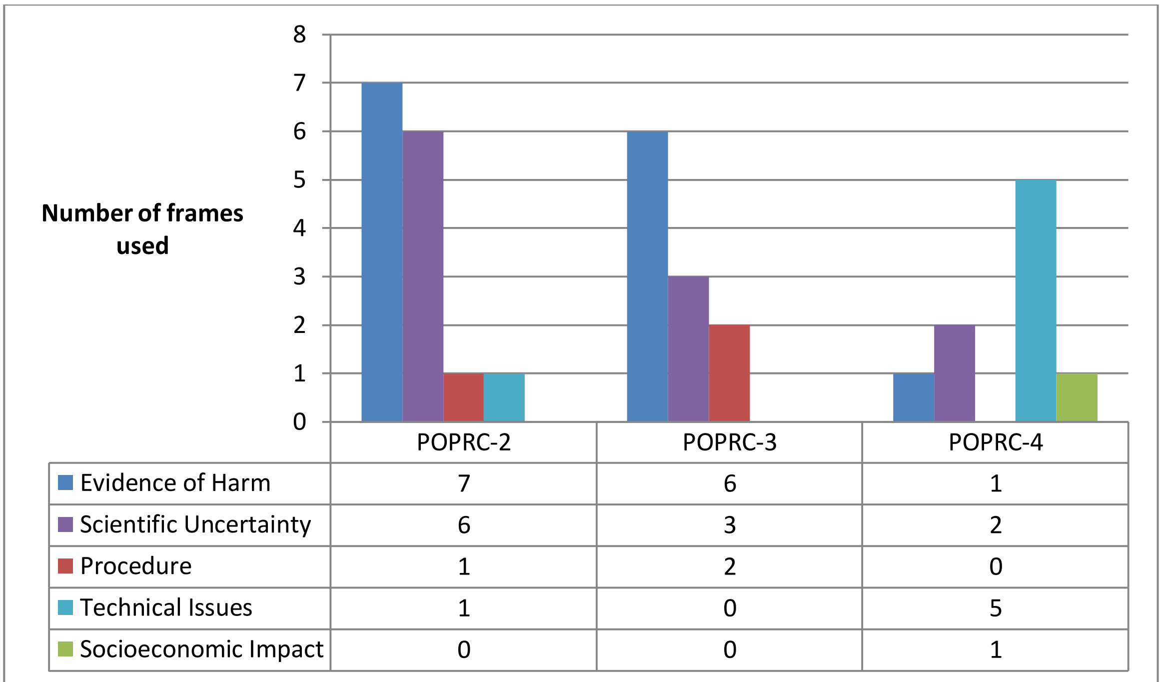
Commercial octabromodiphenyl ether (c-octaBDE) is a synthetic industrial chemical mixture which was proposed for listing in Annex A (elimination) by the EU in 2006. The precise mixture of polybrominated diphenyl ethers varies, but typically includes pentaBDE, which POPRC had already categorized as a POP (decision POPRC-1/3, 2005), and hexaBDE, another compound which was thought to have POPs characteristics. Primarily employed as flame retardants in coatings for textiles and in hard plastics, these additives were commonly used in foam, upholstery, and casings for computers and other electronics until the mid-2000s.

Production of c-octaBDE began to decline in the mid-1990s; according to the risk management evaluation produced by POPRC, world-wide production dropped by almost half between 1994 and 2001 (UNEP/POPS/POPRC.4/15.Add.1). Production was phased out in most of Europe and North America by the mid-2000s, due to "declining demand" (BSEF 2005), and some countries (e.g., Japan) voluntarily phased out imports in the same time period. While little information is available regarding the production and use of c-octaBDE in developing countries, in 2008, POPRC determined that it was "essentially impossible to buy c-octaBDE" at a global level (UNEP/POPS/POPRC.4/15.Add.1, p.4). However, many products containing octaBDE are still in use around the world, and present disposal issues that are relevant to the Stockholm Convention.[49]

[49] Disposal of articles containing octaBDE is technically complex and politically contentious, as recycling BDE-containing plastics for use in new products (e.g., carpet padding) will perpetuate exposure to these hazardous substances. However, separating BDE-containing products from the waste stream is a significant logistical challenge, and in some cases, is simply impossible. This issue is currently being addressed by a POPRC working group, which is trying to reconcile conflicting environmental and public health concerns, as well as the economic interests of countries with waste recycling industries. This controversial issue underscores the importance of regulating both live and "dead" chemicals, and also provides a reminder that chemicals widely considered to be dead may continue to pose risks long after production has ceased.

Commercial-octaBDE progressed through each stage of POPRC's review in three years, and was ultimately listed in Annex A of the Stockholm Convention (it was one of the nine "new POPs" – the first substances added to the original twelve - listed at COP-4). The discussions at each stage were relatively uncontroversial and cooperative, and although questions were raised about the evidence of harm posed by the compounds, each stage of review concluded with a consensual decision to move the chemical to the next phase of the decision-making process. Discussions during each stage reflected a mix of frames, and primarily consisted of interventions which highlighted either evidence of harm or scientific uncertainty. Figure 7.1 below illustrates the use of frames during each stage of its evaluation by POPRC.

Figure 7.1 Frames used in discussions on OctaBDE, POPRC-2 - POPRC-4



	POPRC-2	POPRC-3	POPRC-4
Evidence of Harm	7	6	1
Scientific Uncertainty	6	3	2
Procedure	1	2	0
Technical Issues	1	0	5
Socioeconomic Impact	0	0	1

As this table illustrates, the first two stages of POPRC's review (during POPRC-2 and POPRC-3) were dominated by discussions of evidence of harm and scientific uncertainty. The third stage of review, discussion of the risk management evaluation, involved substantially more interventions relating to technical issues (country capacity for disposal, recycling of BDE-containing plastics, etc.), as well as the possible socioeconomic impacts of listing the chemical. This shift from science-based interventions to interventions which emphasize technical issues reflects the intended structure of the review process; the first two stages are focused on science-based evaluation of the substance, while the third is devoted to discussion of management of the risks posed by POPs, and is, therefore, the first point at which it is appropriate to address the socioeconomic and other issues which may arise as a result of listing.

In the opening round of discussions of octaBDE in 2005, two opposing views of appropriate action were presented. These positions were maintained throughout the evaluation of the chemical. The EU took an explicitly pro-regulatory stance by proposing octaBDE (which came to be designated as commercial octaBDE, or c-octaBDE) for listing in Annex A due to evidence of harm, while an industry association framed consideration of the chemical as a waste of POPRC's time and resources, saying that octaBDE did not pose a global risk and should be of "low concern" for the Stockholm Convention (BSEF 2005, p. 5).

The POPRC member from the EU introduced the issue, in accordance with POPRC's rules of procedure, by presenting a statement outlining its reasons for concern, as well as scientific evidence that the mixture meets the screening criteria. The data provided by the EU supported the conclusion that octaBDE is persistent, toxic, and subject to long-range environmental transport, three of criteria that must be fulfilled to classify a substance as a POP. With reference to the fourth criterion, the EU presented evidence that the mixture has "a strong potential for bioaccumulation" (Ashton et al., 2006, p. 9). The use of the word "potential" is significant, because it falls short of demonstrating actual bioaccumulation. The lack of certainty associated with the bioaccumulative properties of c-octaBDE created an opening for opponents of regulation to argue that the substance failed to meet the Annex D screening criteria, and should not be subject to further review or eventual listing.

The most vocal opponent to the listing of octaBDE was the Bromine Science and Environmental Forum (BSEF), an industry association representing producers of brominated chemicals.[50] When the EU nominated octaBDE at POPRC-2, the representative of BSEF distributed a position paper with information about each of the screening criteria, including citations of evidence supporting the conclusion that c-octaBDE is not bioaccumulative. BSEF's paper also stated that c-octaBDE is not "readily transported long distances in air," and thus fails to meet the requirement that a substance be subject to long-range environmental transport (BSEF 2005, p. 5). Furthermore, BSEF cited the declining levels of production and use of the commercial mixture of octaBDE as evidence that POPRC should not proceed with evaluation of the substance. In an informal interview, a representative of BSEF described c-octaBDE as a dead chemical, and emphasized that he did not believe it would ever be produced again even if the Stockholm Convention decided not to take action to ban the substance.[51] All three of these scientific uncertainty frames support an argument for ending review of the chemical at the first stage.

Given BSEF's characterization of octaBDE as a dead chemical, and the evidence of declining production and use of the substance, it is reasonable to question BSEF's interest in challenging the case for listing the substance. While the BSEF representative declined to participate in a formal interview, citing concerns about violating his employer's rules, he did highlight what he characterized as the importance of ensuring that the Stockholm Convention is applied in a way that is procedurally and scientifically correct.[52] If a chemical fails to meet all of the criteria for listing, it should not advance to the next stage of review. This view was echoed by several industry

[50] Current BSEF members include Albemarle Corporation, ICL Industrial Products, Chemtura, and Tosoh Corporation.
[51] Campbell, Robert. BSEF. Informal interview conducted at POPRC-3, 29 November 2007.
[52] Ibid.

representatives interviewed for this research, as well as by representatives of the United States.[53] According to this perspective, rigorous scientific review of nominated substances and strict interpretation of the Convention's rules of procedure will ensure the credibility and sustainability of the Convention. Importantly, it will also prevent participants with a pro-regulatory agenda from pushing chemicals through the process when the scientific case for regulating a substance is weak. As several interviewees repeatedly emphasized, the Stockholm Convention is applicable only to those toxic chemicals that are subject to long-range environmental transport. Thus, a substance may be highly toxic, persistent, and bioaccumulative, but if it does not meet the threshold for long-range environmental transport, it represents a domestic or regional issue that should not be addressed by a global instrument.

In spite of BSEF's stated concerns for the sustainability and credibility of the Stockholm Convention, as the discussions unfolded it became clear that economic concerns were shaping the industry association's framing strategies. The frames employed by BSEF's representative, and his willingness to accept decisions which were specific to commercial-octaBDE, suggested that BSEF was concerned with protecting other brominated diphenyl ethers from being swept up in regulatory action on octaBDE. Other BDEs with higher congeners are still produced and used as flame retardants, and the industry association's job is to represent the manufacturers of these live, economically valuable substances. Significantly, at approximately the same time that octaBDE was nominated for listing, new research was suggesting that higher-congener BDEs, such as decaBDE, could debrominate in the environment. In other words, upon exposure to air, decaBDE could break down and become octaBDE or pentaBDE. This finding, as several POPRC participants subsequently noted, would explain why lower-conger BDEs were likely to be found in the Arctic, while octaBDE was more likely

[53] Willis, Jim. United States Environmental Protection Agency. Interviewed in Washington, DC. 29 October 2007.

to be found close to its source of release.[54] It also implied that higher-congener BDEs could be subject to regulation by the Stockholm Convention. Thus, to protect its economic interests, BSEF's best strategy would be to challenge the listing of octaBDE, and to ensure that, if the mixture began to advance through POPRC's stages of evaluation, review focused strictly on octaBDE and did not broaden to include higher-congener BDEs.

The discussions of c-octaBDE in each stage of review reflected a mix of frames, including both scientific uncertainty and evidence of harm. In the first stage of evaluation, the members from Japan, Sierra Leone, and India questioned whether the bioaccumulation criterion was met, and subsequently accepted the validity of the relevant data presented by the members from Sweden, Norway and Spain. Notably, the member from India asked if the information presented "collates all relevant scientific literature;" a concern that various scientists affiliated with the government of India echoed in discussions of almost every chemical reviewed by POPRC (Ashton 2006, p. 9). While POPRC members addressed concerns about bioaccumulation, toxicity, and persistence, it is notable that none of the committee members raised concerns about long-range environmental transport, as highlighted by BSEF at the start of POPRC-2. Without the support of a Committee member, this frame gained no traction and had no impact on debate. Furthermore, each frame emphasizing scientific uncertainty was countered with a frame emphasizing evidence of harm, with the latter consistently meeting with acceptance from the rest of the Committee. The scientific uncertainty frames introduced by BSEF were moderately effective; they were adopted by POPRC members, but these members subsequently accepted the counterframes highlighting evidence of harm.

Following the comprehensive and conclusive discussion among committee members regarding the screening criteria, the BSEF representative shifted his strategy away from highlighting scientific

[54] Rae, Ian. POPRC member from Australia. Interviewed during POPRC-4. Geneva, Switzerland. 23 October 2008.

uncertainty, and instead concentrated on addressing concerns about chemical identity. Highlighting the need for specificity and technical accuracy, the representative suggested that POPRC concentrate on the commercial mixture of octaBDE. This shifted the focus of regulation to a particular mixture, and away from the components (which could be more easily linked with other BDEs). While the member from China expressed concern that this would complicate implementation of regulation, other members supported the idea of increasing technical accuracy, and the Committee agreed to BSEF's suggestion. The technical accuracy frame was strong, as it emphasized the importance of precision and scientific rigor without directly challenging underlying policy preferences. Thus, this frame achieved broad support among Committee members, because it appealed to their scientific expertise and was perceived as a way of strengthening their conclusions. This supports Hypothesis 5, which posits that elites with technical expertise will only be affected by strong frames, and will be able to identify and ignore weak frames. In the context of this discussion, scientific uncertainty represented a weak frame, given the influx of evidence which supported the listing of octaBDE.

The issue of chemical identity was raised again in the intersessional working period, and quickly became a dominant concern at POPRC-3. The draft risk profile prepared by the intersessional working group, in which the representative from BSEF participated, referred to hexa-, hepta-, octa- and nona-BDE, instead of just octaBDE. Throughout POPRC-3, the interventions made by the representative of BSEF focused on increasing the specificity of the risk profile. For example, BSEF "emphasized the need to clarify that the information in the draft risk profile only covers some of the congeners named in the profile" (Ashton 2007, p. 11). BSEF received support from several members and observers, including the member from Jordan, who called for more precision in the risk profile, an observer from India, who called for more information before proceeding, and observers from the United States, who noted that the updated risk profile covered congeners which had not been in the original. The Committee addressed each of these concerns by amending the risk profile to increase specificity and accuracy, and once again reached consensus to move to the next stage of evaluation.

The risk management evaluation stage of discussion tends to be the least controversial stage of decision-making, as it focuses on gathering information on socioeconomic and technical issues to assist the COP; given the status of c-octaBDE as a dead chemical, the stakes for countries were comparatively low (as previously noted, the one major issue associated with BDEs is recycling, an issue which has not had any bearing on the decision to list the substance). Members and observers highlighted concerns relevant to the countries with which they were affiliated, all of which were noted in the risk management evaluation. For example, both Morocco and China emphasized the need for financial and technical assistance to help developing countries implement a ban on octaBDE. The risk management evaluation stage is the first opportunity for country representatives to formally discuss the socioeconomic implications of listing substances, and thus the onus falls on POPRC scientists to shift their roles from politically-disinterested technical advisors to policymakers who must represent the non-scientific interests of their countries. However, all information presented can be incorporated into the risk management evaluation for presentation to the COP; thus, scientists are not negotiating among themselves about how to resolve these concerns.

Discussion

The causal model set out in Chapter 4 posits that scientists' policy preferences are shaped by affiliation, the status of the chemical, and the scientific data on the substance. It is notable that the only producer of octaBDE is Chemtura Corporation, an American chemical company which was represented at POPRC by BSEF. None of the POPRC members were affiliated with countries with an interest in continued production of the substance. The interventions made by participants during discussions of octaBDE reflect larger patterns of interventions throughout all of POPRC's reviews. For example, the POPRC members who made interventions emphasizing scientific uncertainty (including, but not limited to, India, Sierra Leone, Jordan, and the Russian Federation) tend to raise these concerns with regard to all chemicals being reviewed by POPRC, as illustrated by Table 6.2 in Chapter 6 (Ashton et al. 2006, Ashton et al. 2007, Kohler et al. 2008, Templeton 2009). Similarly, countries which introduced evidence of harm were developed countries, including, but not limited to, Australia, Canada, Norway, Sweden, and Spain. This suggests patterns of support or opposition which are not derived strictly from the chemical under review; rather, some scientists are predisposed to favor listing, perhaps indicating a risk-averse approach to chemicals management, while others favor strict evaluations which limit the scope of POPRC and the Stockholm Convention to regulate chemicals in the context of scientific uncertainty.

The discussions of octaBDE also illustrate the influential roles observers can play in the decision-making process. The strategy employed by BSEF started by introducing several reasons to end consideration of octaBDE at the first stage of evaluation, and shifted to a cooperative approach which appealed to scientists and transcended any preexisting policy preferences. By framing a narrowed focus on the commercial mixture of octaBDE as an issue of technical accuracy and precision, the representative of BSEF successfully prevented POPRC from making a broad recommendation which could have been interpreted to include higher-congener BDE mixtures that are still produced and used.

The next section will analyze the discussions of SCCPs. In contrast to the review of c-octaBDE, evaluation of this substance has been highly contentious, and is as yet unfinished. While c-octaBDE illustrates the way highly effective framing can be used to bring participants together to reach a consensual decision, the use of these tactics in the review of SCCPs has involved competition between two strong frames and has led to a stalemate in the Committee.

7.2.2 Short-chained chlorinated paraffins

POPRC Chairman Reiner Arndt has characterized short-chained chlorinated paraffins (SCCPs) as a "persistent" problem for POPRC – pun intended.[55] While nominated chemicals are expected to spend one year in each stage of evaluation, to date, SCCPs have remained in the risk profile stage of review for four consecutive meetings. Despite the repeated redrafting of the risk profile to include new data, as well as the input of invited experts with specialist knowledge of these compounds, POPRC has been unable to agree either that SCCPs warrant global action or, conversely, that they do not meet the criteria for listing and should be set aside. Numerically, there is substantial support for both sides of this debate, as well as a sizable number of POPRC members who have not publicly stated a preference. At POPRC-5, an informal show of hands requested by the Chair revealed that eight members favored ending review, nine members favored advancing to the next stage of evaluation, and the remaining 12 members were undecided (two members were absent). This unusual situation invites analysis of scientists' preferences to explain the entrenched positions of several of the members, as well as the way issue framing has been used to attempt to win support for each side. As the following analysis of the debates between POPRC-2 and POPRC-5 will show, the preferences of many POPRC participants have not changed despite the introduction of new evidence.

