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**From Regional to Global Assessment:
Learning from
Persistent Organic Pollutants**

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The Global Environmental Assessment project is a collaborative team study of global environmental assessment as a link between science and policy. The Team is based at Harvard University. The project has two principal objectives. The first is to develop a more realistic and synoptic model of the actual relationships among science, assessment, and management in social responses to global change, and to use that model to understand, critique, and improve current practice of assessment as a bridge between science and policy making. The second is to elucidate a strategy of adaptive assessment and policy for global environmental problems, along with the methods and institutions to implement such a strategy in the real world.

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Publication abstracts of the GEA Project can be found on the GEA Web Page at <http://environment.harvard.edu/gea>. Further information on the Global Environmental Assessment project can be obtained from the Project Associate Director, Nancy Dickson, Belfer Center for Science and International Affairs, Kennedy School of Government, Harvard University, 79 JFK Street,

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FOREWORD

This paper was written as part of the Global Environmental Assessment Project, a collaborative, interdisciplinary effort to explore how assessment activities can better link scientific understanding with effective action on issues arising in the context of global environmental change. The Project seeks to understand the special problems, challenges and opportunities that arise in efforts to develop common scientific assessments that are relevant and credible across multiple national circumstances and political cultures. It takes a long-term perspective focused on the interactions of science, assessment and management over periods of a decade or more, rather than concentrating on specific studies or negotiating sessions. Global environmental change is viewed broadly to include not only climate and other atmospheric issues, but also transboundary movements of organisms and chemical toxins. (To learn more about the GEA Project visit the web page at <http://environment.harvard.edu/gea/>.)

The Project seeks to achieve progress towards three goals: deepening the critical understanding of the relationships among research, assessment and management in the global environmental arena; enhancing the communication among scholars and practitioners of global environmental assessments; and illuminating the contemporary choices facing the designers of global environmental assessments. It pursues these goals through a three-pronged strategy of competitively awarded fellowships that bring advanced doctoral and post-doctoral students to Harvard; an interdisciplinary training and research program involving faculty and fellows; and annual meetings bringing together scholars and practitioners of assessment.

The core of the Project is its Research Fellows. Fellows spend the year working with one another and project faculty as a Research Group exploring histories, processes and effects of global environmental assessment. These papers look across a range of particular assessments to examine variation and changes in what has been assessed, explore assessment as a part of a broader pattern of communication, and focus on the dynamics of assessment. The contributions these papers provide has been fundamental to the development of the GEA venture. I look forward to seeing revised versions published in appropriate journals.

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ABSTRACT

How can global assessment processes secure the advantages of building on existing national and regional assessments without creating biases against new information from other parts of the world, or alienating stakeholders absent from the initial assessments? There seems much to be gained in global assessment processes from learning sound lessons from earlier efforts at smaller scales; certainly, there seems little need for global assessment processes to recreate from first principles all the pertinent assessments previously done by others. However, making use of regional experience can raise significant issues of how assessments are viewed by a larger set of participants. This paper addresses issues of the interactions between regional and global environmental assessment by examining the case of the United Nations Environment Programme (UNEP) negotiations on persistent organic pollutants (POPs). It looks in particular at one regional precedent for the global negotiations, the 1998 Århus Protocol on POPs to the Convention on Long-Range Transboundary Air Pollution (LRTAP). It examines the question of what global POPs negotiators learned from LRTAP's scientific assessment experience, and explores the impact of the use of such regional assessment on the effectiveness of assessment in a global context. In particular, it looks at its effect on the global assessment's scientific or technical credibility; its legitimacy (perceived fairness); and its salience (utility in addressing questions of interest to a particular user). It concludes that while potential pitfalls of credibility and legitimacy can be avoided using particular strategies for applying regional assessments in global context, risks to salience emerge as the most significant, long-term problem. While intelligent application of regional assessments can greatly facilitate agenda-setting and consensus-building at the global level, these advantages may come at the expense of creating a common, salient information base among all global participants. The paper concludes by exploring alternative strategies that can be employed to provide salient information to a range of different parties.

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TABLE OF CONTENTS

1. INTRODUCTION	1
2. BACKGROUND: CASE STUDIES AND METHODOLOGY	3
2.1. EFFECTIVENESS AND CREDIBILITY, SALIENCE, AND LEGITIMACY	3
2.2. INFLUENCES ON CREDIBILITY, SALIENCE, AND LEGITIMACY	5
2.3. CASE STUDY: ASPECTS OF GLOBAL ASSESSMENT WITH LRTAP INFLUENCE	6
2.3.1. <i>The Framing of the POPs Problem</i>	7
2.3.2. <i>The Substance List</i>	7
2.3.3. <i>The Background Assessment</i>	8
2.3.4. <i>The Criteria Expert Group</i>	8
2.4. ANALYSIS AND METHODOLOGY	8
3. THE LEGACIES OF LRTAP: OUTCOMES OF ASSESSMENT	9
3.1. IMPACTS OF LRTAP ON THE GLOBAL PROCESS	9
3.1.1. <i>Accelerating the Agreement</i>	10
3.1.2. <i>Sidestepping Concerns about Legitimacy</i>	14
3.1.3. <i>Less Salience to Non-Participants</i>	18
3.2. SUMMARY OF LESSONS LEARNED	20
4. PATHWAYS TO SALIENCE	20
4.1. SALIENT ASSESSMENTS IN GLOBAL POPs	20
4.2. PARTICIPATION, LEGITIMACY, AND SALIENCE	21
4.3. MULTIPLE PATHWAYS TO SALIENCE?	22
5. CONCLUSIONS AND LESSONS FOR DESIGN	23
REFERENCES	25
TABLES	29
FIGURES	33
ENDNOTES	35