Production and uses of SCCPs

SCCPs are synthetic industrial chemicals commonly used as plasticizers in flexible PVC (e.g., conveyor belts), rubber, and paint; as lubricants in metalworking fluids; and as softening agents in leathers and textiles (UK Environment Agency 2011). According to the 2009 risk profile prepared by POPRC, chlorinated paraffins of various chain lengths are currently produced and used in the United States, the EU, Russia, India, China, Japan, Brazil and Slovakia. In addition, the following countries reported

[55] Comment made during introduction of SCCPs. POPRC-5. 20 October 2010.

that they import SCCPs: Switzerland, Australia, the Republic of Korea, and Mauritius (UNEP/POPS/POPRC.5-2.Rev.1). It is possible that SCCPs are used elsewhere, but such uses have not been identified by POPRC.

While production of SCCPs in Europe, North America, and Japan is declining due to domestic regulatory review and action (European Chemicals Agency 2009, Environment Canada 2010, Jabr 2010, US EPA 2010), it is rising in both China and India, with a reported increase in production in China of "30-fold in fewer than 20 years" (Jabr 2010, p. 2). Precise information on production around the world is limited, as its availability depends on what both producers and governments are willing to disclose. Governments do not always have accurate information about what is being produced in their countries (Jabr 2010); nor are they always willing to share this information. Notably, at POPRC-5, the member from China told the committee that China did not produce SCCPs, but when pressed by the member from the EU to clarify this statement, he said that he had no information about production of SCCPs (Templeton 2009). This back-pedaling illustrates the dual role played many POPRC members; while they are formally considered to be independent technical advisors, in reality many of them are constrained by the economic and political interests of the governments with which they are affiliated, and their participation in POPRC may be heavily influenced by governmental policy preferences.

Chemical Identity

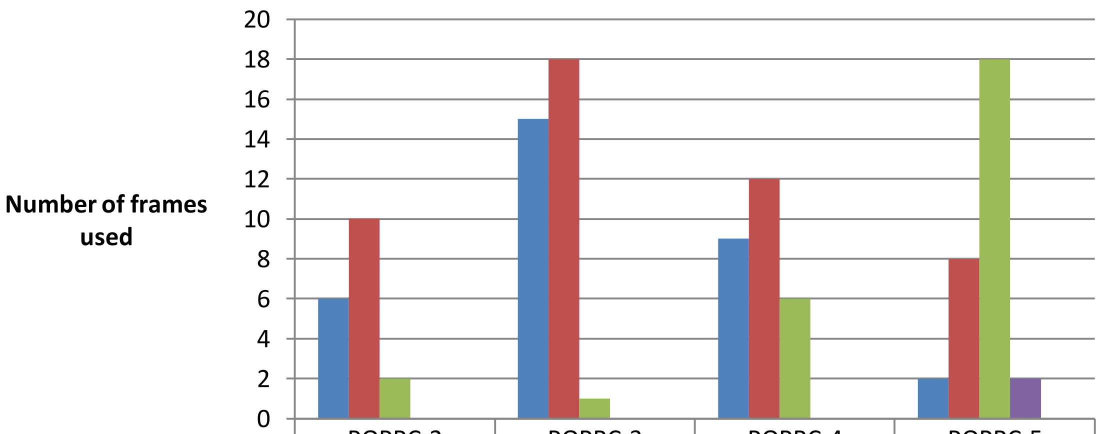
SCCPs are part of a "family" of chlorinated paraffins that are categorized as short-, medium-, or long-chained, depending on "the length of their carbon backbones" (Jabr 2010, p.1). Identifying SCCPs, and distinguishing them from other chlorinated paraffins, is complex, and the challenge of establishing chemical identity has been a critical issue throughout POPRC's review of these compounds. In an interview with *Environmental Health News*, two POPRC observers (both of whom have expressed support for listing during POPRC meetings) discussed the complexity of chlorinated paraffins, noting that it is "difficult for scientists to identify and analyze them" (Jabr 2010, p. 4). According to Gregg Tomy, a chemist at the University of Manitoba who has served as an invited expert on SCCPs for POPRC, "There are only a few labs in the world, and you can count them on one hand, that are actively working in this area because of the complexity….This makes PCBs and PBDEs seem like a walk in the park in terms of quantification and detection" (quoted in Jabr 2010, p. 4). Tala Henry, a toxicologist with the US EPA, emphasized that chlorinated paraffins are "difficult to characterize," and said that "there's a difference in interpretation about what a short-chained chlorinated paraffin is" (Jabr 2010, p.4).

The challenge of distinguishing chlorinated paraffins of different chain lengths provides insight into why producers and users of these widely used, economically valuable substances would object to listing; if it is technically difficult to distinguish SCCPs from other chlorinated paraffins, then agreement that SCCPs warrant global action could set a precedent for regulation of the nearly identical MCCPs and LCCPs. This concern arises from POPRC's experience with other substances; the listing of octaBDE in 2009 was facilitated by the listing of pentaBDE as one of the original POPs, and alpha- and betaHCH were nominated and eventually listed as a result of POPRC's review of gammaHCH (Lindane). Given the economic importance of MCCPs and LCCPs, in addition to the continued production and use of SCCPs, stakeholders will be invested in ensuring that POPRC's evaluation is as narrow as possible and does not affect continued production and use of closely-related chemicals which have not been formally proposed and evaluated.

Opponents to listing have framed the issue as one of extensive scientific uncertainty which, they argue, outweighs the comparatively weak evidence of harm. The counterframe, established by the EU's nomination of the substance for listing, is that SCCPs pose a significant threat to human health and the environment and, therefore, warrant global action. As the following analysis will demonstrate, each of these frames has gained roughly equal support from POPRC members, and both have fallen short of winning over the substantial number of members who remain noncommittal in their views of appropriate action. As the positions of most POPRC members remain static, despite the introduction of new evidence of harm by supporters of regulation, the debate has shifted away from evidence of harm and scientific uncertainty, and has come to be dominated by procedural frames. The changing use of frames is illustrated in the Figure 7.2 below, and is analyzed in the following section.

Framing of SCCPs: POPRC-2 to POPRC-5

Figure 7.2 Frames used in discussions on SCCPs, POPRC-2 - POPRC-5



	POPRC-2	POPRC-3	POPRC-4	POPRC-5
Evidence of Harm	6	15	9	2
Scientific Uncertainty	10	18	12	8
Procedure	2	1	6	18
Technical Issues	0	0	0	2
Socioeconomic Impact	0	0	0	0

SCCPs were proposed for listing by the EU at POPRC-2 (2006), and as illustrated by Figure 7.2 above, scientific uncertainty and evidence of harm frames dominated discussion. The member from the UK, who spoke on behalf of the EU and its member states, opened discussions by framing SCCPs as a threat to human health and the environment which warrants global action. She presented evidence to demonstrate that SCCPs meet the Annex D screening criteria on bioaccumulation, toxicity, and

LRET, but acknowledged that little evidence of persistence was available (Ashton et al. 2006). This evidence of harm frame was supported by the members from Canada, Spain, and Norway, each of whom presented additional data to support the EU's proposal. Notably, Canada pointed to studies which supported the conclusion that SCCPs are persistent; this evidence was crucial in ensuring that the Annex D screening criteria were fulfilled.

Other members attempted to counter the pro-regulatory evidence of harm frame by highlighting scientific uncertainty. While an observer from India emphasized that SCCPs are not as persistent as other POPs, the bulk of scientific uncertainty frames focused on chemical identity and the challenges of distinguishing SCCPs from medium- and long-chained chlorinated paraffins. These concerns foreshadowed future debate, but did not outweigh the evidence of harm frames supported by the EU and its allies. At the conclusion of POPRC-2, the Committee agreed that the screening criteria were fulfilled and established an intersessional working group to draft a risk profile. POPRC also formally agreed to take note of the variability of evidence on persistence and LRET, and to "exercise caution in the next phase" of review (Ashton et al. 2006, p. 10). This reflects moderate success for the scientific uncertainty frames, as they were deemed credible enough to be formally incorporated into POPRC's decision. They did not, however, preclude a decision to advance to the next stage of review. The dominance of the evidence of harm frames was facilitated by the comparatively low thresholds for evidence which must be presented to fulfill the Annex D screening criteria. As previously noted, the Annex E stage of evaluation, during which a risk profile is drafted, involves much closer scrutiny of the strength and weaknesses of the evidence presented, as well as gaps in data. Thus, the incorporation of words of caution into the decision at the Annex D phase foreshadowed the difficulty POPRC would face in reaching agreement that the chemical meets the comparatively high thresholds for evidence at the next stage of review.

At POPRC-3, the draft risk profile was introduced by the SCCPs working group chair, Mohammed Yadallee (Mauritius), who outlined evidence supporting each of the criteria for listing and concluded that SCCPs were “likely to lead to adverse effects” on human health or the environment and should be advanced to the final stage of POPRC’s evaluation. This pro-regulatory framing of the issue was countered by several POPRC members and observers who highlighted gaps in data on toxicity, and also questioned the validity of both the evidence presented and the scientific methods used to collect the data. For example, the member from Sierra Leone called for more information about the “conditions under which the measurements were taken” (Ashton et al. 2007, p.12). This statement reflected his ongoing argument that POPs may deteriorate more quickly when used in hot climates, and, consequently, countries like Sierra Leone should not be subject to the same restrictions as countries in colder climates. This framing of the issue, which is aimed at reducing Sierra Leone’s obligations under the Convention, has garnered some support from India, but has been largely ignored by other members. This may be due in part to the policy implications of this argument, which, if accepted, would necessitate the restructuring of the Convention to enable legal differentiation among countries based on geographic location. Furthermore, during negotiations of the Stockholm Convention, developed country governments and industries strongly opposed allowing developing countries to “operate under different restrictions,” due to the economic disadvantage this could engender (Selin 2010, p. 141). Nevertheless, the member from Sierra Leone has raised the issue in discussions of multiple chemicals. This repetition supports the assertion by Chong and Druckman (2007b) that individuals seeking to frame issues will use repetition as a tactic for building support among other participants.

Another frame with implications that exceeded the chemical in question was introduced by the member from China, who questioned the validity of POPRC’s decision-making process. In this intervention, the member from China “expressed concern that his comments were not sufficiently reflected” in the draft risk profile and highlighted the need for a “fair, impartial and objective decision" (Ashton et al. 2007, p.12). According to review of the meeting reports and ENB summaries, this comment represents the first time any of the POPRC members formally questioned the transparency and fairness of POPRC's decision-making process. Importantly, this intervention reflected growing tensions among POPRC participants who, for the first time, were faced with reviewing a chemical that was both technically difficult to distinguish from similar substances and of significant economic importance to a number of countries.

The deeply entrenched opposition to listing SCCPs was reflected in the Yadallee's report to plenary on the last day of the POPRC-3, which included a procedurally unsupportable conclusion. After extensive discussions throughout the week, the working group "reached a general consensus" that SCCPs were persistent, bioaccumulative, and subject to long-range environmental transport, and that they were "likely to lead to adverse environmental effects" (Ashton et al. 2007, p.12). Crucially, however, they could not agree that SCCPs were likely to adversely affect human health. In other words, while they agreed that SCCPs were toxic to aquatic species and wildlife, some participants (who were not named by Yadallee) rejected the conclusion that SCCPs were likely to be toxic to humans. This controversial distinction met with surprise from some delegates, who argued that he distinction did not make sense from a scientific perspective. The unwillingness of some participants to support action after agreeing that adverse environmental effects were likely suggests that non-science-based interests were playing an important role in shaping scientists' preferences and evaluations of the risks of SCCPs, particularly given the Stockholm Convention's explicit support in Article 8.7(a) for precautionary action in the face of scientific uncertainty. If scientists were truly disinterested technical advisors, the conclusions presented by Yadallee would have been a procedurally and scientifically valid basis for regulatory action. However, before the distinction between environmental and human health impacts could be challenged, the members from Japan and China both intervened to withdraw their support for the conclusion that SCCPs adversely affect the environment. In the ensuing discussion, two factions emerged: the members from Japan, China, Ecuador, Sierra Leone and the Philippines called for postponement of a decision until POPRC-4, while the members from Norway, the UK, the Czech Republic, Sweden, Trinidad and Tobago, South Africa, and Ethiopia supported moving SCCPs to the RME phase of review (Ashton et al. 2007). The member from China's support for deferring review is particularly interesting in light of the following year's discussion of Endosulfan, at the start of which the member from China challenged the procedural validity of reviewing any substance which had been introduced and then deferred to subsequent meetings. He did not raise the same objection to continuing the review of SCCPs, despite the similarity in action on the two substances. This inconsistency suggests that his tactics in the Endosulfan meeting were part of a strategy designed to end review of the chemical, rather than to ensure the procedural validity of POPRC's decision-making process.

The discussions at POPRC-4 were similar to those at POPRC-3. Proponents of regulatory action introduced new evidence of harm, and opponents of regulation highlighted gaps in data and scientific uncertainty. The conflict between the framing strategies was reflected in the statement of a representative of the Chlorinated Paraffins Industry Association, who "emphasized that while individual sentences in the [draft risk profile] were accurate, the way they were put together led to insupportable conclusions" (Kohler et al. 2008, p. 8). The entrenchment of POPRC members' preferences was becoming increasingly obvious, and the Committee agreed once again to defer the issue to the next meeting. In hopes of breaking the deadlock with the weight of expertise, the Committee agreed to invite outside experts on SCCPs to provide further evidence at POPRC-5. In a concession to the political undercurrents of discussion, however, the Committee agreed that it would invite one expert from a developed country and one from a developing country. Furthermore, the member from India highlighted the need to call on outside experts in order to get "unbiased" opinions (Kohler et al. 2008, p. 8). Such comments and decisions demonstrate the growing involvement of political considerations and interests in the work of POPRC. The discussions of SCCPs and Endosulfan (as the next section will illustrate) reflected closer scrutiny of evidence, more concerns about divergence in the socioeconomic interests of developed and developing countries, and a growing politicization of POPRC's discussions.

In POPRC-5, the discussion was dominated by discussion of procedural issues, but analysis of the interventions reveals that the underlying preferences of POPRC members did not change. Yadallee opened the discussions of SCCPs by presenting the latest version of the draft risk profile, which concluded that SCCPs are persistent, bioaccumulative, and toxic, and that they undergo long-range environmental transport. He noted that unresolved issues included chemical identity and interpretation of toxicity information, and in contrast to the conclusion of the draft risk profile, he said that some members questioned whether there was enough evidence to conclude that SCCPs warrant global action (Templeton 2009). This presentation demonstrated the enduring conflict between evidence of harm and scientific uncertainty frames, each of which were still supported by the same participants. Contrary to the hopes expressed at POPRC-4, the invited experts did not conclusively repudiate either position or win new support for either side, as they gave presentations which reached opposite conclusions about the appropriateness of action.

Faced with repetition of the same issues addressed in the previous two meetings, POPRC Chairman Arndt proposed a procedural deviation designed to help the Committee move forward in its decision-making. Arndt proposed to satisfy opponents of regulation by keeping SCCPs in the risk profile stage for a fourth year, while simultaneously satisfying proponents of action by allowing intersessional collection of information on risk-reduction strategies (information which would normally be gathered in preparation for the next stage of evaluation, after the risk profile had been finalized). In contrast to Arndt's plan, however, this proposal met with mixed reactions from the Committee. Opponents to regulation (India and Sierra Leone, among others) expressed support for the proposal, while those in favor of advancing to the next stage of review (Thailand, France, and Switzerland, among others) objected. While India and Japan "emphasized the value of risk reduction information for producers and users of SCCPs," Switzerland and France "expressed concern about the proposal and its possible consequences for future action on SCCPs" (Templeton 2009). Interviews with participants indicated that proponents of listing of SCCPs believed this action would set a negative precedent for regulation of economically-valuable chemicals when the weight of evidence supported listing. They were also concerned about the implications of deviating from the established decision-making process in order to accommodate the preferences of opponents to listing, as in their view, this could set a precedent for indefinite inaction on all chemicals which met with opposition.[56] The interviewees acknowledged that these concerns are more pressing due to the shift from dead to live chemicals, and the increasing difficulty of reaching consensus on economically valuable substances.

Given the lack of consensus on Chairman Arndt's proposal, the suggestion was dropped. The Committee agreed to defer discussion to POPRC-6, and to request that Parties submit additional data on toxicity, risk evaluations, production, and other points that could help the Committee reach a decision. While POPRC-6 exceeds the timeframe for this analysis, it is worth noting that the discussions at this meeting again reflected competition between scientific uncertainty and evidence of harm frames, and approximately the same level of support for each side. At POPRC-6, the Committee agreed to defer further discussion of SCCPs to POPRC-8, in order to avoid a repeat of the past four meetings. The lack of movement on this issue, in spite of the repeated introduction of new evidence, demonstrates the moderate success of the two key framing strategies. While advocates of listing argue that the weight of evidence supports action, opponents continue to point to gaps in data and argue that SCCPs fall short of the thresholds for listing substances as POPs. Neither frame has been compelling enough to be adopted by a significant proportion of the committee (approximately 13 members have refused to express support for either course of action).

[56] Anonymous interviewees B and E. Interviews conducted during POPRC-5, Geneva, Switzerland. 16 October 2009.

The intractable conflict over SCCPs demonstrates the complexity of science-based evaluations of substances, and particularly the significant room for interpretation in a field that non-scientists often regard as being able to provide definitive answers. This also illustrates the challenges POPRC is likely to face as it reviews newer chemicals, the effects of which may as yet be poorly understood. Ultimately, the case of SCCPs highlights the fundamentally political nature of POPRC; while it is a technical review committee, the correlation between scientists' use of issue framing and country interests suggests that POPRC members are not acting as autonomous, politically disinterested technical advisors. This conclusion is further supported by the use of issue framing in debates on Endosulfan. Notably, however, while the use of procedural frames in discussion increased considerably during the third round of discussions on SCCPs, they were not used to challenge the decision-making process in the same way that procedural frames were used in the evaluation of Endosulfan. Rather, the procedural discussion was introduced by Chairman Arndt, the POPRC participant whose credibility depends most on the appearance of neutrality, after which the two factions supported the procedural actions they perceived as the best means of achieving their policy preferences. This reactionary use of issue framing contrasts starkly with the preemptive use of issue frames in the discussion of Endosulfan, in which procedural frames were used in repeated attempts to delegitimize review of the chemical. Thus, despite the spike in procedural frames in the discussions of SCCPs, participants have focused most heavily on the more traditional science-based frames, and each side has achieved moderate success. Neither has won, but importantly, neither has lost, despite the expectation that chemicals will move through each stage of review in a year. Furthermore, neither side has expressed willingness to vote on the issue. The willingness of the Committee to keep deferring the issue from year to year suggests that the pro-regulatory side feels strongly that the evidence is on its side, but it recognizes that having so many scientists vote against the issue would undermine the strength of POPRC's recommendation and perhaps lead to overtly political division over the issue at the next COP. The opponents to regulation, on the other hand, can capitalize on the complexity of SCCPs to highlight scientific uncertainty, and can continue to call for more evidence indefinitely. Such delays will be economically valuable for producers and users of the whole family of chlorinated paraffins, as agreement to list SCCPs could pave the way for listing medium- and long-chained chlorinated paraffins.

7.2.3 Endosulfan

As the foregoing analyses of octaBDE and SCCPs demonstrate, strategic issue framing has been used by participants seeking to win support for their policy preferences throughout POPRC's review process. Most of the issue frames used in discussions of both octaBDE and SCCPs focused on either evidence of harm or scientific uncertainty. While scientific evidence was used strategically to support the wider policy agendas of many of the actors involved in discussions, the framing discourse was grounded in the technical knowledge of individuals with relevant scientific expertise. Procedural issue frames were of secondary importance, as participants with policy preferences focused on highlighting data that supported those preferences, all working within the structure created by the Stockholm Convention to facilitate decision-making. As the following analysis will demonstrate, however, the review of Endosulfan represented a turning point in the work of POPRC. Specifically, POPRC-4's evaluation of this substance marked the first time procedural frames were used as the primary strategy for opposing possible listing of a chemical. Whereas previous framing of live, economically valuable substances had emphasized elements directly related to the chemical itself (e.g., chemical identity, evidence of harm, gaps in data, etc.), POPRC-4's discussions shifted away from science to an explicit focus on the decision-making process, and consequently, to the political context in which POPRC is conducting its work. As such, these discussions represent a critical juncture in POPRC's work as a scientific review committee.

The case of Endosulfan provides a striking example of the power of strategic issue framing in policy debates, particularly among scientists who are conducting the boundary work associated with science-based policymaking. This example suggests that the power of strategic issue framing may be particularly strong when used among actors who are formally expected to play objective, non-political roles, as these individuals may be the least prepared to respond to aggressive use of heresthetical devices like issue framing. One of the key actors in the Endosulfan discussions, the POPRC member from India, raised so many objections to evidence provided by others, and consequently stirred up such rancor within the committee, that he brought about significant changes to the norms by which the Committee conducts its work. As one Committee member privately noted at the conclusion of POPRC-4, the use of such tactics could be the "death knell for POPRC."[57]

The following sections will provide an overview of the uses of Endosulfan, its production status, and POPRC's discussions of Endosulfan between its nomination at POPRC-3 and the conclusion of the risk profile stage of evaluation at POPRC-5.

Production and Uses of Endosulfan

Endosulfan is an agricultural pesticide used to control beetles, aphids, tsetse flies, snails in rice paddies, and other pests. Major usages include application to a range of crops, such as soy, cotton, rice, and tea, as well as ornamental shrubs and forest trees (UNEP/POPS/POPRC.6-13-Add.1). According to the 2010 risk management evaluation prepared by POPRC, Endosulfan is currently produced in India, China, Brazil, Israel, and the Republic of Korea, and it is used in Argentina, Australia, Brazil, Canada, China, the USA, and India (UNEP/POPS/POPRC.6-13-Add.1). India is the world's largest producer and user of the pesticide, and accounts for at least 50-60% of global

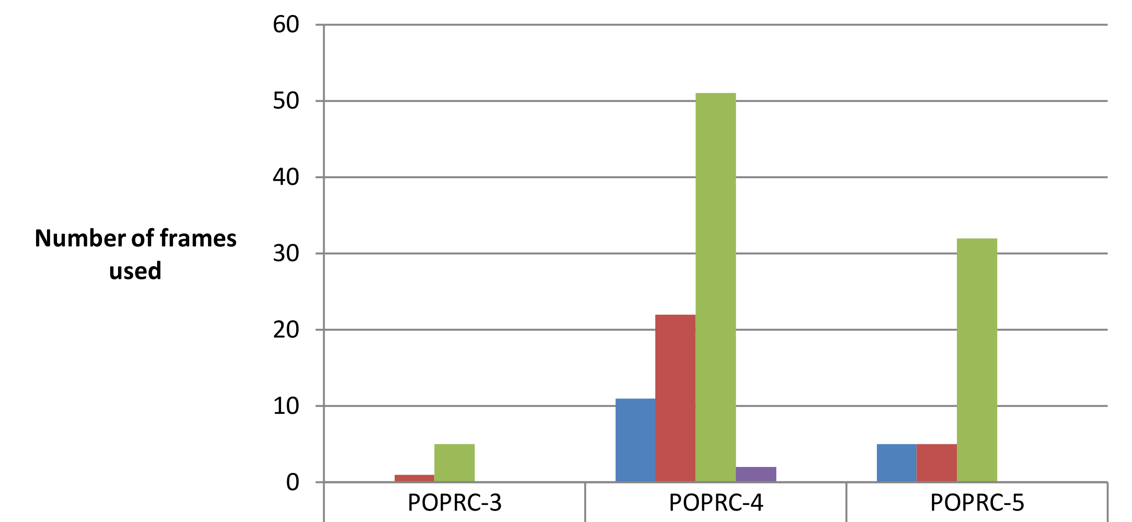
[57] Anonymous interviewee C. Interviewed during POPRC-4, Geneva, Switzerland. 17 October 2008.

production; some sources within India say the country produces more than 70% of the world's supply (Indian Express 2011; The Hindu Business Line 2011). China is the second biggest producer, accounting for approximately 25-35% of the global supply. The production levels of the remaining countries are uncertain, but are far less significant. POPRC's risk management evaluation notes that over 60 countries have banned the substance, which indicates that viable alternatives are already in use in both developed and developing countries. However, representatives of India have emphasized that the economic costs of banning Endosulfan would be substantial, projecting that the costs to Indian producers would be $62-$100 million, plus up to $24 million for the country's farmers, and would result in the loss of approximately 6,000 jobs (UNEP/POPS/POPRC.6-13-Add.1).[58] Representatives of China predicted costs to industry of up to $31 million, and costs to farmers of up to $8 million. Representatives of Israel, Brazil, and the Republic of Korea estimated a combined total of $14-$31 million in losses to industry, and up to $58,000 for the agricultural sector. This information, which was compiled for the final stage of POPRC's review, clearly delineates the economic consequences of a global ban on Endosulfan for those countries with stakes in its production. As the following analysis will demonstrate, the most active opponents to listing Endosulfan were the members from China and India, both of whom used both procedural and scientific uncertainty frames to challenge the EU's proposal to list the substance.

Strategic Issue Framing of Endosulfan

[58] All costs are in United States dollars.

Figure 7.3 Frames used in discussions on Endosulfan, POPRC-3 - POPRC-5



	POPRC-3	POPRC-4	POPRC-5
Evidence of Harm	0	11	5
Scientific Uncertainty	1	22	5
Procedure	5	51	32
Technical Issues	0	2	0
Socioeconomic Impact	0	0	0

POPRC's review of Endosulfan encountered difficulties from the start. The European Union nominated the substance for listing in 2007, but at the beginning of POPRC-3, Jose Tarazona (Spain) announced that "a number of problems, internal to the EU…made it impossible to release information necessary to the discussion" (Ashton et al. 2007, p. 14). Chairman Arndt informed the Committee that without this information, the document lacked "substantial data relevant to decision-making," and the member from the United Kingdom suggested that the first phase of POPRC's review be deferred to POPRC-4. The members from Thailand and Ecuador expressed concern about the procedural legitimacy of deferral, but after seeking guidance from the Stockholm Convention's Legal Advisor, Masa Nagai, the Committee agreed to postpone consideration of Endosulfan until POPRC-4. The members from China, India and Sierra Leone agreed to the deferral, but noted that they had prepared a counter-proposal on Endosulfan which concluded that the chemical did not fulfill the criteria to be included in Annex D. This proposal was noted but not formally considered.

While there were no objections to deferring review of the EU's proposal at POPRC-3, this action created an opening for the procedural framing tactics which followed in subsequent meetings. Furthermore, the counter-proposal introduced by the members from China, India, and Sierra Leone provides evidence to support Hypothesis 4, which posits that systematic differences will exist between discussions of dead and live chemicals. In this case, two major Endosulfan producers, plus Sierra Leone, had prepared a proposal to contradict the EU's nomination of the chemical before review even began. Such action indicates their strong interest in this substance, and suggests that their preferences are derived from sources which are external to the normal process of scientific review. If the members were acting as politically disinterested technical advisors whose remit did not include consideration of socioeconomic implications of listing, there would be no reason to challenge the review of a substance before the process had even begun.

Framing of Endosulfan during POPRC-4

POPRC-4 represented a critical juncture for POPRC. While previous evaluations of nominated chemicals had focused primarily on scientific evidence for or against regulation, the discussions of Endosulfan were dominated by objections to the legitimacy of POPRC's decision-making process. Tension pervaded the discussions of scientific data, as well, and was exacerbated by the repeated refusal of the member from India to accept the validity of evidence presented by other members. As illustrated in Figure 7.3 above, procedural frames dominated discussions, and the number of recorded interventions emphasizing scientific uncertainty was almost twice that of interventions emphasizing evidence of harm. The main opponents of listing Endosulfan, the members from India, China and Sierra Leone, first used procedural framing to attempt to prevent POPRC from carrying out the first stage of its review. When this framing strategy failed to prevent POPRC from proceeding, these members attempted to use scientific uncertainty frames to prevent Endosulfan from advancing to the next stage of review. The member from India, in particular, also used procedural frames throughout the week to challenge the use of various pieces of evidence, end consideration of the chemical, and ultimately challenge the validity of POPRC's decision-making process. This section will detail the use of frames throughout this stage of debate.

The member from Spain reintroduced Endosulfan at POPRC-4, and established an evidence of harm frame by citing evidence that the substance meets each of the Annex D screening criteria. Before discussion of this decision was opened to the Committee, however, the members from China and India presented a conference paper "urging POPRC-4 to refuse to consider the EC's proposal, as they objected to the procedure used at POPRC-3 to adjourn its consideration" (Kohler et al., 2008, p. 10). Specifically, they argued that the process by which discussion of this chemical had been deferred to POPRC-4 contradicted the terms of Article 8.4 of the Convention, which states:

> If the Committee decides that: (a) It is satisfied that the screening criteria have been fulfilled, it shall, through the Secretariat, make the proposal and the evaluation of the committee available to all Parties and observers and invite them to submit the information specified in Annex E; or (b) It is not satisfied that the screening criteria have been fulfilled, it shall, through the Secretariat, inform all Parties and observers and make the proposal and the evaluation of the Committee available to all Parties and the proposal shall be set aside.

The members from India and China argued that because POPRC had not decided whether Endosulfan fulfilled the screening criteria during the first meeting in which it was on the agenda, the Committee had effectively been unable to reach agreement and was required to end its review of the substance. Several members disagreed with this assertion, and the UNEP Legal Advisor to the Stockholm Convention was asked to determine the legally appropriate course of action. Nagai advised the Committee that the procedure by which the discussion had been adjourned at POPRC-3 was correct, because the Committee had not completed the procedure outlined in Article 8 and therefore had not reached the point at which a decision was required. He also noted that the rules of procedure do not prohibit POPRC from deferring work to subsequent meetings. However, this advice was rejected by the members from India and China, who continued to frame the continuation of review as a violation of POPRC's rules of procedure. These actions support Hypotheses 1 (scientists have policy preferences which they will seek to promote during science-based evaluations of nominated substances) and 3 (scientists will use strategic issue framing to emphasize certain facts and considerations while deemphasizing or ignoring others). They also suggest that these scientists were representing the socioeconomic concerns of their countries, both of which were heavily invested in the continued production and use of Endosulfan. If these members had been genuinely interested in ensuring that procedure was being followed correctly, the Legal Advisor's guidance should have satisfied their concerns. Furthermore, it is notable that neither member raised procedural objections when the Committee agreed to defer a decision on SCCPs from POPRC-3 to POPRC-4, despite the fact that discussion of SCCPs had reached the point at which a decision could have been required. These members challenged the validity of the decision-making process with regard to one chemical but not another, which supports the conclusion that this procedural framing was a heresthetical tactic designed to support a predetermined policy agenda.

The procedural frames introduced by the members from China and India were moderately successful, as they were initially accepted by the rest of the Committee as legitimate concerns which merited discussion. Furthermore, the member from Sierra Leone adopted these procedural frames and called for Endosulfan to be removed from POPRC's agenda. The Secretariat countered this framing by emphasizing that the Committee's terms of reference (adopted in decision SC-1/7) require POPRC to adopt work plans which are "flexible and take into account the work load and the need to acquire sufficient information from relevant stakeholders" (UNEP/POPS/POPRC.4/15, p. 10). Several POPRC members expressed confidence that they had correctly followed the procedure specified by the Convention. Because agreement on the issue could not be reached (in spite of two hours of discussion and the assurances provided by the Legal Advisor), the Committee voted on whether it would consider the EU's proposal. Twenty-four members voted in favor of moving ahead with review, the members from China and India opposed this course of action, and the member from Sierra Leone abstained.

While most POPRC members expressed disagreement with the members from India, China, and Sierra Leone, the extensive discussion of these points illustrates the strength of the frames employed by these individuals. This supports Hypothesis 5, which posits that elites with technical expertise will be affected only by strong frames, and will be able to identify and ignore weak frames. In the early stages of discussions, these procedural frames were treated as legitimate issues which could be resolved through discussion, and with the assistance of the Legal Advisor. The strength of these frames was predicated on the credibility of the framers, who, as POPRC members (as opposed to observers), were treated as objective authorities whose agreement was necessary before the Committee would proceed with its work, despite the fact that only three members were supporting these frames. The discussion of the legality of considering Endosulfan took two hours - a substantial amount of time in a five-day meeting constrained by limited working hours of the translators - and the Committee members resorted to voting only when it was clear that consensus could not be reached. This decision reflected both the Committee's strong preference for consensus-based decision-making and a decline in the credibility of the three members who opposed continuing to discuss Endosulfan. As the discussions of SCCPs demonstrate, POPRC is willing to defer decisions repeatedly in order to reach consensus. However, in this case the members from India and China were perceived to be taking unreasonable positions. In informal interviews, some participants (members and observers) began referring to the political motivations of these members.[59] While these concerns were not raised in plenary, several members expressed frustration in private, and the

[59] Anonymous interviewees B, E, and H. Interviews conducted during POPRC-4, Geneva, Switzerland. 15 and 16 October 2008.

Committee responded to what some perceived as politically-motivated objections by overruling them.

Following the vote to allow consideration of the EU's proposal, the discussions shifted from procedural issues to a science-based evaluation of whether Endosulfan met the Annex D screening criteria. The member from the EU attempted to establish an evidence of harm frame by outlining evidence for persistence, bioaccumulation, potential for long-range environmental transport, and toxicity. The member from Sierra Leone countered with a scientific uncertainty frame, highlighting lack of information about the conditions in which data were gathered and arguing that evidence taken from in cold climates may not be applicable to more temperate regions. As previously noted, the member from Sierra Leone raised this concern in discussions of most chemicals which were being reviewed by POPRC. This approach supports Chong and Druckman's assertion that framing strategies require the framers to employ rhetorical strategies which are consistent and repetitive, as repetition will increase the accessibility and potentially the success of the frame (2007). The frame introduced by Sierra Leone was adopted by the members from Japan and India, both of whom argued that Endosulfan may only be persistent in certain conditions.

The member from India attempted to strengthen the case for scientific uncertainty by arguing that Endosulfan does not meet all three of the criteria for bioaccumulation and thus failed to meet the screening criteria for further review. This frame was significant, because only one of the three criteria for bioaccumulation must be met in the Annex D stage; thus, the member was attempting to raise the threshold for chemicals to advance through the review process, and perhaps to establish seeds of uncertainty about the chemical's qualifications for later stages of review. The member from Switzerland countered the scientific uncertainty frame by highlighting evidence of harm; specifically, she cited studies which show that Endosulfan does meet the criteria for bioaccumulation. The member from Switzerland's presentation of evidence undermined the member from India's arguments, and he shifted his focus to other elements of the screening criteria. The effectiveness of the member from Switzerland's counter-framing of the issue suggests that interventions demonstrating clear evidence of harm outweigh those which emphasize uncertainty. However, the complexity of chemicals, and the lack of knowledge about the environmental fate and adverse effects of many substances, creates nearly unlimited opportunities for opponents of regulation to highlight gaps in data and call for more evidence before action is taken.

The member from India invoked scientific uncertainty frames to challenge the evidence of harm frames presented for each of the screening criteria. On toxicity, the member from India stated that the Committee should draw a distinction between the short and long-term, arguing that short-term toxicity does not pose the same risks to the environment as long-term toxicity. He also challenged the validity of data gathered in laboratory tests and called for additional field data, saying that lab environments may not accurately mimic field conditions. On long-range environmental transport, he argued that a number of factors may influence the way the chemical is deposited into the environment. This argument seemed to have a two-fold goal: first, to undermine the case for regulation by drawing attention to contradictory evidence, and second, to promote the argument raised by the member from Sierra Leone, namely that local conditions should determine whether chemicals should be subject to regulatory action. Such an argument has historically failed to win support within POPRC, but if the Committee were to engage in discussion about this issue, more time would be diverted from moving Endosulfan (and other chemicals) through the regulatory process. Ascribing such arguments to a goal of complicating and subsequently delaying the progress of POPRC's work is consistent with the member from India's assertion that each stage of review must be completed in a single meeting or else be removed from POPRC's agenda. Together, these interventions represent an attempt to counter every aspect of the evidence of harm frames used in the EU's nomination of Endosulfan, and far exceed the requirements for evaluation at this stage of review.

The repetitive, negative framing strategy employed by the member from India was a departure from the Committee's typically collegial discussions in which members use diplomatic language to acknowledge the evidence or concerns raised by other members. Chairman Arndt underscored this point by noting that never before had a member argued that the data for all of the screening criteria were invalid. The Chair's comments illustrate the burgeoning frustration among POPRC participants, which increased throughout the week as the member from India shifted his focus from evaluation of evidence to attacks on the professional integrity of other members. As the week progressed, the aggressively negative framing approach employed by the member from India led to his isolation from other members of the Committee, including the members from China and Sierra Leone, who eventually stopped expressing support for his interventions. However, the Committee continued to respond to his objections, both in plenary and during working group sessions, and his concerns were incorporated into the draft texts produced throughout the week. While the member from India was garnering little support for his frames, he was using POPRC's time and resources, and was also successfully establishing a record of dissent which could be communicated to stakeholders and potential allies who were not participating in POPRC.