ACRONYM LIST

BAF	Bioaccumulation Factor
BCF	Bioconcentration Factor
CEE	Central and East European
CEG	Criteria Expert Group (UNEP POPs negotiations)
CRP	Conference Room Paper
GEA	Global Environmental Assessment Project
HCH	Hexachlorocyclohexane
HELCOM	Helsinki Commission
IFCS	Intergovernmental Forum on Chemical Safety
INC	Intergovernmental Negotiating Committee
IOMC	Inter-Organization Programme for the Sound Management of Chemicals
IPCC	Intergovernmental Panel on Climate Change
IPCS	International Programme on Chemical Safety
Kow	Octanol-Water Partition Coefficient (log)
LRTAP	Convention on Long-Range Transboundary Air Pollution
PAHs	Polycyclic Aromatic Hydrocarbons
PARCOM	Paris Commission
PBTs	Persistent Bioaccumulative Toxics
PCBs	Polychlorinated Biphenyls
PCDDs	Polychlorinated Dibenzo-p-dioxins
PCDFs	Polychlorinated Dibenzofurans
POPs	Persistent Organic Pollutants
SADC	Southern African Development Community
UN-ECE	United Nations Economic Commission for Europe
UNEP	United Nations Environment Programme
U.S. EPA	United States Environmental Protection Agency

1. INTRODUCTION

Negotiating global environmental agreements is an extremely difficult undertaking. Negotiations often involve over a hundred parties, who have very different goals and preferred options for policy. It might be easier to negotiate complicated policies where there are fewer parties – for example, in regional forums. The model of starting with a small region and then expanding agreement is prevalent in matters such as trade policy – negotiating as a region, such as North America or the European Union, is widely considered easier than attempting to harmonize standards globally. On the other hand, such an approach runs the risk of establishing very different standards in each region. The growing number of cooperative efforts in implementing regional environmental agreements – for example, in the Baltic region, in the Mediterranean, and in North America – raises the question of whether it is easier to build from the experiences of one or many regional accords, in making policy on global environmental concerns. What effect would this have on the potential for a harmonized global accord? The same question might be asked of the scientific assessment efforts that very often support such negotiations – how might regional assessment experience influence a global assessment and negotiating effort?

Experience conducting scientific assessments of environmental issues at a global scale has shown that such endeavors are often fraught with controversy (e.g. GEA 1997; Clark 1999). Truly global assessment processes involve significant resource commitments and are often quite complicated and lengthy processes; one example of this is the Intergovernmental Panel on Climate Change (IPCC). Those designing global environmental assessment processes must integrate the concerns of a very large number of participants as well as a multitude of different interests, while maintaining the scientific nature of the exercise.

Many scientific assessments of environmental issues might be easier to conduct effectively with only a subset of those participants. Global efforts to address matters of environmental policy often build on precedents at the national and regional level, many of which incorporated scientific assessments. Such national or regional assessments can be of use in a global processes – one particular example of assessments used in such a way were national assessments from the U.S. and U.K. used in the production of the “Blue Book” assessment of stratospheric ozone (Clark et al. 1996). However, the use of assessments produced at sub-global scale in making global decisions can raise significant issues of how a larger set of participants views such assessments. Is the information contained in such assessments scientifically authoritative beyond the regional setting in which it was produced? Can these assessments expand their regional focus to address questions of relevance to decision makers from other regions? Can a process that makes heavy use of these regional precedents be considered fair and legitimate by those who did not participate in conducting it? These are significant concerns. On the other hand, there seems little need for global assessment process to recreate from first principles all the pertinent assessments previously done by others.

This paper addresses the question of how a global assessment process – seeking to learn from regional experience – can strike a balance between efficiency and learning from experience, and the pitfalls of relying too heavily on regional work. These pitfalls include losing scientific or technical credibility; legitimacy (i.e. perceived fairness); and salience (i.e. utility in addressing questions of interest to a particular user). What are the effects that making use of regional precedents has on a global assessment process, and how does this impact the global assessment’s effectiveness? This is a difficult question to address analytically, because there is a high degree of variation in regional assessments used at global

scale. Some regional assessments can include two or three countries, others can include ten or twenty. Some are conducted by scientists, some by governments, some by non-governmental organizations. Different environmental issues are characterized by different stakeholders and interests. Therefore, a case study to address the credibility, salience, and legitimacy of regional assessments in global fora needs somehow to address variation due to significant differences in regional assessment properties, as well as the ways in which regional assessment is used in global context.