During working group sessions, in which a subset of interested members and observers addressed the technical aspects of the proposal, the member from India, supported by Indian government observers, used scientific uncertainty frames to challenge the validity of the data for each of the screening criteria and prevented the group from reaching consensus on a draft decision.[60] In plenary discussion of the draft decision, which reflected this lack of consensus, the member from India invoked procedural frames to challenge the decision-making process. First, he stated that the draft text was invalid because it did not include a lengthy note of dissent he had submitted. Second, he argued that Endosulfan should be set aside because the contact group had considered information

[60] Anonymous interviewee B. Interviewed during POPRC-4, Geneva, Switzerland. 15 October 2008.

provided by the EU which had not been included in the original (2007) proposal. He argued that this submission represented a conflict of interest, as the new evidence supported the EU's case for regulation, and argued that adding new information was a violation of the rules of procedure. While this frame was not supported by any other POPRC members, Chairman Arndt again treated it as a legitimate concern, asking the contact group to "bracket any text based on information not provided in the EC's proposal" (Kohler et al., 2008, p. 10). The member from France informed the committee that "the only piece of information not contained in the original proposal related to the biomagnification factor (BMF) values in terrestrial organisms" (Kohler et al., 2008, p.10). The member from India repeated his objections and called for the Legal Advisor to settle the dispute. Nagai was contacted for the second time in the course of the meeting to clarify the rules about what information could be considered, and he informed the committee that Article 8.3 of the Convention:

> …made it clear that the Committee was to take all information into account, not just that found in the proposal as originally submitted by its proponent, in an integrative and balanced manner as applied through the working practice of the Committee (UNEP/POPS/POPRC.4/15).

Nagai also noted that previous POPRC evaluations had incorporated new information at all stages of review. Consequently, if POPRC accepted the assertions of the member from India, then numerous decisions on other substances would have been rendered invalid. The prospect of invalidating previous decisions galvanized other POPRC members, who, led by the member from Switzerland, swiftly countered the procedural invalidity frame invoked by the member from India with expressions of support for Nagai's advice.

Despite the lack of support for his views, the member from India questioned the validity of Nagai's interpretation and continued to frame consideration of new information as being procedurally unacceptable. In an effort to undermine the credibility of the Legal Advisor, the member from India questioned the need for and validity of the legal advice which had just been given. These interventions proved to be weak frames, however, which further isolated India from the rest of the Committee and undermined the credibility of his interventions. Even those members who had supported some of the member from India's previous objections (specifically, the members from China, Sierra Leone, and Japan) remained silent. Furthermore, two ostensibly neutral participants, the Committee Chairman and a representative of the Stockholm Convention Secretariat, attempted to reinforce the established meta-framing of POPRC as a politically neutral body devoted to objective technical review of nominated substances. The representative of the Secretariat underscored the "role and importance of UNEP's legal advisors as guides to treaty interpretation" (Kohler et al., 2008, p. 11), and Chairman Arndt emphasized that POPRC is a scientific body which has an explicit duty to consider any additional information which could help it make a sound decision. Like all data presented to the Committee, such evidence must "be based on available and reliable sources," and will be evaluated by all members as part of POPRC's transparent, open, and scientific process (Kohler et al., 2008, p. 11). This statement reflects the Chairman's commitment to maintaining scientific objectivity within the Committee. If POPRC's decision-making process were to become overtly politicized, its credibility as a scientific body would be severely diminished. The implications of such a shift could be dramatic, as the validity of the Stockholm Convention as a global environmental agreement is predicated on the separation of scientific analysis from political negotiations. Thus, the POPRC Chairman has a vested interest in ensuring that POPRC discussions remain free of politics.

Another sign of politicization of POPRC's work was the request of the members from China and India to allow observers to participate in the drafting of a decision on Endosulfan. Chairman Arndt flatly rejected these calls, as allowing observers to participate in a drafting group would be a violation of POPRC's rules of procedure. Observers are given the opportunity to comment on the drafts which are produced, and they are also invited to submit information for the Committee members to consider before they produce their drafts, but they are excluded from formal decision-making. As

Chairman Arndt noted in an interview, the participation of observers is a privilege, not a right; observers have "subsidiary status."[61] As previously noted in this thesis, maintaining a distinction between observers and members is crucial to the objectivity of a scientific committee, as members act as disinterested technical advisors, while observers explicitly represent interests ranging from industry to the environment. If granted, the request by the members from India and China to allow observers to participate would have allowed lobbyists from chemical companies to advise the POPRC members as text was being drafted, an arrangement which would have compromised the standards of objectivity and detachment which members are expected to meet. The request supports the hypothesis that some scientists have policy preferences which they seek to support during POPRC's review of nominated substances (Hypothesis 1).

As debate continued, the member from India continued to use both scientific uncertainty and procedural frames to challenge the validity of the proposal. While he received support from the member from Sierra Leone, most of his points were groundless or irrelevant to the Annex D stage of review, while others had already been addressed. For example, the member from India restated his argument that a lack of data from tropical regions precluded regulation in hot climates, because the local effects were unknown. He also questioned the validity of methods used to collect data. Invoking a procedural frame, he argued that the proposal contained references to unpublished data sources. The member of Spain noted that this was untrue, and emphasized that correct procedure had been followed (all of the references for the unpublished data were listed in the proposal's bibliography). This contributed to what appeared to be a strategy to lodge as many objections as possible, in hopes of complicating discussions and running down the clock. If POPRC could not reach a decision on Endosulfan during the current meeting, the issue would have to be deferred for another year. Such a delay could yield economic benefits, and also give opponents to listing time to build a stronger case against regulation.

[61] Arndt, Reiner. POPRC Chairman. Interview conducted by telephone. 8 April 2008.

Several participants countered these frames with evidence of harm or procedural frames which supported the validity of the POPRC's decisions. For example, the member from France informed the Committee that he could provide references to new studies on the biomagnification of the chemical, as well as its effects as an endocrine disruptor. The member from South Africa objected to the level of detail the member from India was requesting, saying that such evidence should be considered at the risk profile stage of evaluation. An observer from the environmental NGO Alaska Community Action on Toxics informed the Committee that Endosulfan is not used in the Arctic, but has been found in the region's "air, water, snow, fish and animals," which demonstrates LRET. She also cited multiple studies which show that Endosulfan bioaccumulates in the food chain (Kohler et al., 2008, p. 11). While the support for advancing Endosulfan to the next stage of review seemed to be overwhelming, India continued to raise objections.

The competition to achieve dominance in framing continued for the rest of the week, in both plenary and working group sessions. Most participants invoked evidence of harm frames, while the member from India continued to emphasize both procedural and scientific uncertainty frames. Despite his uncompromising approach, other members continued to address his concerns as though they were valid points which could be resolved by reference to legal advice or scientific data. For example, a participant in the drafting group privately noted that the members had worked hard on Wednesday night to find a compromise that would be acceptable to all participants, but said that the member from India rejected all proposals.[62] The group eventually overruled the member from India, and proceeded to draft the text that was presented on Friday morning. This member also stated that the member from India had brought two observers into the contact group meeting, who refused to leave when the group began its drafting work and "almost had to be forced out of the

[62] Anonymous Interviewee D. Informal interview conducted during POPRC-4, Geneva, Switzerland. 16 October 2008.

room physically." [63] Not only was the member from India attempting to obstruct progress by systematically objecting to every statement favoring the case for regulating Endosulfan, but he was also violating the diplomatic norms of behavior which guide the members in their daily work. The member from China, who had lodged early objections to several points about Endosulfan, had noticeably backed away from the issue. The delegate from China is, by all accounts, a highly respected member of POPRC, and while the Chinese government has economic interests in Endosulfan, the member from China behaved in a way that was perceived by other members as both constructive and respectful of science and the Committee. In contrast, the Indian delegate's approach was combative and dismissive of other members. One member privately noted that the member from India was "knowingly referring to incorrect procedural points in order to slow the process."[64] Another said he was using "ploys" to obstruct progress on the issue.[65] Bo Wahlström, the former POPRC member from Sweden, linked these tactics to the shift from dead to live chemicals and expressed pessimism about likelihood of reaching agreement on any controversial chemicals, saying, "delegates don't want to make friends now."[66]

On the final day of POPRC-4, the member from India invoked the same procedural and scientific uncertainty frames he had been unsuccessfully promoting throughout the week, all of which were countered by other members of POPRC. For the first time in days, however, he received support from the member from China, who intervened with multiple points emphasizing scientific uncertainty. The member from China stated that the chemical did not meet the requirements for bioaccumulation, expressed concern about the validity of the modeling used to show the bioaccumulative potential of Endosulfan, and repeated the argument made by the members from

[63] ibid
[64] Anonymous interviewee B. Informal interview conducted during POPRC-4, Geneva, Switzerland. 16 October 2008.
[65] Anonymous interviewee E. Informal interview conducted during POPRC-4, Geneva, Switzerland. 16 October 2008.
[66] Wahlström, Bo. Former POPRC member from Sweden. Informal interview conducted during POPRC-4, Geneva, Switzerland. 17 October 2008.

India and Sierra Leone that verifying long-range environmental transport was complicated by widespread use of the substance. The member from India supported these interventions, concluding that the screening criteria were unmet and that the proposal could not move forward.

Several members countered these anti-regulatory frames with interventions emphasizing the validity of POPRC's decision-making. For example, member from the Czech Republic argued that the strength of evidence would be considered at the risk profile stage. The member from Japan supported the member from the Czech Republic, emphasizing that "if there are reliable data that meet the criteria, then one should consider the Annex D criteria fulfilled," and furthermore, that Annex D does not require the scientists to collect "every form of data under every condition" (Kohler et al. 2008, p. 12). The member from Ecuador argued that "extraneous criteria had infiltrated the discussion," and suggested that "POPRC's new members had not been provided with proper training on how to apply the Annex D criteria" (Kohler et al. 2008, p. 12). The POPRC Chairman also responded with a lengthy rebuff. According to the Stockholm Convention Secretariat's meeting report, Chairman Arndt informed the dissenting members that their arguments represented:

> … a fundamental misunderstanding of the Committee's role with respect to Endosulfan at the current stage of the process … and also a misreading of the terms of Annex D. He pointed out that the Committee's role at the current meeting was not to make a final determination about whether to list Endosulfan in the annexes to the Convention but rather to apply the specific criteria of Annex D, in a flexible and integrative manner, to make a preliminary determination of whether there was some evidence to suggest that it might be a cause for concern and therefore worthy of further investigation (UNEP/POPS/POPRC.4/15, 2008, p.11).

Several Committee members expressed support for the Chairman's intervention, and argued that Endosulfan clearly met the Annex D criteria. Undeterred, however, the member from India restated his objections, emphasizing that his comments had been ignored by the drafting group.

By this stage of the discussion, all of the frames presented by the member from India had been countered repeatedly. His credibility as a member of POPRC had been substantially reduced due to his interpersonal approach and unwillingness to accept points made by other members. In comparison with the start of the week, when his interventions were treated as credible points which needed to be addressed, the frames he invoked by the end of the week were extremely weak. It was clear that POPRC would not be able to reach agreement on this issue. When faced with entrenched disagreement about appropriate action for SCCPs, POPRC agreed to defer the issue in order to gather more evidence. In this case, however, the antagonistic behavior of the member from India had provoked unprecedented levels of frustration within the Committee. Thus, on Friday afternoon, the member from Sweden invoked correct procedure and evidence of harm frames and called for a vote. She emphasized that most members were in agreement regarding the availability of data for the Annex D criteria, and said the disagreement was focused on the validity of that data. She framed moving to the next stage of review as the procedurally correct action that would enable the Committee to evaluate the evidence and to consider the member from India's concerns.

Voting on a substantive issue was unprecedented in POPRC's decision-making, as the Committee strives for consensus-based decision-making as a means of reinforcing the credibility of its decisions. If a group of scientists cannot reach consensus on an issue, the credibility of the group is likely to be questioned by observers, and particularly by the non-scientists who depend on the group for objective, evidence-based recommendations. However, voting is a valid option: Article 19.6(c) of the Convention requires the Committee to "make every effort to adopt its recommendations by consensus," and if all efforts fail, the Committee may decide to vote. Chairman Arndt encouraged the Committee to defer consideration of the issue to POPRC-5, which demonstrates his reluctance to vote. The members from China and Sierra Leone, who presumably realized the vote would not favor their preferences, expressed support for this alternative. However, the member from India argued that postponing the decision would contravene the rules of procedure, and said that a decision should be made during the current meeting or not at all. This intervention provides further evidence that the member from India was attempting to delay the decision-making process throughout the week in order to prevent the Committee from reaching agreement, thus causing the nomination of Endosulfan to be permanently set aside.

Other members were also reluctant to vote, even if this meant delaying consideration of Endosulfan for another year. The member from Australia asked if it would be possible to stop one step short of a vote, and find a "third way," but this suggestion was ignored as other members expressed support for proceeding with a vote. After several members had spoken in favor of the vote, the member from India intervened to argue that the rules of procedure require that decisions on substantive issues be made by consensus. This intervention suggests that the member from India was willing to block the advancement of Endosulfan on his own, if necessary, and also explains why he did not support the suggestion that discussions be deferred to POPRC-5.

Because the Committee cannot vote on a document which contains bracketed text, drafting group Chairman Barra introduced a draft decision in which all brackets had been deleted. The member from India objected to the deletions (most of which included text he had suggested), and argued that the Committee was voting on a new document which had not been produced collectively, and instead reflected only the views of the EU. In a foreshadowing of future arguments that would be repeated widely in Indian media, the member from India accused the Committee of trying to "bulldoze through an agenda that was set by the nominating party"[67] without regard for the objections raised by other members. The member from Sweden emphasized that the draft text was the result of a week's work, and noted that some of the sentences which remained after deletion of the brackets "actually reflect the other view."[68] This intervention frames the decision as

[67] Personal notes. 17 October 2008.
[68] Ibid.

procedurally correct and underscores the transparency, objectivity, and fairness of the Committee's decision-making process.

Despite additional procedural objections raised by the members from India and China, POPRC voted in favor of moving Endosulfan to the next stage of review. Of the 24 members present and voting, 21 voted in favor, and three abstained. The implications of voting in a scientific committee were significant. A representative of the US Department of State emphasized that "moving away from consensus sets a major negative precedent and does not provide governments with assurance that their concerns will be reflected in international treaties" (Kohler et al., 2008, p.13). Despite the low likelihood of reaching consensus, by choosing to vote, POPRC demonstrated its willingness to override the preferences and views of some of its members. While a review of events would show that reaching consensus was almost certainly impossible, even if the issue had been deferred for a year, the fact that POPRC chose to vote opens its decision-making process to accusations of scientifically unsound decision-making. Even participants who do not oppose regulation of Endosulfan could object to the process, as some perceive voting as a threat to the cooperative diplomatic agreement which initially brought Parties to the negotiating table.

Issue Framing at POPRC-5

The framing strategies employed by participants in POPRC-5 were remarkably similar to those used at POPRC-4, from the initial procedural objections raised by the member from India to the concluding vote to move Endosulfan to the next stage of evaluation. On the first day of the meeting, the member from India objected to consideration of the draft risk profile which had been prepared intersessionally, arguing that the decision-making process to date was invalid. Furthermore, he argued that COP-4, which had been held in the intersessional period, had not explicitly endorsed POPRC's decision-making process, which rendered the Committee's previous decision "null and void" (Templeton 2009, p. 4). The member from China supported this objection, but Chairman Arndt rejected these arguments, saying that "in the absence of guidance from the COP, there was no alternative to continuing the meeting" (Templeton 2009, p. 4). India called on the Committee to postpone all controversial issues, a suggestion which gained no support from other participants.

Once again, the member from India used a mix of procedural and scientific uncertainty frames to undermine the case for listing Endosulfan. The masterframe established by the EU, that Endosulfan represents a threat to human health and the environment that warrants global action, was reinforced during the intersessional drafting of the risk profile, and was supported by most participants during working group and plenary sessions. The member from China attempted to frame the decision-making process as "too hasty," and the members from Sierra Leone, Japan, and Ghana called on the Committee to defer the decision for a year while more evidence was gathered. Other members, including the delegates from France, Switzerland, and Australia, supported the evidence of harm frame, calling the draft risk profile "solid" and emphasizing that "Article 8.7(a) states that lack of full scientific certainty shall not prevent a chemical from proceeding" (Templeton 2009, p. 5).

While the member from India continued to raise procedural and science-based objections to the advancement of Endosulfan to the final phase of evaluation, the Committee did not treat his objections as legitimate, as it had during POPRC-4. This supports the argument made by Chong and Druckman (2007b) and Hypothesis 5, which posits that elites with technical expertise will be affected by strong frames, and will be able to identify and ignore weak frames. The credibility of the framer is an integral aspect of the strength of frames, and the antagonistic, repetitive approach taken by the member from India had essentially destroyed his credibility as a member of a technical review committee operating in the context of a global instrument for environmental policymaking. While the member may have been able to rebuild his credibility by respecting the norms that guide

POPRC's work, his interventions and interpersonal antagonism suggested he had little interest in trying to use a cooperative approach to build support for his preferences. This approach left him even more isolated than he had been during POPRC-4. Chairman Arndt emphasized publicly that he was the only member blocking consensus, but this pressure did not yield results. The member from Thailand called for a vote, a suggestion which was supported by 20 members. POPRC then voted in favor of advancing Endosulfan to the risk management evaluation phase. Notably, the Committee also agreed to invite parties to submit new information about the adverse effects of Endosulfan on human health, a move which resulted from the interventions of the members of India and China which had framed this issue as "borderline" and uncertain (Templeton 2009, p. 5). The formal inclusion of this point in POPRC's decision on Endosulfan represents the success of the framing strategy on this point. While the frame did not end the evaluation of Endosulfan, it was officially incorporated into POPRC's decision. This has potential to be used in future discussions of the substance, such as COP-5's discussions of whether to accept POPRC's recommendation to list the substance in the Annex A of the Convention.