In order to examine how regional assessments might best be used in global environmental decision-making, this paper will look specifically at one particular regional assessment and negotiating process that has been cited and used in different ways in global action to address the same issue. This case is the issue of persistent organic pollutants (POPs) assessment at regional and global scale. Over 100 countries are currently negotiating a global, legally-binding convention under the auspices of the United Nations Environment Programme (UNEP) to address the problem of POPs, which are organic chemicals that persist in the environment, bioaccumulate in living organisms, and pose a toxic risk to human health and the environment at locations far from the site of their use and release. A significant precedent for UNEP action is the 1998 Århus Protocol on POPs to the Convention on Long-Range Transboundary Air Pollution (LRTAP). The LRTAP Convention is a regional agreement under the United Nations Economic Commission for Europe (UN-ECE); parties to LRTAP include European Union countries, eastern European countries, the United States, Canada, and Russia. Negotiations for both the LRTAP POPs protocol and the UNEP POPs convention were preceded by significant assessment processes. Many parties considered the LRTAP agreement as a model for the global negotiations, especially in the area of science-based decision-making, where LRTAP's assessment process was particularly thorough. During the global POPs assessment and negotiating processes, the results and products of the LRTAP POPs assessment process were used in various different ways, with different results.

This paper asks the question of what global POPs negotiators learned from LRTAP's scientific assessment experience, looks at the effect of LRTAP's precedent on global assessment and negotiation, and explores the pitfalls and the potential of its use in a global context. It aims to begin to identify what the best strategies are for using regional assessment in a global context. It does this by looking at aspects of the global assessment process where LRTAP had differing types of influence, and analyzing the credibility, salience, and legitimacy of these different uses of LRTAP's assessment to global parties.

This is a good case study to address these issues for several reasons. By looking at one particular regional assessment and its fate in a global assessment process and negotiation, the properties of the regional assessment are held constant. Because the regional and global processes addressed the same environmental issue – toxic chemicals – in similar ways, the power and interest configurations that could differ quite significantly among different issues are in this case relatively stable. This case study, therefore, has the advantage of focusing on what it is about the use of regional assessment in global context that influences credibility, salience, and legitimacy.

One of the more surprising results from this case study is that salience – not credibility or legitimacy – emerges as the most significant pitfall in the use of regional assessment in a global forum. Though one might expect that such an assessment's legitimacy would suffer the most, this case shows that assessors and negotiators can make use of particular strategies to address such concerns. Salience, however, seems to depend heavily on more substantive participation in the original assessment process. While intelligent application of regional assessments can greatly facilitate agenda-setting and consensus-building at the

global level, these advantages may come at the expense of creating a common, salient information base among all global participants.

The analysis is structured as follows: section 2 addresses research methodology and relevant theoretical background, and introduce the specific aspects of the global POPs assessment process to be examined. Section 3 analyzes the impacts of LRTAP on the global process in these aspects of the global POPs assessment process, with particular attention to LRTAP's credibility, salience, and relevance in global context. Section 4 looks more specifically at the issue of salience, and the different pathways by which assessments can gain salience to a range of different parties. Section 5 concludes by drawing lessons from this case study about the design of global environmental assessment processes.

2. BACKGROUND: CASE STUDIES AND METHODOLOGY

In order to begin to analyze the process by which regional assessment has been put to use in global context in this particular case, it is first necessary to have a clear understanding of the possible effects of these sorts of assessment processes, and the aspects of assessment that might influence these outcomes. This section identifies and describes three properties that other work (Clark 1999) has shown is associated with effectiveness in global environmental assessments – credibility, salience, and legitimacy – and identifies qualities of assessment processes that might influence these outcomes. It also introduces the four aspects of global POPs assessment processes, with varying influences of LRTAP POPs assessment, that are examined in section 3.

Scientific assessment can have a number of effects on policy processes. Among the effects that scientific assessment might exert are changes in issue frames, policy agendas, actor behavior, and the perception of knowledge needs (Clark 1999). Beyond identifying the effects of assessment, however, determining whether scientific assessment has been effective is a difficult proposition. Different participants in and analysts of such processes often have different goals and desired outcomes from an assessment process – and therefore different conceptions of what is effective, and what is ineffective. Assessments are contested processes with a multitude of different interests and competing perspectives represented. However, participants in assessment processes often identify particular assessments as more effective than others. For example, participants in the LRTAP convention's assessments often cite its assessment processes as particularly effective (Eckley 1999). It is often quite clear to both participants and observers, as well, when assessments fail or are ineffective.

2.1. Effectiveness and Credibility, Salience, and Legitimacy

In the work of the Global Environmental Assessment (GEA) project, three dimensions have emerged as characteristic of more effective assessments: these are the qualities of “credibility,” “saliency,” and “legitimacy” (Clark 1999). As proximate pathways through which assessments might achieve greater effectiveness, these three concepts emerge as useful measures of the outcomes of assessment in the cases to be examined – with particular reference to a defined “user” of the assessment. Past research has characterized the common pitfalls that often undermine assessment processes (e.g. GEA 1997; Eckley, 1999 #97); these pitfalls correspond to the categories of credibility, salience, and legitimacy.