Discussion

While the member from India's attempts to block consideration of Endosulfan failed to prevent POPRC from advancing the chemical through each stage of review, evidence suggests that his consistent opposition to the procedural and scientific validity of POPRC's decision is part of a larger strategy to challenge the validity of POPRC and the Stockholm Convention. The issues associated with Endosulfan have been framed by the Indian government and some industry representatives (e.g., the Indian Chemical Council) as a case of EU manipulation and abuse of a global treaty to impose its economic and political agenda on developing countries. This controversy has significant implications for the future work of POPRC, as the committee continues to address relatively new chemicals which are of substantial economic and political importance to Parties to the Convention.

In the discussions of Endosulfan, several members felt that a strong political response was needed to match what they saw as politically motivated manipulation of POPRC's decision-making process. According to one POPRC member, "Endosulfan is one of the worst chemicals, so it is clear that it should be banned. The behavior of Indian delegate is shocking. It is totally inappropriate. I work on several environmental agreements and I have never seen behavior like that before."[69] In confidential conversations during and immediately after the meeting, several other members expressed similar opinions, with one Member arguing that "behavior like this needs to be managed."[70] Other members expressed a sense of optimism that such politically-motivated obstruction could be overcome, with one saying "this is a scientific committee which will come to scientific conclusions."[71] This member emphasized that POPRC had dealt with contentious issues before "and come out of it fine," and said he was not worried about the future.[72]

While a majority of members may have considered voting necessary to prevent further delay and to send a message that a single member will not be permitted to obstruct the decision-making process, the decision to vote may also have serious negative consequences for the credibility and legitimacy of POPRC. While the member from India did not block evaluation of Endosulfan, his framing strategies were effective in other ways. Most obviously, the persistent and repetitive framing of the issue as procedurally invalid and scientifically baseless pushed the Committee into the difficult position of choosing between a delay in decision-making (an option which would have conferred legitimacy on the objections made by the member from India) and sacrificing the Committee's strong preference for consensus-based decision-making. Some Committee members felt that voting was a victory, as they believed that the member from India was deliberately obstructing the process

[69] Anonymous interviewee E. Informal interview held at POPRC-4, Geneva, Switzerland. 17 October 2008.
[70] Anonymous interviewee G. Informal interview held at POPRC-4, Geneva, Switzerland. 17 October 2008.
[71] Anonymous interviewee H. Informal interview held at POPRC-4, Geneva, Switzerland. 17 October 2008.
[72] ibid

and needed to be overruled. Others, including some who voted, felt that the votes were damaging to the credibility of the scientific committee, which, as previously noted, is expected to reach decisions based on evidence, which, in turn, is expected to yield clear answers. Particularly in the early stages of decision-making, when the threshold for action is lowest, the scientific validity of a non-consensual decision may be questioned. Given that many of the political decisions which are made by the COP involve significant economic sacrifices for Parties (both for Parties who agree to stop using a particular chemical, and often, for those developed countries which agree to provide financial assistance to help developing countries transition to using alternatives), reaching consensus on these complex and often difficult political decisions may be even harder when POPRC's recommendations are based on controversial decisions.

In an interview immediately following POPRC-4, one veteran Committee member argued that India and other members who had objected to regulation of Endosulfan were attempting to redefine the standards chemicals must meet to progress to the next stage of evaluation. He said that these delegates are "turning the Convention on its head," and that "scrutiny is tougher now than it was for earlier POPs. They are like lawyers. Earlier POPs wouldn't have passed this level of scrutiny. They are just looking for weaknesses."[73] He emphasized that the more intensive analysis of data was unexpected, as he and others involved in the negotiations to create the Stockholm Convention had expected it to become more precautionary over time, not less.

While representatives from India have rejected repeated requests for formal interviews, at the close of POPRC-4, the member from India said that he felt that "voting is not a good basis for decision-making," and that "Parties may withdraw" from the Convention as a result of POPRC's actions.[74] This statement underscored India's commitment to consensus-based decision-making and the

[73] Anonymous interviewee F. Informal interview held at POPRC-4, Geneva, Switzerland. 17 October 2008.
[74] Pandey, G.K. Informal interview held at POPRC-4, Geneva, Switzerland. 17 October 2008.

member's dissatisfaction with the outcome of POPRC-4's deliberations. Analysis of POPRC-5 suggests that the Endosulfan debate is indicative of a broader political agenda which India (and others) will continue to promote. The highly contentious debate: 1) politicized a supposedly scientific discussion and led committee members to form alliances in support of their preferences, 2) cast doubt on the credibility of POPRC's decision-making process, and 3) provided a clear indication of the difficulties ahead both for POPRC's ability to evaluate chemicals which are economically important and the COP's ability agree to list them. While India was unsuccessful in its attempts to eliminate Endosulfan from POPRC's agenda, its efforts have created numerous cracks in the structure of the Stockholm Convention. If, as several delegates to COP-4 privately suggested, India's larger goal is to obstruct the process of listing new chemicals and thereby render the Stockholm Convention impotent, the Endosulfan campaign could be considered a successful first strike. Strategic issue framing was the primary tool India used to promote its agenda, and the Party's successes illustrate the power and influence of framing as a tactic for directing discourse, defining issues, and supporting political agendas.

7.3 Conclusion

Each of the chemicals discussed above provides an illustration of the way strategic issue framing can be used to support the preferences of participants in the earliest stages of policymaking. The analysis of octaBDE demonstrated the influential role that can be played by observers, particularly when those observers can contribute technical expertise to the discussion. In this case, the representative of BSEF was able to narrow the focus of POPRC's evaluation to a particular mixture of octaBDE by framing such action as an issue of technical precision and accuracy. He used scientific language to address the issue, took a cooperative approach, and was widely seen as contributing important technical information which was useful to the POPRC members. His supportive, helpful approach, combined with his ability to contribute unique technical expertise derived from his work in the field, gave him particular credibility with the POPRC members, and his framing strategy was successful. Notably, he dropped BSEF's initial framing strategy, which was to challenge the listing of octaBDE by highlighting scientific uncertainty. Given the availability of evidence of harm, and the fact that none of the POPRC members represented a country with economic interests in continued production of octaBDE, this strategy garnered little support from the Committee. When it was clear that he could not stop octaBDE from proceeding through the stages of evaluation, the BSEF representative shifted his strategy to limit the scope the evaluation, and did so in a way that reinforced his credibility as a supportive, helpful expert. This strategy was successful, and represents highly effective framing.

The review of SCCPs involved two moderately effective framing strategies, both of which have gained a similar number of supporters among POPRC members and observers. This case demonstrates the capacity of opponents to capitalize on the complexity of chemicals to frame issues as being scientifically uncertain. While the Stockholm Convention condones precautionary action in in the absence of certainty, in practice, such an approach can only be taken when POPRC members are willing to accept that action is justified. If these members are representing the economic interests of countries, they can use scientific uncertainty to slow the decision-making process, or potentially to end POPRC's review of a substance. This suggests that in the cases of live, economically valuable chemicals, the precautionary approach will carry little weight; it will only be accepted when members do not feel entirely certain about some elements of the proposal and have no other (e.g., economic) concerns which would preclude support for advancing the chemical through additional stages of review. This also indicates that participants who tend to favor regulation (e.g., advocacy groups, the EU and its member states) will only be able to list those live chemicals for which strong scientific evidence is available. The level of scrutiny to which chemicals are being subjected suggests that economically-valuable chemicals can be held up in POPRC's decision-making process unless the evidence for listing is strong.

Furthermore, both SCCPs and Endosulfan demonstrate the critical role of issue framing in presenting credible arguments for inaction on nominated substances. Both of these live chemicals are of significant economic importance to some of the Parties to the Convention, but arguing against listing for economic reasons would be neither procedurally acceptable during the science-based review of the substance, nor given much credence by those who have no economic interests in the substance and are subject to harm caused by its production and use. By the time socioeconomic concerns can be appropriately addressed in the decision-making process, the substance in question has already been labeled as a persistent organic pollutant. Thus, the best strategy for an opponent to listing is to prevent POPRC from categorizing the substance as a POP. From an economic perspective, undermining the science is the best approach to ensuring that the market for the substance is unaffected, as being rejected by POPRC could imply that the substance is "safe."

Thus, strategic issue framing allows participants to support their policy preferences in a way that will win support from participants who do not necessarily share their interests or underlying policy preferences. By highlighting certain aspects of an issue while deemphasizing others, rational participants can build support for action that will favor their policy interests. As the within-case analyses demonstrated, highlighting procedural concerns or gaps in knowledge can legitimize courses of action that would not be acceptable if they were addressed directly. Furthermore, these cases have demonstrated the importance of credibility of the frame initiators: in this context, cooperative, technical contributions are valued, while antagonistic or emotional interventions receive little or no support from other participants.

Most importantly, these within-case analyses have provided an additional means of testing the causal model, which posits that scientists will use strategic issue framing to support their policy preferences, and that effective issue framing will be a determining factor in the decision taken by POPRC at each stage of its review. The analysis of octaBDE demonstrated one failed approach to issue framing, which highlighted scientific uncertainty in an attempt to prevent a recommendation to list the substance, as well as one highly successful use of issue framing, in which the BSEF representative successfully appealed to the Committee's preference for accuracy and thereby succeeded in limiting the scope of the recommendation to a precise formulation of the substance. The analysis of SCCPs demonstrates two moderately successful, competing issue framing strategies, with pro-listing participants emphasizing evidence of harm, and opponents to listing emphasizing scientific uncertainty. The most vocal opponents are affiliated with countries which have economic interests in continued production and use of SCCPs, which further supports the hypotheses that scientists have preferences derived from non-science-based, external sources, and that they will use issue framing to support these preferences. Finally, the analysis of the Endosulfan review highlights the way participants may attempt to manipulate the decision-making process itself to support their policy preferences. This analysis also demonstrates the importance of observing the behavioral norms of a given context; when the member from India deviated from these norms, his credibility was significantly diminished and his preferences were formally overruled with the unprecedented decision to vote on the issue.

Fundamentally, these within-case analyses show that scientists with strong preferences will use strategic issue framing to support their preferences. These analyses also demonstrate the unacknowledged politicization of POPRC's work; when socioeconomic interests are at stake, scientists are willing to engage in heresthetical behavior in order to protect those interests. However, political interests are rarely acknowledged in POPRC's discussions (either in the formal plenary sessions or in the less formal, but still "public" working group meetings), even when those interests are being discussed privately by many participants (e.g., India's undisclosed, direct economic interest in continued production of Endosulfan). Such reticence could be attributed to the importance of maintaining POPRC's credibility as a scientific committee committed to reaching objective, politically-neutral decisions. If POPRC were to be seen as a politicized body, its legitimacy could be compromised, thereby undermining both its recommendations and subsequent decisions to list chemicals.

The final chapter of this thesis will consider the key themes of this research, including the use of strategic issue framing in POPRC's work, the role of scientists in the Stockholm Convention's decision-making process, and the politicization of science-based decision-making in this context.

Chapter 8: Discussion and Conclusion

As highlighted in the introduction, the goal of this thesis is to explain why some chemicals are listed in the Stockholm Convention with broad support from stakeholders, while proposals to take action on similar substances are met with resistance from many of the same participants in the policymaking process. In order to explain this anomaly, this thesis has moved beyond the traditional explanations (e.g., lack of scientific consensus, lack of available substitutes, and potential economic losses for stakeholders), and has analyzed the role of strategic issue framing in the process by which chemicals are evaluated and recommended for listing in the Annexes of the Stockholm Convention. By strategically framing issues in ways that are likely to win support for their policy preferences, rational actors engage in heresthetical attempts to structure policy discourse and understanding of key issues in ways that enable them to achieve their goals. In the context of the Stockholm Convention, the actors who are best positioned to make use of such heresthetical tactics are the scientists who participate in the work of POPRC, as these actors nominate, review, and recommend chemicals for listing. These responsibilities give scientists control over the first stages of policymaking, and, consequently, the authority to frame the debate in ways that will either support or oppose regulation of nominated substances.

Given the key role of scientists in the Stockholm Convention's policymaking process, this thesis has analyzed the formation of scientists' policy preferences, considering whether such preferences are driven by technical expertise and understanding of the problem, or, alternatively, whether scientists' preferences are shaped by external political interests (e.g., the preferences of the governments with which POPRC members are affiliated). Identifying the sources of scientists' policy preferences is critical, as this sheds light on the extent to which decision-making is being driven by science or by political interests. In several cases, analysis of the interventions made by scientists indicated that they were using strategic issue framing to support the political and economic interests of the governments with which they were affiliated, rather than preferences derived from their own technical expertise. The overview of framing across all chemicals reviewed between POPRC-2 and -5 demonstrated clear correlations between economic or political interests of parties and the interventions made by scientists during reviews, and the within-case analyses of octaBDE, SCCPs, and Endosulfan contextualized and further illuminated the ways in which scientists use issue framing to support the policy goals of governments and organizations. In particular, the within-case analyses demonstrated the relative success and failure of different approaches to framing taken by scientists. The implications of these findings will be discussed in the following sections.

8.1 The Interrelationship of Science and Politics in the Stockholm Convention

8.1.1 Explaining the absence of epistemic communities

One of the key findings of this research is that epistemic communities have not formed in the context of the Stockholm Convention. This finding supports the work of many scholars who have criticized the epistemic communities approach, some suggesting that evidence for the existence of such values-driven scientific communities is minimal or nonexistent (Bernstein 2001; Harrison and Bryner 2004). It is interesting to consider, however, why such communities have not developed in the context of global POPs regulation, particularly given the high level of technical expertise required to understand and respond to this issue. The foregoing analysis of the scientists' use of framing, which demonstrates a close relationship between issue framing and the socioeconomic and political preferences of the participants who were most active in discussions of various chemicals, suggests that the potential for the development of such groups in this context has been precluded by the relationships between scientific delegates and the governments they represent.

Analytically, focusing on the technical expertise of scientists as a starting point for evaluating their role in policymaking presumes that they have significant influence on both public understanding of POPs as an environmental policy problem and the resulting policymaking agenda. However, the expectation that scientists act as disinterested policy advisors minimizes the importance of connections between scientists and the governments or organizations with which they are affiliated. Many of the scientists who participate in the work of POPRC are full-time employees of government ministries (e.g., the members from India, the EU, and Sweden, among others), and therefore may be representing institutional interests rather than preferences derived from their personal expertise. Other POPRC members are academics who serve on POPRC on a consulting basis, and thus may have more autonomy (e.g., the members from Japan, South Africa, Australia, and Sierra Leone) in formulating preferences derived from their personal expertise. However, as several participants discussed in interviews, they are still constrained, to varying degrees, by the interests of their governments. In other words, establishing a clear distinction between science and politics would be possible only if the participation of scientists in the work of POPRC were not at the behest of actors with socioeconomic concerns about policy decisions (either in favor of or opposition to regulation).

Several interviewees noted that they are accompanied to POPRC meetings by government representatives, who analyze the proceedings and provide information to each member about the government's preferences. One POPRC member repeatedly referred to his government colleague as his "minder."[75] While this interviewee laughed as he described the government representative in this way, the characterization provides insight into the relationships between many governments and the scientists they send to POPRC. Scientists who serve on POPRC are expected to be politically neutral; they are required to sign agreements to disclose any conflicts of interest (regarding both personal and government interests in the chemicals being discussed), and are expected to provide science-based opinions that reflect their disciplinary expertise rather than policy-driven preferences.

[75] Rae, Ian. POPRC member from Australia. Interviewed by telephone. 29 January 2008.

However, the presence of government "minders" at POPRC meetings is standard practice for many countries (particularly the wealthier countries, which have the financial resources to support the attendance of multiple representatives). The active involvement of government delegates in plenary sessions and working group meetings indicates that the division between science and politics is more permeable than is acknowledged either in the text of the Convention or by participants in the process.

The engagement of government "minders" in monitoring and, to some extent, guiding the work of POPRC members also supports Litfin's observations that "science and politics function together in a multidimensional way," and that "knowledge and power should be understood as interactive" (Litfin 1994, p. 184). Litfin argues that the epistemic communities approach is predicated on the rationalist notion that science can be separated from politics, as scientists use their unique expertise to control the policymaking process. However, the close relationships of many government delegates to POPRC scientists, the fact that many POPRC scientists are themselves full-time employees of government agencies, and the comments of interviewees about the pressure they feel to represent government interests indicate that political power constrains the extent to which scientific knowledge could independently drive policymaking. While the Stockholm Convention is structured in a way that emphasizes a distinction between science and politics, and indeed gives primacy to scientific knowledge as a driver for policymaking, in practice, this division is blurred. Scientists themselves utilize knowledge for a range of purposes, as demonstrated by the extensive use of strategic issue framing to attempt to shape POPRC's discourse and ultimately its decision-making. Thus, science does not transcend politics.

The relationship between Parties and POPRC members does not explain the lack of an independent cadre of scientists, however. Theoretically, an epistemic community of scientists with expertise in this field could have a place at the policymaking table, participating as independent observers. To date, however, all scientists participating in the work of POPRC have been affiliated with governments or NGOs with explicit economic or political interests in the process. Perhaps this is due to the comparatively low level of public interest in and awareness of persistent organic pollutants, as opposed to some of the more salient environmental issues on the public agenda, such as climate change. Greater availability of funding for research into such issues would create more opportunities for independent scientists to engage in relevant research and, critically, to participate in the political negotiations in which such research is utilized by policymakers. Jim Willis, a senior official from the United States Environmental Protection Agency, supported this notion, noting that while independent scientists are not yet heavily involved in the work of the Stockholm Convention:

> …there is certainly an opportunity. The new pot of [Global Environment Facility] money is $300 million over a three- or four-year period. … The World Bank generally co-finances it at about two to one. So, that $300 million should be leveraged into about $700 million, and that $700 million is all dedicated toward helping developing countries, or countries with economies in transition, apply the provisions of the Convention. … The UN agencies at that point should, theoretically at least, step in and try to match up assistance with needs, and pull together the right people, including people from the research community.[76]

As more financial support for research and science-based implementation becomes available, scientists will have more opportunities to engage with the Stockholm Convention without being representatives of governments or NGOs. Hypothetically, this could lead to the creation of epistemic communities of scientists who are engaging with POPs-related issues in the field, and who wish to participate in the policymaking process. Epistemic communities may be likely to form when the costs of participation are low, or when funding is available to support research and participation, and when there is need for scientific expertise. However, another barrier to the formation of epistemic communities seems to be the clarity with which parties to the Stockholm Convention view their own interests in POPs regulation. Governments of European countries almost invariably favor

[76] Willis, Jim. United States Environmental Protection Agency. Interviewed in Washington, DC. 29 October 2007.

listing nominated substances, whereas emerging economies like China and India object to regulatory action that would contradict their economic interests. In the context of such clear political and economic preferences, there may be little opportunity for scientists to influence the preferences of policymakers. In the absence of scientific certainty, and sometimes in the face of strong evidence, economic interests are likely to outweigh possible risks to human health and the environment.