The idea of “credibility,” as used here, is intended to reflect the scientific and technical believability of the assessment to a defined user, often in the scientific community. An assessment that lacks credibility, for example, might be challenged by scientists for being based on shoddy research, or for drawing inappropriate conclusions from scientific data. A more credible assessment would pass scientific muster, and could be seen as technically adequate.

A “salient” assessment is one that addresses the particular concerns of the user – that is, asks and satisfactorily answers the right questions. The classic example of an assessment that lacks salience is a report that is produced, only to remain on a shelf in perpetuity. The criterion of salience is intended to be an indication of the utility and relevance of assessment.

The quality of “legitimacy” is a measure of the political acceptability or perceived fairness of an assessment. A legitimate assessment process has been conducted in a manner that allows users to be satisfied that their interests were not overlooked, and that the process was a fair one.

These three qualities of assessment are similar to the so-called “metacriteria” for evaluating policy-relevant science identified by Clark and Majone (1985). Their criterion of “adequacy,” which emphasizes avoiding common pitfalls of scientific inquiry, reflects the same idea as “credibility” above. Clark and Majone’s criterion of “value” is somewhat like “salience;” however, value expresses more strongly notions of importance and feasibility of scientific research programs, whereas “salience” is more concerned with relevance and usability. Their criterion of “legitimacy” is very similar to that envisioned here, in particular their emphasis on a socially negotiated civil legitimacy based on “fair play.”

It is difficult to conceptualize what one might observe as a signal that an assessment is “credible,” “salient,” and/or “legitimate.” In contrast, it is far easier to see that a lack of credibility, salience, or legitimacy could signal possible assessment ineffectiveness. Effective assessments, therefore, are effective because they skillfully avoided the problems that undermined their predecessors. This sort of analysis draws upon the concept of “pitfalls” in scientific research programs discussed by Ravetz (1971). Ravetz uses the concept of pitfalls to analyze how well scientific work is progressing: work well done avoids the commonly-recognized pitfalls that have plagued others.

For example, one might imagine the science-based conclusions of an assessment being questioned because a user of that assessment believed that a laboratory measurement was in error, a crucial process was omitted in an atmospheric model, or an inappropriate analytical methodology was employed. These would correspond to questioning the credibility of an assessment. In contrast, parties in a global negotiation might question an assessment because they felt that their input was not included or that their interests were ignored. This would fall into the category of legitimacy. Criticisms that an assessment does not address a user’s problem or situation reflect a lack of salience.

In this framework, therefore, the skillful avoidance of these common pitfalls of lack of credibility, salience, and legitimacy can be considered an indicator of more “effective” assessments. Of course, any measure of qualities such as credibility, saliency, and legitimacy require that a user of assessments be defined. What is credible, salient, or legitimate to one party may not be similarly so to another. In analyzing these case studies of POPs assessment, therefore, the specified user will be the country parties engaged in the global POPs negotiating process. Though other users might be identified in this global negotiating forum (e.g. NGOs or scientific communities), there are several reasons for choosing country parties as the assessment user to concentrate on in this case. Countries are the only entities that have a

vote under United Nations rules. Official representation at virtually all of the official POPs meetings has been on the basis of countries; others are permitted only as observers. As well, the implementation of any agreement will fall to national regulatory authorities, who have been substantively involved in this assessment and negotiation process from its inception. Where appropriate, different categories of parties will be distinguished: for example, one important distinction is between countries that did and did not participate in the LRTAP POPs protocol negotiations; another is between developed and developing countries.

2.2. Influences on Credibility, Salience, and Legitimacy

A number of different factors might affect the credibility, salience, and legitimacy of a regional assessment to parties in a global assessment process. These properties fall into three broad categories:

- The properties of the regional assessment itself: for example, which regional group conducted the assessment, or which questions the assessment examined, might affect how it is looked at by a broader group.
- The way such a regional assessment is used in the global forum: an assessment used as supporting material to conduct a separate, globally-based assessment will likely be considered differently from an assessment that exists unchanged.
- The properties of the global context: for example, at which stage in the policy process the regional assessment is cited and/or used, or the alignment of global interests on the issue.

If one is to analyze what it is about regional assessments that make them more credible, salient, and legitimate to wider audiences, it is helpful to categorize more rigorously those variables that might affect assessment outcomes. Properties of an assessment that influence outcomes might be helpfully collected into the categories of context, content, and process (GEA 1997). These are the characteristics of a regional assessment itself that could have influence. The variables of context would include the scientific, political, and economic factors that form the background against which a regional assessment is conducted. Content would represent the material conveyed in the regional assessment, and process includes those variables which determine how an assessment was conducted (e.g. participation in the assessment).

The context of the global assessment is important as well in determining the fate of a regional assessment. Specifically, whether the global policy process is at an early stage (e.g. framing of the problem) or a late stage (e.g. specifying policy solutions or implementations) could affect how a regional assessment is viewed. The degree of controversy surrounding the issue globally might also be a factor.

While the properties of a regional assessment and the properties of global context can be given in an assessment situation, the strategies for using regional assessment in a global context are often decided by various actors in the process. It is possible to distinguish several different ways a regional assessment could be employed in global context. The regional assessment might transfer unchanged to the global process, clearly marked as a regional contribution. A global institution or process might review the regional assessment and offer its stamp of approval, without significantly changing the substance of what was done on a regional level. The regional assessment might be modified more substantively on a global level. Or, a global process might do its own fully independent assessment that duplicates and/or ignores the effort of the regional group. These different strategies might have different impacts on the credibility, salience, and legitimacy of assessment.

A conceptual model of how these possible influences might impact the effectiveness of a regional assessment in global context is presented as Figure 1. This model will form the basis for analyzing the impacts of regional assessment in the case study of POPs.

2.3. Case Study: Aspects of Global Assessment with LRTAP Influence

In choosing a case study to examine which of the characteristics outlined above have the most impact on the credibility, legitimacy, and salience of regional assessment in a global context, this analysis will focus in particular on the strategies that are somewhat under the control of those designing assessment processes. In the categories above, these would be the strategies for regional assessment use in global context, as well as one particular property of the global context, the policy stage at which regional assessment is employed.

In measuring the impact of these characteristics, the ideal case study would hold constant all other possible influences of regional assessment attributes and global context, and vary the strategies by which regional assessment was globalized. Examining the case of persistent organic pollutants under regional and global assessment and negotiation offers an opportunity to hold a number of possibly confounding variables constant. The case study examined in this research will be four different aspects of the global POPs assessment process, in which products and results from the LRTAP POPs protocol's assessment process had varying influences. By focusing on one issue, that of persistent organic pollutants, the context of global negotiations, and the power and interest configurations that go along with any particular issue, are the same among the cases. Because the regional assessment is the same in all of these cases – the LRTAP POPs protocol assessment process – its qualities are relatively constant as well. LRTAP, as well, is the highest-profile regional process addressing POPs that had influence in the global negotiations. While there were other regional assessments and agreements on POPs – the most important ones being the Sound Management of Chemicals program under the North American Agreement on Environmental Cooperation, and the Arctic Monitoring and Assessment Programme's efforts – LRTAP was the most significant and thorough, and was most cited in global situations. Therefore, constructing the cases in this way allows a substantive look at the effects of strategies for regional assessment use in a policy context, and of variations in policy stages, on credibility, salience, and legitimacy.

The four aspects of global assessment to be examined are described in more detail below. Briefly, they are:

- The initial scientific assessment work that provided a framing of the POPs problem and put POPs on the global agenda
- The process that resulted in the choice of twelve substances for global negotiation
- The expert assessment process that established that the twelve substances were indeed of global concern
- The Criteria Expert Group (CEG) procedure, which set up criteria and a procedure for adding additional chemicals beyond the initial twelve to the POPs convention after its entry into force

These four aspects, as will be explored below, occurred at different stages of the global negotiation; assessment information from LRTAP played different roles in each. Though, upon initial examination, not all of these aspects of the global process seem particularly assessment-like, they share several

characteristics that make their consideration as assessments appropriate in this context. For one, each of these processes integrated scientific and political concerns. If one considers assessment as “the entire social process by which expert knowledge related to a policy problem is organized, evaluated, integrated and presented in documents to inform policy or decision-making” (GEA 1997), then these case studies clearly lie within the domain of assessment as it interfaces with policy decision-making. For reference, a timeline of activity under both the LRTAP and UNEP POPs assessment and negotiating processes is provided as Table 1.

2.3.1. The Framing of the POPs Problem

The first aspect of the global POPs process is the early part of the assessment and negotiation process, when the framing of the POPs issue emerged; this encompasses the initial assessments of POPs and the framing of the POPs problem. That the issue of persistent organic pollutants is on the global agenda at all is a product of a scientific assessment process. The category of “POPs” is certainly not one that emerges straight from scientific literature or from existing regulatory efforts; in fact, the concept of a POP emerged virtually concurrently with the emergence of international concern about toxic contamination from these substances. The scientific assessments done under the LRTAP process were instrumental in setting the global agenda; no similar preliminary scoping or assessment exercises were conducted on a global basis. Therefore, this represents a case where LRTAP assessment was employed in the global process relatively unchanged. The framing and agenda-setting assessments occurred very early in the evolution of global POPs policy.

2.3.2. The Substance List

A second aspect involves the process by which substances were chosen for global action. Though in practice this process was the least assessment-like of the cases examined, it occurred against a backdrop of significant scientific and expert assessments. Negotiations for a global POPs convention are focused on twelve chemicals: nine pesticides (including DDT, Chlordane, and Mirex), two byproducts (dioxins and furans), and a class of industrial chemicals (PCBs). This list was established by UNEP’s Governing Council in 1995, and has since remained unchanged (UNEP 1995).¹ According to the UNEP Governing Council decision, these twelve chemicals were chosen because they were currently the list under negotiation in the UNECE forum, under the LRTAP POPs protocol. The selection of substances for negotiation in the LRTAP process was preceded by a significant amount of scientific input, which ranked substances on the basis of their properties of persistence, bioaccumulation, toxicity, and liability to travel long distances. The LRTAP POPs protocol addresses the twelve UNEP chemicals, as well as four additional chemicals/chemical categories added in negotiations after 1995 (UNECE 1998b),² however, the UNEP list is a reasonable facsimile of the LRTAP list as it existed in 1995.³ This case is an aspect of the global POPs process where the products of a LRTAP assessment were used explicitly and without conscious modification, in a relatively early policy stage.