The different valuation of scientific evidence and economic interest is illustrated repeatedly within the context of POPs regulation. For example, PFOS, a ubiquitous industrial chemical used in a wide variety of consumer products, was listed at COP-4 on the basis of an uncontroversial recommendation by POPRC. However, agreement to list this economically valuable substance was secured only after Parties were given the opportunity to request exemptions for every desired use (Ashton et al. 2009). The extensive list of exemptions for continued use of PFOS was never subjected to scientific or technical review; rather, it was accepted by the COP in order to facilitate agreement to list PFOS in the Annexes of the Convention. The circumstances of this decision mean that, practically, PFOS is only restricted for uses which are no longer desired by any party to the Convention. This example demonstrates the lesser importance of scientific knowledge, as well risks to human health and the environment, compared with economic interests. The risks of PFOS to human health and the environment are infamous, particularly following a 2007 study of newborns in the US, which found PFOS in 99% of the sample of infants' cord serum, indicating prenatal exposure (Johns Hopkins University 2007). The health risks to humans are undisputed, and yet the COP could only reach agreement to list this substance by allowing parties with economic interests to have unlimited exemptions for continued production and use. While there may be scientifically or politically valid reasons for choosing not to list substances in the Annexes of the Stockholm Convention (e.g., a substance is not subject to long-range environmental transport, thus rendering the Stockholm Convention an inappropriate mechanism for regulation), or for giving exemptions (e.g., the continued use of DDT for malarial vector control in sub-Saharan Africa) the circumstances surrounding the listing of PFOS suggest that scientific rationales for action may be outweighed by economic and political interests that have little to do with assessment of risk.

8.1.2 Politicization of POPRC's review process

Despite the presence of government observers and advocacy groups in POPRC's meetings, the extent to which the work of committee is politicized was unexpected. As noted above, this thesis hypothesized that epistemic communities of scientists would promote political goals derived from their scientific expertise and research. However, analysis of scientists' interventions and interviews with participants revealed no indications of coordinated action among scientists based on discipline or stated values. The same analysis has provided extensive support for the hypothesis that scientists do promote policy agendas, but for the most active scientists in POPRC's debates, these agendas are set by the scientists' employers, and are derived from predetermined socioeconomic and political interests rather than from analysis of relevant scientific information. While this was to be expected in the cases of scientists representing industry and environmental/public health NGOs, the Stockholm Convention's emphasis on the political neutrality and scientific focus of POPRC suggested that Committee members (who are not even formally referred to as "delegates," as they are expected to represent their own views, not those of a Party) would provide objective scientific advice to the bureaucrats, who would in turn use the scientific recommendations of the POPRC to make policy decisions. The bureaucrats would address the socioeconomic implications of proposed regulatory action, thus dealing with these issues in after the conclusion of science-based evaluations of nominated chemicals. In practice, however, the role of science is mediated by political interests. While the Convention is structured in a way that presents science as the forerunner to policy, the actual relationship between science and politics is, as identified by Litfin in her analysis of the ozone negotiations (1994), multidimensional. As discussed in Chapters 6 and 7, scientists themselves play different roles within POPRC's work; while some see themselves as "pure" scientists and embrace the “objectivity” of science, explicitly supporting the notion that science and policy can be clearly separated, others embrace their work as policymakers with scientific expertise, or “chemicals managers” who are explicitly using science to craft policy.

As previously discussed, many of the scientists interviewed have been forthright about their allegiances, and several noted that they have been instructed to come up with results favorable to their nations. Such comments, as well as the issue frames identified through analysis of scientists’ interventions during POPRC meetings, indicate that the work of POPRC is highly politicized. Rational actors recognize that their best chance of influencing the agenda of the Stockholm Convention lies in the earliest stages of decision-making, when the agenda is being set. Once a chemical has been labeled as a threat to human health and the environment, it is difficult for stakeholders to avoid listing. Furthermore, even if the COP decided not to list a chemical because of the opposition of a small minority of participants, it is likely that states would engage in domestic or regional action to ban the substance in question (for example, since Endosulfan was nominated for review, several countries in South America have banned the substance domestically, further reducing the market for the chemical). This could have a negative impact on the ability of countries that produce or use the substance to access the substance or to export goods which contain the chemical. Thus, states that oppose listing of a substance have significant incentives to stop the evaluation of the substance as early as possible. Once POPRC has recommended a chemical for listing, a Party which objects is likely to experience pressure from other Parties to support the listing. Even if an objecting Party refuses to regulate the chemical, manufacturers and users of nominated substances are likely to face declining markets and difficulty exporting products which contain the chemicals. Thus, a Party which has economic interests in continued use of a chemical would be best served by early elimination of the chemical from POPRC’s consideration. As the previous sections have illustrated, many Parties pursue precisely this goal by strategically framing issues in ways that will support their political goals.

The findings of this thesis support the assertion made by Dimitrov (2006) that environmental policy is not based on science; as demonstrated by the within-case analyses of c-octaBDE, SCCPs, and Endosulfan, economic and social interests shape the way issues are presented, understood, and acted upon during the supposedly politics-free stages of scientific review. Furthermore, this thesis differentiates between scientific knowledge and the agents (scientists and technical experts) who employ that knowledge. This explicitly-interest based account of the role of science in POPs-related policymaking concentrates on the way that those actors with asymmetric control of scientific knowledge, and with the comparative advantage of acting as gatekeepers to the political stages of the Stockholm Convention's decision-making process, use strategic issue framing tactics to support their policy preferences. This distinction between knowledge and the agents who interpret knowledge is critical in bridging the rationalist-constructivist theoretical divide. While this thesis does support a conclusion that science transcends politics, it also finds that not all scientists who participate in the science-based policy work are able to acknowledge or respond to the rationalist use of framing tactics by their more strategically-minded peers. This finding is messy, in that it enlarges upon the Litfin's observation that the relationship between science and politics is multidimensional. Politics informs science and science informs politics, and not all actors are either aware of or willing to accept the complicated relationship between the two. The use of framing in the Endosulfan debate clearly illustrates the advantage that can be gained by rational actors seeking to manipulate policy discourse in this context; in the absence of explicit acknowledgment of the political motivations – and indeed, with the credibility of the committee resting on the preservation of its image as an objective, apolitical group of experts – some scientists were able to shape the policy discourse and affect the ways in which issues were understood. While the campaign to prevent recommendation of Endosulfan for listing ultimately failed, it clearly demonstrated the potential gains to be had from framing issues throughout the stages of review. By introducing science-based dissent, and by calling the credibility of the decision-making process into doubt, opponents to listing of a given chemical can bring about valuable delays in decision-making, as well as sow the seeds for a public campaign to discredit UNEP decision-making. This demonstrates that the effectiveness of frames can have consequences that are unrelated to the decisions taken by POPRC. Those consequences may be considered to be desirable and valuable to actors who are playing to win a bigger game than just influencing the decisions of a committee of scientists. In this sense, scientists are strategically constructing public understanding of an issue using communication frames. This underscores the potential for politicization of a given scientific committee's work, through the deliberate, rational and strategic shaping of policy discourse.

8.2 The Role of Strategic Issue Framing in Decision-Making

8.2.1 The five categories of frames identified in POPRC's discourse

Strategic issue framing has played a critical role in POPRC's decision-making process, most obviously in the cases of substances that are of economic importance to stakeholders. This was demonstrated particularly clearly by the within-case analyses of POPRC's evaluations of Endosulfan, SCCPs, and octaBDE. These analyses illustrated the ways in which strategic issue framing tactics have been used by a range of scientists and technical experts, including those affiliated with industry associations, advocacy groups, and members of POPRC, to support their policy preferences.

The types of frames used in the context of POPRC's discussions reflect the scientific nature of the committee; almost all of the frames used between POPRC-2 and POPRC-5 were detached, technical points designed to influence scientists' perceptions of methodologically appropriate action. Such approaches to framing stand in stark contrast to the emotion-based appeals that could be effectively employed by frame initiators targeting general, non-expert audiences. In the context of POPRC, elite actors with scientific expertise used their expertise to present frames which emphasized the need for technical precision and accuracy. The few frames which deviated from this trend (e.g., the assertions of bias made by the member from India during POPRC-4, as well as the teary, emotional appeals made by the observer from the Inuit Circumpolar Conference during POPRC-3 and -4) received no support from POPRC members, and thus failed to support the agendas of the frame initiators. In the case of Endosulfan, the anger-fueled interventions accusing members of bias actually weakened the credibility of the member from India, and thereby undermined the effectiveness of his overall framing strategies. Thus, the successful framing strategies used in POPRC's decision-making process are specifically designed to appeal to scientists working in a diplomatic setting. In this context, successful frames are dispassionate, separating the frame initiator from any personal, subjective interest in the subject. They also appeal to precision, accuracy, and appropriateness, whether they are challenging the validity of procedure or of the scientific methods used to gather the evidence under review. This distinguishes strategic issue framing in the work of POPRC from issue frames that may be used in other stages of environmental policymaking, during which issues of social justice (e.g., for populations which are disproportionately exposed to POPs, such populations near the Arctic, farmworkers, etc.), fairness (e.g., the argument of many developing countries that the pace of regulation puts an unfair burden on countries with the least capacity to meet obligations imposed by the Stockholm Convention), poverty/hardship (e.g., the socioeconomic impact of banning affordable pesticides in developing countries), and other less technical issues may be regarded appropriate and worthy of consideration. As previously noted, such issues are occasionally raised in POPRC, but they usually fail to gain support among POPRC members.

For opponents to regulation, scientific uncertainty frames provide a technical, science-based means of challenging the case for listing a nominated substance. These frames allow opponents to raise objections which may be of concern to all members, regardless of their interests and underlying preferences, as POPRC's legitimacy is based on its ability to make decisions that are grounded in careful scientific review. The scope for using scientific uncertainty frames is broad, as some measure of uncertainty exists in almost every analysis of the substances under review. This was illustrated by the review of Endosulfan, during which opponents to listing challenged the validity of the methods used to gather data (e.g., the use of lab results rather than data gathered in the field, the use of outdated methods, and the use of new models) as well as the validity of test results and the applicability of those results to particular regions (Kohler et al. 2009). Live chemicals may also be more susceptible to uncertainty because they are often comparatively new substances, the long-term effects of which have not been observed. Thus, while new chemicals usually undergo rigorous testing before they are marketed (particularly in the EU), little data may be available on crucial issues such as the environmental fate of a substance, long-range transport, or bioaccumulation. Such issues can result in repeated delays to the decision-making process, as illustrated by the case of SCCPs (discussed in Chapter 7). Scientific uncertainty frames never speed the pace of regulation; invariably, they call into question the validity of scientific analyses which underlie calls for regulatory action, which can effectively draw out the decision-making process as scientists attempt to fill the gaps in knowledge with more evidence.

Procedural frames are also technical, seemingly dispassionate frames that emphasize practical reasons for delaying regulation. The members from China and India used these frames to attempt to permanently remove Endosulfan from POPRC's agenda, and the member from China also used this frame to delay consideration of HBCD. When using either type of technical frame, individuals can distance themselves and their personal interests from the points being highlighted. Thus, they can express support for listing dangerous chemicals, in principle, but prevent listing of specific chemicals in the name of protecting the validity of the decision-making process. Importantly, opponents to listing may use procedural frames as a way of countering a substances progress through the stages of review when evidence for listing the substance is strong, and therefore difficult to attack directly. As the within-case analyses demonstrated, procedural frames were heavily used in the review of

Endosulfan, but less so in the case of SCCPs. The technical complexity associated with SCCPs creates extensive scientific uncertainty that is acknowledged by most participants, including those who support listing the chemical. In contrast, Endosulfan is a comparatively simple substance, and the evidence for listing is both plentiful and largely uncontested. Given the availability of evidence to support the listing of this substance, it is difficult for opponents to mount a credible campaign to undermine the nomination on the basis of gaps in knowledge or scientific uncertainty. Thus, challenging review of the chemical on procedural grounds provided a possible avenue for ending review of the substance without challenging other members' views of the evidence.

Despite the lack of impact of emotional frames on the course of POPRC's discussions, some NGOs continue to emphasize evidence of harm with graphic descriptions of the effects of POPs on humans and other animals. While this tactic may be valued by some members, as indicated by a minority of interviewees, it does not affect the course of debate. The true value of these frames for NGOs may be in their usefulness as signals to their civil society supporters. The colorful, descriptive, and often heart-rending frames are designed to capture the imagination. For individuals who are not acting as representatives of state or industry, these frames tell a story about the horrors of POPs and the importance of the work which is being carried out by the advocacy groups participating in the work of the Stockholm Convention. The interventions of these organizations are frequently recorded in publications like the Earth Negotiations Bulletin, and may be picked up by the mainstream media, which cover the openings and other key events within the larger meetings. For example, IPEN and other advocacy organizations held a demonstration outside the entrance to the convention center on the opening day of COP-4. Many participants, including ENB and the Stockholm Convention Secretariat, posted pictures of the demonstration on their websites. Thus, while the demonstration may have had little impact on the political agendas of the delegates in attendance, it sent a message to the organizations' supporters and to those individuals who were following coverage of the meeting. The demonstration, which highlighted the human and environmental effects of POPs, not only framed the issue for all who saw it in person or in pictures, but it also provided concrete, visual evidence of the work the organizations are doing at the meeting. The vivid, colorful photo opportunity created by the demonstration ensured that official photographers would cover the event, as it provided pictures that would stand out from the more common shots of delegates sitting behind desks. Thus, while emotional frames may have no impact on debate, they may be repeated or otherwise expressed to the laypersons whose political and financial support is crucial for the success of the NGOs.

The low numbers of socioeconomic and technical frames used between POPRC-2 and -5 is unsurprising. Not only are such concerns technically irrelevant to decision-making prior to the drafting of the risk management evaluation, in addition, these frames can be countered effectively by offers of financial and technical assistance from developed countries. Thus, these frames are useful for Parties wishing to signal their objections to a ban on a chemical, but are not effective at preventing regulation. Such signaling can begin early in the process, as illustrated by the objections of the members from Sierra Leone and China to the proposed regulation of Lindane. By flagging the negative implications of regulation, these countries can ensure that other Parties can find ways to help resolve the problems before the final decision must be taken. For example, Kenya used this frame to secure additional financial assistance during COP-4, when it objected to listing Lindane on socioeconomic grounds; these concerns were resolved in bilateral negotiations (Ashton et al. 2009).

8.2.2 Actors' use of strategic issue framing

Strategic issue framing plays an important and influential role in policymaking under the auspices of the Stockholm Convention. As the foregoing discussion indicates, strategic actors use issue framing with varying degrees of success at all stages of decision-making. Scientists, in particular, make effective use of these tools for influencing discourse, in part because of their asymmetric control over technical information, and in part because they are positioned at the beginning of the policymaking process, which issues are being defined. If a proposal to regulate a particular chemical can be undermined during a POPRC meeting, the chemical is unlikely to be addressed again without a substantial increase in evidence. Thus, rational opponents to regulation will focus their efforts on this stage of the decision-making process, and attempt to establish a masterframe which either supports or opposes regulation of a substance from the moment it is nominated.

The technically-minded actors who participate in POPRC meetings focus on issues which are directly related to scientific analysis, and are often unwilling to discuss the non-technical aspects of chemical pollution during plenary or working group sessions. While some participants attempt to influence scientists' decisions through emotional appeals which emphasize the negative effects of POPs, scientists rarely take up the points highlighted in these frames. Thus, participants who rely on emotional frames (e.g., the Inuit Circumpolar Conference representative) have little impact on the decision-making process. In contrast, representatives of industry can refer to their practical experiences with production and use of chemicals, information which is highly valued by the POPRC members. The interventions of industry are unemotional and usually consist of technical data which scientists can incorporate directly into their evaluations and reports. The practical knowledge of industry and the ability of its representatives to "speak the language" of the scientists increases its credibility and influence over discourse.

Furthermore, members and observers with resources tend to be more influential in POPRC and COP discussions than their less well-resourced colleagues. While representatives of developed countries often have large staffs which help them prepare for meetings, representatives from developing countries are often working alone to cover multiple environmental conventions. Thus, individuals from developed countries tend to dominate discussions at POPRC and at the COP. While the leadership in both settings deliberately and systematically includes representatives from both groups, individuals from the poorest countries often contribute the least to discussions. Thus, developed countries have a disproportionate influence over discourse, as they are conducting most of the research of the effects of these chemicals, their representatives can draw on the support of many others in formulating policies, and they are often able to transition to use of new chemicals without any economic hardship (in fact, transitioning to new chemicals often provides an economic advantage to the industries which are based in developed countries).

Most participants utilize issue frames to support their arguments, and none of the frames identified in this study increase the pace of regulation. As demonstrated by the within-case analyses, evidence of harm frames support the expected progress of a chemical through one stage of review per year, while effective scientific uncertainty and procedural frames may slow the decision-making process substantially. Most importantly, the scientists who actively engage in issue framing are not acting as neutral interpreters of technical information. While high-level officials associated with the Stockholm Convention insist that POPRC is a politically neutral environment, observation of meetings, interviews with participants, and analysis of ENB reports indicate that decision-making within this scientific body is highly politicized in a way that is both subtle and influential. In practice, these actors actively represent the political interests of the nations and groups by which they are employed. As a tactic for influencing discourse, strategic issue framing is particularly useful because it allows scientists and other participants to promote their political goals without acknowledging their underlying socioeconomic and political interests.

The opponents to listing substances promote a hypocritical duality by arguing that science is the gold standard by which decisions should be made, and then undermine that principle by pointing to the uncertainties that are inherent in scientific analyses. This approach allows strategic actors to set increasingly high standards for scientific analysis, ostensibly creating a strong foundation for future work under the auspices of the Convention, while at the same time ensuring that such standards cannot be met. In this way, actors can ensure that the pace of regulation is slow, while appearing to support the moral objective of the Convention, which is to protect human health and the environment from the dangers posed by exposure to POPs. Strategic issue framing is a valuable and influential tool for Parties who are politically and morally pressured by other Parties and by their citizens to support this objective, but who know that action to achieve this goal will contradict their economic interests. The prioritization of these interests explains why some chemicals are regulated quickly, with broad support, while proposals to regulate nearly identical chemicals are met with widespread objections. These objections rarely refer to economic interests; rational actors recognize that they are more likely to achieve their goals if they find reasons to slow regulation which are considered to be legitimate by and of interest to as many other actors as possible. Thus, while blatant explanations of economic interest will be rejected, as was the case with Kenya's argument for continued use of Lindane, focusing discussion on scientific uncertainty or procedural problems is likely to draw support from others. In this way, strategic issue framing plays a critical role in elite policy discourse and decision-making under the auspices of the Stockholm Convention.