2.3.3. The Background Assessment

A third aspect is the background assessment process that established the scientific basis for taking global action on POPs. UNEP's 1995 Governing Council decision invited two international organizations, the Inter-Organization Programme for the Sound Management of Chemicals (IOMC) and the Intergovernmental Forum on Chemical Safety (IFCS), to conduct an assessment process on the twelve chemicals set out in this decision. At that time, the IFCS established an *ad hoc* working group on POPs, whose function was to provide information and make recommendations to UNEP on POPs. As input into this effort, a background assessment report was conducted on the twelve POPs by a consultant to the International Programme on Chemical Safety (IPCS) (Ritter et al. 1995). The UNEP Governing Council explicitly asked that the background assessment process take into account information available from, among other sources, the UNECE process, and much of the information included had first been collected under LRTAP. However, the information was reviewed and collected under global auspices. This process occurred before negotiations commenced in the global process.

2.3.4. The Criteria Expert Group

A fourth and final aspect is the Criteria Expert Group process, which was a subgroup operating within the POPs negotiations to develop criteria and a procedure for adding substances to the eventual POPs convention. The future global POPs convention, like the LRTAP POPs protocol, is designed to be a flexible instrument. That is, it is envisioned that additional chemicals might be added to the initial list, at some time after the instrument enters into force. In both of these agreements, the procedure for adding substances will be based on specified criteria, consisting of threshold values of persistence and bioaccumulation, combined with a risk characterization, that establish that this chemical is of global concern. Such criteria are set based on a combination of science-policy judgment (Rodan et al. 1999). The criteria and procedure for adding substances to the global POPs agreement were initially drafted by the Criteria Expert Group (CEG), a subgroup of the Intergovernmental Negotiating Committee (INC) for POPs. Though the idea of such criteria came out of the LRTAP process, and LRTAP's assessments in this area were quite prominent, the global process explicitly conducted its own complete process, claiming to start from ground zero. This process occurred during the negotiating stage of the global POPs process.

2.4. Analysis and Methodology

In examining these four aspects, the following analysis looks specifically at the degree of credibility, salience, and legitimacy gained by these various aspects of global assessment of POPs, and draw conclusions about what strategies have what effects on outcomes. The analysis is based on more than thirty in-depth interviews with participants in both the LRTAP and UNEP POPs assessment and negotiating processes. Many of these interviews were conducted at the 3rd and 4th Intergovernmental Negotiating Committee (INC) meetings.⁴ As well, additional evidence was gleaned from an extensive set of documents from both the LRTAP and UNEP assessment and negotiating processes.

3. THE LEGACIES OF LRTAP: OUTCOMES OF ASSESSMENT

The regional scientific assessments conducted for the LRTAP POPs protocol clearly had a significant impact on the global POPs assessment and negotiating process. From the framing of the POPs issue, to the selection of substances, assessment of the problem, and the discussions about criteria for selecting further POPs, LRTAP was a significant factor in discussions.

Different parties in the global POPs process view LRTAP and its significance quite differently, however. Its relevance more broadly is a matter of much debate. As a precedent for international agreement on these substances, the Århus protocol itself is tremendously influential. A senior representative of UNEP Chemicals said of its influence:

Probably the most important thing that LRTAP did is let us all know that it's possible to reach a successful outcome. And when you're not doing something for the very first time it's a bit reassuring to know...that indeed we ought to be able to get a good treaty at the end of this, because the UNECE did (Interview 9 1999).

Whereas LRTAP's influence at political level was as a precedent for agreement on these substances, its influence in the area of scientific assessment has been perhaps even more significant, and it is this aspect of LRTAP that will be examined here. Beyond analyzing the relative degrees of credibility, salience, and legitimacy resulting from the four case studies outlined in section 2, one might also ask the larger question – what value did the LRTAP assessment precedent have to those contemplating and negotiating global action? An official of the Intergovernmental Forum on Chemical Safety posed the question slightly differently in an interview, and wondered whether there would have been more demand for rigor and scientific credibility in the global POPs assessment process if there had been no LRTAP precedent (Interview 23 2000). The official did not have an answer to this question. But it is clear that aspects of LRTAP had some impact on the credibility, salience, and legitimacy of global assessment processes; these influences will be explored in more detail below.

3.1. Impacts of LRTAP on the Global Process

Upon characterizing the impacts of LRTAP assessment across the four case studies examined, three conclusions emerge about its influence.

First, the existence of LRTAP, and its assessment process in particular, jumpstarted and accelerated the global assessment and negotiating process. In early policy stages of the global process, assessments with heavy LRTAP influence were able to evade potential pitfalls, particularly those of credibility and legitimacy. In fact, the results of LRTAP assessment in the early stages of global POPs policy gained quite high degrees of acceptance among non-LRTAP country parties.

Second, while one might expect that the main problem a regional assessment might face in a global process would be gaining legitimacy, the results of these cases show that skillful strategies were able to avoid legitimacy problems in globalizing LRTAP's assessment. Though non-LRTAP parties did raise questions about the legitimacy of certain aspects of LRTAP's application to the global process, these were eventually addressed through various strategies within the global assessment process. Legitimacy was significantly more likely than credibility to pose concerns for assessors and negotiators.

Third, whereas legitimacy did not turn out to be a lasting problem, salience issues were more pervasive. LRTAP's assessments, and their direct progeny in the global process, had difficulty achieving salience among all parties, and various strategies for application of regional assessment had little if any impact in mitigating these concerns.

3.1.1. Accelerating the Agreement

Likely the most significant impact of LRTAP's assessment process in the global POPs was its role in accelerating the progress of a global agreement. A substantive amount of previous scientific assessment work under the LRTAP agreement formed a strong basis for action on a global level; because these conclusions achieved a degree of credibility and legitimacy among global parties, the core scientific data forming the basis for negotiations was largely not controversial in the global POPs process. Therefore, assessment-based conclusions that one might expect would be areas of significant controversy in a global assessment process (for example, the selection of substances) proceeded rapidly and without controversy in the global POPs negotiations.

The influence of LRTAP stretches all the way back to the very beginnings of global interest in the POPs issue: if LRTAP had not addressed POPs, it is quite likely that the issue would not have been on the global agenda for a long time. The impetus for an international agreement on persistent organic chemicals came initially in the late 1980s from northern countries, particularly Canada, which found that levels of substances banned and restricted domestically were nevertheless accumulating in northern biota, threatening wildlife and indigenous populations of the Arctic. One of the peculiar properties of POPs substances is their propensity to accumulate preferentially at higher latitudes; because they are semi-volatile, they volatilize in warmer climates, condense in colder ones, and travel poleward in a cycle of volatilization and condensation termed the "grasshopper effect" (Wania and Mackay 1996). In the late 1980s, the Canadians brought this emerging scientific evidence to the attention of several different international organizations they thought might be interested in international controls, but at the time, there was little interest in such action. A Canadian delegate involved in the early scientific assessment work on POPs said of their effort:

At that time we couldn't get anybody interested. We couldn't get UNEP interested; we couldn't get WHO interested. The only organization that showed any hint of an interest was the LRTAP convention, and so between then and 1994 we put all of our energy into LRTAP. And that was in the form of providing scientific documentation, a convincing case that POPs from distant sources were a problem for health and safety in other places (Interview 11 1999).

It was only after LRTAP's scientific work had progressed, and resulted in a state-of-knowledge report and a decision to negotiate a protocol, that global organizations began to show some interest in the POPs issue. The State of Knowledge Report, the result of four years of assessment work under a LRTAP POPs Task Force, was finalized in 1994 (UNECE 1994). In May of 1995, the global POPs assessment process was initiated at UNEP's Governing Council meeting (UNEP 1995). In October of the same year, the Conference to Adopt a Global Programme of Action for the Protection of the Marine Environment from Land-Based Activities, held in Washington, adopted a declaration recommending implementation of UNEP's Governing Council decision, and recommended the development of a global legally-binding instrument to control POPs. After IFCS assessment activities in 1996, UNEP's Governing Council adopted another decision, giving a mandate to begin negotiations on the twelve selected POPs (UNEP 1997a).

Not only were POPs on the global agenda primarily as a result of LRTAP, but the dominant framing of the problem – as a problem of persistent organic pollutants, as opposed to, for example, a problem of chemicals, or of pesticides – was constructed by the influence of LRTAP’s assessment process. The category of POPs *per se* is a fairly unique one. Though a number of efforts have looked at persistent, bioaccumulative, toxic chemicals (e.g. the U.S. Environmental Protection Agency’s Persistent Bioaccumulative Toxics (PBT) initiative), and several international agreements addressed specific POP chemicals and contamination problems (e.g. the Helsinki Commission (HELCOM) and the Paris Commission (PARCOM)), the category of POPs and its moniker “stuck” in international circles as a result of LRTAP.⁵ The term POP is one that is simultaneously resident in science and policy worlds; as such, it might be looked at as a sort of “boundary object” around which these negotiations have coalesced. While policymakers point to “scientific” definitions of criteria as defining POPs, scientists are more likely to view the category as a convenient policy construct around a class of particularly dangerous chemicals. In negotiating a global agreement on these substances, therefore, the category of POPs was a convenient one that served to bound the scope of the possible agreement, and the existence of LRTAP as a POPs agreement helped this decision to be made without a substantive amount of controversy. At the time of the governing council, there was a proposal for a framework convention on chemicals put forward by the Nordic countries; this proposal was opposed by the United States, among others, who thought the scope would be too broad (Interview 16 1999). The existence of the POP framing under LRTAP, which had been agreed to by both the United States and the European Union, allowed the framing of the global agreement to coalesce around something that had already been agreed to on a regional basis. In addition, the framing of the POPs problem as an issue of long-range transport of toxic substances carries through to the present as the dominant sort of description of POPs hazards. In contrast, the POPs problem could have been framed as an issue of existing stockpiles of obsolete chemicals; of the need for technical assistance in chemicals management activities; or of local problems from chemicals in international trade. While most official statements and communications emphasize the long-range risks of POPs, this is certainly not the only framing of the issue held by parties; this will be explored further in section 4.