8.3 Implications for Analysis of Science-Based Environmental Policymaking

The politicization of POPRC's work has precluded the formation of epistemic communities and has led scientists affiliated with stakeholders to act as representatives of those interests. The Stockholm Convention is structured in a way that formally separates science from policymaking, but by pressuring scientists to act as representatives of national interests, the distinction between science politics is blurred. Strategic issue framing further muddies the waters by providing scientists with a tool for representing political interests without appearing to deviate from the norms of scientific objectivity. In the context of environmental policymaking, it is not surprising that politics seeps into the process, but the extent to which scientists use heresthetical tactics to direct discourse and support their policy preferences is unacknowledged even by veteran participants in the process.

The findings of this research indicate that achieving a functional separation between science and policy is nearly impossible. Not only do scientists and policymakers co-construct issues (a point which is demonstrated by the very concept of a POP; as Selin (2010) notes, this category was created specifically to facilitate international political action to address transboundary chemical pollution), but many of the scientists working in a policy context act as representatives of the political interests of their governments. Thus, science is secondary to political interests. As one anonymous interviewee stated, "Policy drives the science, not the other way around."[77] Instead of acting as interpreters of technically complex knowledge for policymakers and other laypersons, in the context of POPRC, many of scientists are simply legitimizing the predetermined policy preferences of stakeholders by sifting through the evidence to find favorable data. In this highly political context, epistemic communities could not exist, as there is little space for scientists to form preferences based solely on their unbiased, politically disinterested expertise.

While this thesis does not offer support for the epistemic communities approach, however, neither does it suggest that this approach is invalid. Epistemic communities of scientists may form in other contexts, in which the rules of participation and the structure of decision-making are less rigidly defined than is often the case in global environmental agreements. Furthermore, as noted above, epistemic communities could potentially form in the context of POPRC, if the issue attracted growing interest from the scholarly community, and if this community received financial support to participate in POPRC's work. One of the strengths of the epistemic communities approach is its focus on the unique expertise of scientists; despite the politicization of scientists' work in the context of POPRC, scientists still play a distinctive role in the policy process. Even when they are

[77] Anonymous interviewee A. Comment sent via email. 19 November 2010.

acting as representatives of the non-science-based preferences of other actors, scientists act as a filter for these preferences. They play a defining role in defining risk and appropriate policy responses to the threats, and their unique expertise and role as technical experts differentiates them from bureaucrats and representatives of interest groups. Acknowledging the potential for scientists to use their asymmetric control over the policy process to support their technical expertise is critical for accurate evaluation of science-based policymaking. While epistemic communities have not formed in the context of the Stockholm Convention, they have exerted authority in the context of other recent environmental issues (e.g., policy responses to Dutch coastal flooding, as analyzed by Meijerink 2005). Thus, this approach provides a valuable tool for distinguishing the unique traits of the scientific community, and for analyzing the preferences of those scientists working within the policymaking process.

As noted above, however, it is essential to acknowledge the reflexive relationship between science and politics. It is also critical to emphasize the distinction between scientific knowledge and the way that knowledge is interpreted and perhaps intentionally used by various actors, including scientists, to support given policy goals. Most importantly, this thesis has supported notion advanced by Litfin that the relationship between science and scientists is multidimensional. This thesis demonstrated that scientists within POPRC themselves have different relationships both to science and to politics. Acknowledging such variations is critical to accurate analysis of the role of science and scientists in a given policymaking context. While some actors within POPRC behaved in ways that were demonstrably strategic and politically motivated, others were constrained in their responses to such political maneuvering by their own values and commitment to the notion of science as an objective endeavor that could be held apart from political interests.

8.4 Implications for Framing Theory

As highlighted in the introduction to this thesis, the standard explanations for policy decisions in the context of chemical regulation fail to account for the ways in which participants may engage in heresthetical manipulation of policy discourse to support their interests or preferences. This omission is critical, because accepting these explanations, and the arguments that contributed to them, at face value could lead to superficial analysis and misunderstanding of the decision-making process. To fully understand the policymaking process, it is essential to critically evaluate the interests of participants and the ways in which they contribute to discourse and decision-making. Strategic issue framing is particularly important in the study of policymaking, as it is a tool by which skilled participants can structure issues and guide debate in ways that will favor their interests, and particularly those which would not win support if they were made explicit.

The foregoing analysis of the role of issue framing in the work of POPRC has demonstrated that participants do use strategic issue framing tactics to support their policy preferences, and that these preferences are not always predicated on scientists' technical expertise; instead, frames often reflect the interests of the governments with which scientists are affiliated. Thus, by analyzing the use of issue framing in POPRC's discourse, it was possible to identify the high level of politicization of this supposedly politically disinterested, technical committee, and to illuminate the hybrid role of scientists as technical advisors and political representatives. Previous studies of issue framing have considered the way that political actors may use the tactic to win support for their interests, but no studies had explored the use of these heresthetical tactics by experts whose authority is derived from their apparent objectivity and neutrality.

Furthermore, this thesis considered the way that elite actors frame issues for other elites. In the context of science-based decision-making, it was evident that frames which emphasized technical information were effective, whereas frames which introduced issues considered to be irrelevant (e.g., social justice concerns, poverty issues, etc.) had no impact on discourse. Rather, the frames that garnered support among POPRC members were those which fit with the technical nature of the committee, including those that emphasized evidence, data, and accuracy. Thus, frames emphasizing evidence of harm, scientific uncertainty, and some procedural issues were successful. Notably, however, the credibility of the frame initiator was crucial to the success of the frame. This meant that the frame initiator needed to be responsive to the behavioral norms of the committee; in two notable cases, the frame initiators violated those norms (i.e., the heated accusations made by the member from India, and the teary interventions of the representative of the Inuit Circumpolar Conference), and the frames they promoted failed to win support.

As noted in Chapter 2, a distinction should be drawn between equivalency framing and issue framing, as the cognitive processes underlying each of these differ. Chapter 2 noted that equivalency framing, which focuses on perceptions of risk, could be relevant for this research, because POPs-related policymaking is predicated on notions of risk to human health and the environment. However, analysis of all of the interventions made between POPRC-2 and -5 suggests that risk does not play a significant role in POPRC's decision-making process. While such concerns may play a role in a country's decision to nominate a substance, they do not factor into POPRC's discussions. Rather, review of nominated chemicals focuses largely on determining whether evidence is available to demonstrate that nominated substances meet each of the criteria for each stage of review. Thus, information is collated and considered, and once the appropriate threshold has been reached for each criterion, the committee moves to consideration of the next substance. If perceptions of risk factor into scientists' decision-making, such considerations are not reflected in their interventions. Relatedly, precaution plays a limited role in POPRC's work, and is cited only when one or two participants are unsure about the veracity of evidence, but are not opposed to moving to the next stage of review.

The role of issue framing has played a critical, yet unacknowledged, role in POPRC's decision-making process, and has shaped the decisions taken by the committee with respect to a number of live chemicals. This thesis demonstrates the importance of critically evaluating the role of scientists in policymaking, and considering their roles not only as experts who construct our understanding of reality, but as rational actors who may combine their technical expertise with heresthetical tactics to promote their own policy preferences and the predetermined policy agendas of other stakeholders in the decision-making process. It also highlights the importance of acknowledging the multidimensional nature of the relationship between science and politics. Knowledge cannot be cleanly separated from politics; nor does scientific knowledge necessarily precede political action. The role of scientists as intermediaries in the policymaking process is critical, but not definitive; as this thesis has demonstrated, these agents are themselves constrained by a range of factors, including, at times, the political interests of their governments.

Thus, in analyzing the crucial role that can be played by strategic issue framing in international environmental policymaking, this thesis demonstrates the importance of analyzing the political, social and economic interests that may influence the way technical knowledge is interpreted, used and presented both by political actors and scientists themselves. An approach which recognizes the role of scientists in constructing our understanding of environmental problems, but also identifies the way the production and interpretation of scientific knowledge may be influenced by political interests, is critical. To ignore either the constructivist or rationalist aspects of science-based policymaking would risk oversimplification of the complex, reflexive relationships among the production of scientific knowledge, policy problems and responses, and the scientists, technical experts, and bureaucrats who contribute to the policymaking process.

Appendix A

Persistent Organic Pollutants listed in the Annexes of the Stockholm Convention

Chemical	Abbreviation	Listing Status	Category	Use	Notes
Aldrin*		Annex A	pesticide	Applied to soil to kills termites, grasshoppers, corn rootworm and other insect pests	
Chlordane*		Annex A	pesticide	Used to kill termites and as a broad-spectrum insecticide on a range of agricultural crops	
DDT*		Annex B	pesticide	Formerly used to control disease, including malaria, typhus, and others spread by insects. Sprayed on a variety of agricultural crops after World War II.	Still used to control malaria in Sub-Saharan Africa.
Dieldrin*		Annex A	pesticide	Currently used to control termites and textile pests, and has been used to control insect-borne diseases and insects living in agricultural soils	Highly toxic to fish and other aquatic animals. Primary source of human exposure is food.
Endrin*		Annex A	pesticide	Insecticide sprayed on the leaves of crops such as cotton and grains. Also used to control rodents, such as mice and voles	Highly toxic to fish. Primary source of human exposure is food.
Heptachlor*		Annex A	Pesticide	Primarily used to kill soil insects and termites, but has also been used to kill cotton insects, grasshoppers, other crop pests, and malaria-carrying mosquitoes	Believed to be responsible for the decline of several wild bird populations, including Canada Geese and American Kestrels.
Hexachlorobenzene*	HCB	Annex C	pesticide	Kills fungi affecting food crops, and was widely used to control wheat bunt. Also	Has been found in food of all types. Mothers pass HCB to infants through

Chemical	Abbreviation	Listing Status	Category	Use	Notes
				a by-product of manufacture of some industrial chemicals, and exists as an impurity in several pesticide formulations	the placenta.
Mirex*		Annex A	pesticide	Used primarily to combat fire ants, and has been used against other types of ants and termites. Has also been used a fire retardant in plastics, rubber, and electrical goods	Studies of lab animals have caused it to be classified as a possible human carcinogen, but direct exposure to humans does not appear to cause injury.
Toxaphene*		Annex A	pesticide	Used on cotton, cereal grains, fruits, nuts and vegetables; has also been used to control ticks and mites in livestock.	
Polychlorinated biphenyls*	PCBs	Annexes A and C	Industrial chemical	Used in heat exchange fluids, in electric transformers and capacitors, and as additives in paint, carbonless copy paper, and plastics	Toxic to fish. Linked to reproductive failures and suppression of the immune system in various wild animals (e.g., seals and mink).
Polychlorinated dibenzo-p-dioxins*	PCDD	Annex C	By-product	Produced unintentionally due to incomplete combustion, as well as during the manufacture of pesticides and other chlorinated substances	Associated with multiple adverse effects in humans, including immune and enzyme disorders. Possible human carcinogen.
Polychlorinated dibenzofurans*	PCDF	Annex C	By-product	Produced unintentionally due to incomplete combustion, as well as during the manufacture of pesticides and other chlorinated substances	Associated with multiple adverse effects in humans, including immune and enzyme disorders. Possible human carcinogen.
Chlordecone		Annex A	pesticide	Used primarily as an agricultural pesticide. No current production or use reported.	Possible human carcinogen. Highly toxic to aquatic organisms.
Alpha hexachlorocyclo-hexane	alphaHCH	Annex A	By-product	Unintentionally produced as a by-product of Lindane. For each ton of Lindane produced, around 6-10 tons of other isomers are created.	Possible human carcinogen. Adversely affects wildlife and human health in contaminated regions.
Beta hexachlorocyclo-	betaHCH	Annex A	By-	Unintentionally produced as a by-product	Possible human carcinogen. Adversely

Chemical	Abbreviation	Listing Status	Category	Use	Notes
hexane			product	of Lindane. For each ton of Lindane produced, around 6-10 tons of other isomers are created.	affects wildlife and human health in contaminated regions.
Lindane		Annex A	Pesticide	Used as a broad-spectrum insecticide for seed and soil treatment, foliar applications, tree and wood treatment, and against ectoparasites in both veterinary and human applications.	Evidence of immunotoxic, reproductive, and developmental effects in lab animals and aquatic organisms.
Pentachlorobenzene	PeCB	Annexes A and C	Industrial chemical	Formerly used in PCB products, in dyestuff carriers, as a fungicide, a flame retardant, and might still be used as an intermediate. Also produced unintentionally during combustion, thermal, and industrial processes.	Moderately toxic to humans and very toxic to aquatic organisms.
Hexabromobiphenyl	HBB	Annex A	Industrial chemical	Used in the 1970s as a flame retardant. No longer produced or used in most countries.	Possible human carcinogen, and has other chronic toxic effects.
Hexabromodiphenyl ether	hexaBDE	Annex A	Industrial chemical	One of the main components of c-octaBDE. Alternatives exist and there is no known current production; however, articles still in use contain this chemical.	Can be subject to debromination.
Heptabromdiphenyl ether	heptaBDE	Annex A	Industrial chemical	One of the main components of c-octaBDE. Alternatives exist and there is no known current production; however, articles still in use contain this chemical.	Can be subject to debromination.
Perfluorooctane sulfonic acid, its salts, and perfluorooctane sulfonyl fluoride	PFOS, its salts, and PFOSF	Annex B	Industrial chemical	Intentional production and use is widespread and includes: electric and electronic parts, fire-fighting foam, photo imaging, hydraulic fluids, and textiles. Also unintentionally produced as degradation product of related	Extremely persistent and has substantial bioaccumulation and biomagnification properties. Not lipophilic, but binds to proteins in the blood and liver.

Chemical	Abbreviation	Listing Status	Category	Use	Notes
				anthropogenic chemicals.	
Tetrabromodiphenyl ether	tetraBDE	Annex A	Industrial chemical	One of the main components of commercial-pentaBDE.	Alternatives are available and in use, but may have adverse effects on human health and the environment.
Pentabromodiphenyl ether	pentaBDE	Annex A	Industrial chemical	One of the main components of commercial pentaBDE.	Alternatives are available and in use, but may have adverse effects on human health and the environment
Short-chained chlorinated paraffins	SCCPs	Under review	Industrial chemical	Synthetic compounds primarily used in metalworking fluids, sealants, as flame retardants in rubbers and textiles, in leather processing, and in paint and coatings.	Highly toxic to aquatic organisms.
Endosulfan		Recommended for listing	Pesticide	Widely used as an insecticide. Currently banned in 60 countries, and its production and use are decreasing.	Highly toxic to aquatic species; potential endocrine disruptor in aquatic and terrestrial species; Evidence of neurotoxic effects in lab animals. Improper handling and use by humans has been linked to congenital physical disorders, mental retardations, and deaths among humans.
Hexabromocyclo-dodecane	HBCD	Under review		Primarily used in expanded and extruded polystyrene, which is used to make insulation boards for buildings and vehicles. Also used in textile coatings and in high-impact polystyrene for electrical and electronic equipment.	Detected in human milk and blood; transferred from mothers to babies during pregnancy and via breast milk.

*One of the first twelve POPs to be banned, informally known as the dirty dozen

Appendix B

Summary of POPRC Decisions by Meeting: POPRC-2 through POPRC-5

<table>
<tr><th></th><th>POPRC-2
6- 10 November 2006</th><th>POPRC-3
19-23 November 2007</th><th>POPRC-4
13-17 October 2008</th><th>POPRC-5
12-16 October 2009</th></tr>
<tr><td>PentaBDE</td><td>1. Risk Profile (RP) adopted
2. Risk Management Evaluation (RME) to be drafted</td><td>1. RME adopted
2. recommends listing in Annex A
3. recommendation forwarded to COP-4</td><td colspan="2" rowspan="5">As they had completed the evaluation process there were no further discussions on these chemicals at POPRC –4 and -5</td></tr>
<tr><td>Chlordecone</td><td>1. Risk Profile adopted
2. Risk Management Evaluation to be drafted

Decision notes that lack of full scientific certainty shall not prevent a proposal from proceeding</td><td>1. RME adopted
2. recommends listing in Annex A without exemptions
3. recommendation forwarded to COP-4</td></tr>
<tr><td>HBB</td><td>1. Risk Profile adopted
2. Risk Management Evaluation (RME) to be drafted</td><td>1. RME adopted
2. recommends listing in Annex A
3. recommendation forwarded to COP-4</td></tr>
<tr><td>Lindane</td><td>1. Risk Profile adopted
2. Risk Management Evaluation (RME) to be drafted</td><td>1. RME adopted
2. recommends listing in Annex A
3. recommendation forwarded to COP-4</td></tr>
<tr><td>PFOS</td><td>1. Risk Profile adopted
2. Risk Management Evaluation (R to be drafted</td><td>1. RME adopted
2. recommends listing in Annex A or B
3. recommendation forwarded to COP-4

Recommendation includes PFOS, its salts, and PFOSF</td></tr>
<tr><td>OctaBDE</td><td>1. Screening Criteria fulfilled
2. Risk Profile to be drafted</td><td>1. RP adopted
2. RME to be drafted (Annex F)

Decision specifies commercial mixture of octa-BDE, including hexa-, hepta-, octa- and nonaBDE.

Notes that lack of full scientific certainty shall not prevent a proposal from proceeding.</td><td>1. RME adopted
2. recommends listing in Annex A
3. recommendation forwarded to COP-4</td><td>As they had completed the evaluation process there were no further discussions on these chemicals at POPRC -5</td></tr>
</table>

PeCB	1. Screening Criteria fulfilled 2. Risk Profile to be drafted	1. RP adopted 2. RME to be drafted (Annex F)	1. RME adopted 2. recommends listing in Annexes A and C 3. recommendation forwarded to COP-4 *Listing in Annex C, in addition to Annex A, is necessary to address unintentional releases of PeCB, which can be created as a byproduct of incomplete combustion* Committee approved addendum to RP adopted at POPRC-3 *Addendum included new information on unintentional releases of PECB*	
SCCPs	1. Screening Criteria fulfilled 2. Risk Profile to be drafted *Decision notes the need to take into account the variability of environmental fate properties, and to exercise caution in the next phase of evaluation*	No decision *Decision postponed due to inability of Committee to reach consensus. Seven members recorded as wanting to proceed to next stage; 5 expressed support for deferring decision. The remaining members did not formally express a preference formally, but most made their views known in bilateral discussions with the Chairman.* *A need for additional information on toxicity and LRET was noted, and the ad hoc working group agreed to continue working intersessionally.*	No decision *Decision postponed due to inability of Committee to reach consensus. "Several" members uncertain about the need for global action.* *Committee decided to invite two experts to attend POPRC-5 to discuss toxicity and ecotoxicity.*	No decision *Decision postponed for the third time due to the inability of Committee to reach consensus. According to an informal show of hands, twelve members favored advancing to the next stage, nine opposed, and another eight said they would abstain if the decision came to a vote.*
Alpha- and Beta- HCH	1. Screening Criteria fulfilled 2. Risk Profile to be drafted	1. RPs adopted individually for each isomer 2. RMEs to be drafted (Annex F)	1. RME adopted 2. recommends listing in Annex A 3. recommendation forwarded to COP-4 *Decision notes need to give consideration to by-production of this substance resulting from production of Lindane*	As they had completed the evaluation process there was no further discussion on these chemicals at POPRC -5
Endosulfan		No decision *Discussion of Endosulfan postponed until POPRC-4 due to EU's inability to release information necessary for discussion.*	1. Committee voted in favor of considering EC's proposal of Endosulfan (in response to objections from India and China) 2. SC fulfilled 3. RP to be drafted *Decision to move Endosulfan to the next phase of evaluation taken by vote. This*	1. RP adopted 2. RME to be drafted *RP was adopted by vote, with twenty-two members in favor and one against the proposal. Three members abstained.*

			represents POPRC's first vote on a substantive (i.e., non-procedural) issue.	
HBCD			No decision *Formal discussion deferred to POPRC-5, because the technical paper for discussion had not been distributed three months in advance of POPRC-4, as required.* *An informal "information exchange" was conducted to allow the invited expert in attendance to present the proposal, as planned.*	1. SC fulfilled 2. RP to be drafted

Note: Shading reflects the stage of evaluation process each chemical reached at that meeting

Denotes that screening criteria have been met (Annex D)
Denotes adoption of risk profile (Annex E)
Denotes adoption of risk management evaluation (Annex E) and a recommendation for listing
Denotes that the committee was unable to arrive at a decision

A full description of the policy process is set out in Chapter 5.

Appendix C

Sample extracts from an ENB Report (Kohler et al., 2010)

Earth Negotiations Bulletin — Reporting Services — POPRC-6 FINAL

A Reporting Service for Environment and Development Negotiations

Online at http://www.iisd.ca/chemical/pops/poprc6/

Vol. 15 No. 176 *Published by the International Institute for Sustainable Development (IISD)* *Monday, 18 October 2010*

SUMMARY OF THE SIXTH MEETING OF THE PERSISTENT ORGANIC POLLUTANTS REVIEW COMMITTEE OF THE STOCKHOLM CONVENTION: 11-15 OCTOBER 2010

The sixth meeting of the Persistent Organic Pollutants Review Committee (POPRC-6) of the Stockholm Convention on Persistent Organic Pollutants (POPs) took place from 11-15 October 2010 in Geneva, Switzerland. Over 120 participants attended the meeting, including 29 of the 31 Committee members, 56 government and party observers, and over 20 representatives from non-governmental organizations.

POPRC-6 adopted 12 decisions, including on: support for effective participation in POPRC's work; the work programmes on new POPs; and intersessional work on toxic interactions. POPRC adopted the risk profile for hexabromocyclododecane (HBCD) and established an intersessional working group to prepare a draft risk management evaluation on HBCD. POPRC also agreed, by a vote, to adopt the risk management evaluation for endosulfan and recommend listing endosulfan in Annex A, with exemptions. The Committee considered a revised draft risk profile on short-chained chlorinated paraffins (SCCPs), agreeing to convene an intersessional working group to revise the draft risk profile on the basis of an intersessional discussion of the application of the Annex E criteria to SCCPs and of information arising from a proposed study on chlorinated paraffins by the intersessional working group on toxic interactions.

While many participants were anticipating fireworks during deliberations on some of the more contentious issues on POPRC's agenda, most discussions during the week were characterized by an amicable cooperation that allowed the Committee to conduct its work efficiently and effectively.

A BRIEF HISTORY OF THE STOCKHOLM CONVENTION AND THE POPS REVIEW COMMITTEE

During the 1960s and 1970s, the use of chemicals and pesticides in industry and agriculture increased dramatically. In particular, a category of chemicals known as POPs attracted international attention due to a growing body of scientific evidence indicating that exposure to very low doses of POPs can lead to cancer, damage to the central and peripheral nervous systems, diseases of the immune system, reproductive disorders and interference with normal infant and child development. POPs are chemical substances that persist in the environment, bioaccumulate in living organisms, and can cause adverse effects on human health and the environment. With further evidence of the long-range transport of these substances to regions where they have never been used or produced, and the consequent threats they pose to the global environment, the international community called for urgent global action to reduce and eliminate their release into the environment.

In March 1995, the United Nations Environment Programme's Governing Council (UNEP GC) adopted Decision 18/32 inviting the Inter-Organization Programme on the Sound Management of Chemicals, the Intergovernmental Forum on Chemical Safety (IFCS) and the International Programme on Chemical Safety to initiate an assessment process regarding

IN THIS ISSUE

This issue of the *Earth Negotiations Bulletin* © <enb@iisd.org> is written and edited by Pia Kohler, Ph.D., Jessica Templeton and Cecilia Vaverka. The Editor is Pamela S. Chasek, Ph.D. <pam@iisd.org>. The Director of IISD Reporting Services is Langston James "Kimo" Goree VI <kimo@iisd.org>. The Sustaining Donors of the *Bulletin* are the United Kingdom (through the Department for International Development – DFID), the Government of the United States of America (through the Department of State Bureau of Oceans and International Environmental and Scientific Affairs), the Government of Canada (through CIDA), the Danish Ministry of Foreign Affairs, the German Federal Ministry for Economic Cooperation and Development (BMZ), the German Federal Ministry for the Environment, Nature Conservation and Nuclear Safety (BMU), the Netherlands Ministry of Foreign Affairs, the European Commission (DG-ENV), and the Italian Ministry for the Environment, Land and Sea. General Support for the *Bulletin* during 2010 is provided by the Government of Australia, the Austrian Federal Ministry of Agriculture, Forestry, Environment and Water Management, the Ministry of Environment of Sweden, the New Zealand Ministry of Foreign Affairs and Trade, SWAN International, Swiss Federal Office for the Environment (FOEN), the Finnish Ministry for Foreign Affairs, the Japanese Ministry of Environment (through the Institute for Global Environmental Strategies - IGES), the Japanese Ministry of Economy, Trade and Industry (through the Global Industrial and Social Progress Research Institute - GISPRI), the Government of Iceland, the United Nations Environment Programme (UNEP), and the World Bank. Funding for translation of the *Bulletin* into French has been provided by the Government of France, the Belgian Walloon Region, the Province of Québec, and the International Organization of the Francophone (OIF and IEPF). Funding for translation of the *Bulletin* into Spanish has been provided by the Spanish Ministry of the Environment and Rural and Marine Affairs. The opinions expressed in the *Bulletin* are those of the authors and do not necessarily reflect the views of IISD or other donors. Excerpts from the *Bulletin* may be used in non-commercial publications with appropriate academic citation. For information on the *Bulletin*, including requests to provide reporting services, contact the Director of IISD Reporting Services at <kimo@iisd.org>, +1-646-536-7556 or 300 East 56th St., 11D, New York, New York 10022, USA.

conditions of use in their countries. New Zealand also indicated his support for recommending listing under Annex A with exemptions.

Costa Rica, recognizing efforts to reach a consensus, asked that the issue be brought to a vote. On a point of order, Nagai explained a majority vote was required to determine whether the decision and the RME on endosulfan should be put to a vote. China noted he did not want to decide through a vote. Of the 29 members present and voting, 17 voted in favor of voting, and two voted against, with the others abstaining. The Committee then voted to finalize the RME and adopt the decision on endosulfan. The decision was adopted, with 24 members in favor, no members against and five abstentions.

Final Decision: In the decision (UNEP/POPS/POPRC.6/CRP.9), the POPRC adopts the RME for endosulfan (UNEP/POPS/POPRC.6/CRP.16) and decides to recommend to the COP that it consider listing endosulfan in Annex A of the Convention, with specific exemptions.

CONSIDERATION OF DRAFT RISK PROFILES

HEXABROMOCYCLODODECANE: On Tuesday morning, Peter Dawson (New Zealand), Chair of the intersessional working group on hexabromocyclododecane (HBCD), presented the draft risk profile and supporting documents on HBCD (UNEP/POPS/POPRC.6/10, UNEP/POPS/POPRC.6/INF/14 and INF/25), explaining that HBCD is a high production volume brominated flame retardant primarily used in polystyrene insulation boards, and to a lesser extent in textiles and electronics. Dawson noted that releases of HBCD are increasing, underlining that the draft risk profile concludes that the substance meets all of the criteria for listing and is likely, as a result of LRET, to cause significant adverse effects on human health and/or the environment such that global action is warranted.

China noted that it produces HBCD and suggested including additional information in the risk profile, such as data samples taken close to and far from sources of emission, to increase transparency and facilitate decision-making. The Republic of Korea noted that while some participants may want more data, paragraph 7 of Article 8 of the Convention states that a lack of full scientific certainty shall not prevent the proposal from proceeding. Finland said there is no need to account for the precautionary principle as levels are already of concern. Thailand expressed support for moving HBCD to the RME phase.

An observer from the US suggested including a comparison between toxicity levels found in the environment and effect concentrations, while an observer from IPEN cautioned against such a comparison. Finland noted that the toxicity levels have been compared to the extent possible in the risk profile and he said further comparisons are problematic due to a number of considerations, including reproductive stage, species sensitivity and temperature. France expressed concern about introducing comparisons that lack scientific validity. Chair Arndt noted that by benchmarking existing POPs, some problems of comparison could be overcome. An observer from China emphasized that displaying important risk information in tables makes the report more transparent.

A contact group on HBCD met on Wednesday evening, and a drafting group on the issue met on Thursday. On Thursday, Dawson explained that the revised draft risk profile had been rearranged to include a new section on the comparison of exposure levels and effects data that brought together observed levels in remote and other areas and compared those with toxic effect levels. He highlighted editorial changes to the concluding statement, and explained that it was concluded that there was no need to invoke the precautionary approach in recommending listing.

Responding to a question from China on levels and effects in remote regions, Dawson explained that studies have measured concentration levels in those regions but that there are no studies on the effect of those concentrations on polar bears. Finland underscored that the drafting group was careful not to make comparisons that would be scientifically invalid. An observer from Norway warned against making comparisons, underscoring that when dealing with endocrine effects there are no safe levels of exposure. China stressed the importance of documenting both levels and effects in remote regions, underscoring that in principle satisfying the Annex D criteria was not sufficient for meeting the requirements under Annex E.

Finland highlighted that existing data on environmental concentration and data on toxic effects were collected during preparation of the draft risk profile. Canada said the draft risk profile meets all the requirements for a risk profile, and an observer from the US said the new section improved the document.

On Friday, POPRC-6 considered the revised draft risk profile and accompanying draft decision. China sought clarification on a conclusion that releases of HBCD into the environment are increasing in all regions investigated, and the POPRC agreed to specify Europe and Asia/Japan. The Committee also agreed to specify that a number of measured levels in biota are of significant concern for human health and the environment. The POPRC adopted the risk profile and the accompanying decision, with these amendments.

Final Decision: In the decision (UNEP/POPS/POPRC.6/CRP.12), the POPRC adopts the risk profile for HBCD (UNEP/POPS/POPRC.6/CRP.13) and decides that HBCD is likely, as a result of LRET, to lead to significant adverse effects on human health and the environment such that global action is warranted. The decision also establishes an intersessional working group to prepare a draft RME and invites parties and observers to submit the information specified in Annex F by 8 January 2011.

SHORT-CHAINED CHLORINATED PARAFFINS: On Tuesday, Mohammed Yadallee (Mauritius), Chair of the intersessional working group on SCCPs, presented the revised draft risk profile on SCCPs (UNEP/POPS/POPRC.6/11 and UNEP/POPS/POPRC.6/INF/15), noting that earlier versions had been presented at POPRC-3, 4 and 5, and that 20 countries and two observers submitted new information during the intersessional period. Yadallee highlighted empirical and modeling data indicating that SCCPs undergo LRET and are persistent, bioaccumulative and toxic, particularly to aquatic organisms, and noted that the working group had been unable to reach agreement on a concluding statement to the draft risk profile.

Appendix D

Sample Interview Schedule

Questions tailored for a POPRC member

1. Could you please describe your professional background?
2. In your view, how important is scientific information about risks posed by particular chemicals in comparison with other concerns, such as economic or social issues?
3. Do you feel that there is a clear division between science and politics in the work of the Convention?
4. How would you characterize the relationships among actors? Are there any particular divisions among groups?
5. What role do you think scientists play in the work of the convention? Do they represent any particular sides of the debate?
6. How do representatives to POPRC balance scientific risk assessments with economic and social interests?
7. Do you think laboratory data is more credible than observations of bioaccumulation in the field?
8. During the POPRC meeting, several observers from industry made comments which supported tighter regulation of certain chemicals. Why would industry support tighter regulation of chemicals?
9. Where do POPRC members get their information about the risks posed by chemicals? What are the sources?

Questions tailored for an industry representative

1. What role does industry play in the work of the Convention? Do you feel that industry is influential in decision-making?
2. You have alluded to differences in opinion among various industry participants. Can you tell me a little about the relationships among industry representatives?
3. What role do you think environmental NGOs play? Do you think they have comparable influence?
4. During POPRC-3, several observers from industry made comments which supported tighter regulation of certain chemicals. Why would industry support tighter regulation of chemicals?

5. In your view, how important is scientific information about risks posed by particular chemicals in comparison with other concerns, such as economic or social issues?

6. Do you feel that there is a clear division between science and politics in the work of the Convention?

7. How would you characterize the relationships among actors? Are there any particular divisions among groups?

8. What role do you think scientists play in the work of the convention? Do they represent any particular sides of the debate?

9. How do representatives to POPRC balance scientific risk assessments with economic and social interests?

10. Do you think laboratory data is more credible than observations of bioaccumulation in the field?

11. During the last POPRC meeting, several observers from industry made comments which supported tighter regulation of certain chemicals. One example is octa-BDE. Why would industry support tighter regulation of chemicals?

12. Where do POPRC members get their information about the risks posed by chemicals? What are the sources?

Appendix E

List of POPRC Members, 2006 - 2014

Last Name	First Name	Country	Term Dates
Nudelman	Norma Slbarbati	Argentina	2010-2014
Aleksandryan	Anahit	Armenia	2006-2010
Rae	Ian	Australia	2006-2010
Boechat	Camila Arruda	Brazil	2006-2010
Dombalov	Ivan Panayatov	Bulgaria	2008-2012
Ouedraogo	Desire	Burkina Faso	2006-2010
Choviran	Ken	Cambodia	2008-2012
Chenier	Robert	Canada	2006-2010; 2010-2014
Abderaman	Abderaman Mahamat	Chad	2006-2008; 2008-2012
Barra	Ricardo	Chile	2008-2012
Hu	Jianxin	China	2006-2010; 2010-2014
Rodriguez Castaneda	Jose	Colombia	2010-2014
Gutierrez	Flora Roa	Costa Rica	2010-2014
Kouadio	Kouame Georges	Cote d'Ivoire	2006-2008
Holoubek	Ivan	Czech Republic	2006-2010; 2010-2014
Cueva	Alfredo	Ecuador	2006-2010
El Sehamy	Mohammed	Egypt	2010-2014
Elshouk	Fatma Mohamed Ibrahim Abou	Egypt	2010-2014
Mohammed	Mohammed Ali	Ethiopia	2006-2008
Davetanivalu	Jope Rinabao	Fiji	2006-2008
Seppala	Timo	Finland	2010-2014
Bintein	Sylvain	France	2008-2012
Arndt	Reiner	Germany	2006-2010; 2010-2014
Pwamang	John	Ghana	2008-2012
Ferrary Betancourt	Mirtha	Honduras	2008-2012
Rodriguez	Pablo Ricardo	Honduras	2010-2014
Chowdhury	Chhanda	India	2010-2014
Pandey	Gopal Krishna	India	2008-2012
Kitano	Masuru	Japan	2006-2010; 2010-2014
Khashashneh	Mohamad	Jordan	2006-2010; 2010-

			2014
Choi	Kyunghee	Korea	2008-2012
Yadallee	Mohammad Aslam	Mauritius	2006-2008; 2008-2012
Yarto	Mario	Mexico	2006-2010
Bouqartacha	Farah	Morocco	2006-2010
Dawson	Peter	New Zealand	2010-2014
Mojekwu	Stella	Nigeria	2010-2014
Sall	Liselott	Norway	2006-2008
Sabularse	Dario C.	Philippines	2006-2008
Alvin	Conceicao	Portugal	2008-2012
Al-Easa	Hala Sultan saif	Qatar	2006-2008
Yormah	Thomas Brima Rick	Sierra Leone	2006-2010
Fabjan	Evelin	Slovenia	2006-2008
Bouwman	Henk	South Africa	2006-2010
Tarazona	Jose	Spain	2006-2008
Delvin	Maria	Sweden	2006-2010
Wahlstrom	Bo	Sweden	2006-2008
Hitzfeld	Bettina	Switzerland	2008-2012
Elok	Fouad	Syrian Arab Republic	2008-2012
Katagira	Fransisca	Tanzania	2010-2014
Boon-Long	Jarupong	Thailand	2006-2010; 2010-2014
Komla	Sanda	Togo	2008-2012
Rajkumar	Wayne	Trinidad and Tobago	2006-2008
Yla-Mononen	Leena	UK/European Commission/Finland	2006-2008
Sukhorebra	Svitlana	Ukraine	2010-2014
Alvarez	Jacqueline	Uruguay	2006-2008
El-Shekeil	Ali	Yemen	2006-2008
Banda	Samuel	Zambia	2010-2014

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