The existence of substantive scientific assessments of POPs under LRTAP also allowed the early assessment work, and the selection of substances for agreement, to proceed with surprisingly little controversy. The most telling of these examples involves selection of the twelve chemicals for negotiation. One might expect that the selection of substances for negotiation would be the most controversial aspects of the entire POPs process. The selection of substances for action under the LRTAP protocol was a significant area of disagreement, and the list was not finalized until the final days of negotiations. In the LRTAP protocol, such debates involved in particular the substances lindane and short-chain chlorinated paraffins, and especially the wood preservative pentachlorophenol. Discussions about whether pentachlorophenol would be included in the protocol were highly polarized, and scientific assessment of the substance’s properties was the focus of much of the discussions (Eckley 1999).⁶ In the global process, in contrast, the selection of substances was the least controversial aspect of early POPs assessment. According to several negotiators involved in the process, the UNECE substance list was passed around at a UNEP Governing Council meeting, where it was circulated and agreed to fairly rapidly at ministerial level, with little if any domestic deliberation by countries not involved in the UNECE negotiations. Part of this was likely due to the culture of UNEP Governing Council meetings as ministerial-level conferences, an environment that one person familiar with the process referred to as similar to a “gigantic international game of Telephone.”⁷ As well, the fact that the US and the EU had

already agreed to the list in the context of LRTAP certainly worked in favor of its adoption. To what extent this was due to LRTAP's political influence, versus its scientific assessment tradition, it is unclear. These chemicals were well-known substances, banned or severely restricted in most countries, so agreeing to the list was relatively easy for most. For this reason, it was likely more a political construct; however, it was a political construct with a good deal of scientific assessment behind it.

That scientific information on POPs had been collected and compiled for the LRTAP negotiations, however, clearly allowed the IFCS assessment process to proceed as rapidly as it did. The UNEP Governing Council decision explicitly directed the IFCS to "consolidate existing information available from IPCS, UN ECE and other relevant sources, on the chemistry and toxicology of the substances concerned" as well as to analyze information about transport, sources, risks and benefits, costs, and response strategies related to POPs (UNEP 1995). Though the IFCS ad hoc working group reviewed UN ECE information, it essentially conducted its own global assessment. However, because of the limited time frame authorized for this process – the entire assessment was to be conducted between the May 1995 and February 1997 UNEP Governing Council meetings, a total of 18 months – the work was not a peer-reviewed, scientific research endeavor, but a brief review consisting of a consultant's report and an expert meeting (IFCS Ritter et al. 1995; 1996b). This was a stark contrast to the type of assessments usually conducted under the auspices of IPCS, which are exhaustively peer-reviewed. The core of information was quite similar to the type of information presented in the LRTAP process, including toxicological information and chemical and physical properties.

The truncated nature of the POPs assessment process did run into some problems of credibility – not every delegate considered the outcome of this process scientifically sound. One delegate not involved in the LRTAP negotiations said of the consultancy report (the "Ritter report"), "If you look closely at the detail of that, it I believe was somewhat selective in some of the studies that it chose to use. It wasn't peer reviewed, and yet it [was] presented as being the definitive study.... So we had some concerns about that aspect of it" (Interview 5 1999). However, these concerns were not significant enough to stall the progress of global POPs negotiations. Though there may have been disagreement on some of the specifics of the assessment, it was generally agreed that these twelve substances were problematic, and that global action should be taken; therefore, these concerns about credibility were not very high-profile.

The influence of LRTAP's assessment precedent as an accelerating factor in the global process was most evident in the deliberations of the Criteria Expert Group. By most accounts, the CEG was a very effective forum for discussions. Set up by the INC at its first meeting in June of 1998, the CEG held two sessions: the first in Bangkok from 26-30 October 1998, and the second in Vienna from 14-18 June 1999 (UNEP 1999). Though it had been anticipated that the CEG would need to meet three times, it was able to complete its work in only two sessions – an extremely rare occurrence in international negotiations.

The result of the CEG's deliberations was a set of criteria for selecting POPs that looked very much like the LRTAP values. Both processes set a threshold of a bioaccumulation/bioconcentration factor (BAF/BCF) of 5000; an octanol-water partition coefficient (log Kow) of 5; a 2-day persistence in air; and 6-month persistence in soil and sediment (UNECE 1998a; UNEP 1999).⁸ Table 2 illustrates the criteria under the UNEP and LRTAP discussions. That the UNEP process came out with the LRTAP criteria was certainly not predestined by any clear scientific mandate; no clear scientific thresholds exist that separate POPs from non-POPs (Rodan et al. 1999). Why the similarity? The global process was conducted ostensibly as an independent exercise. However, according to participants, the LRTAP

precedent played a large role, and provided an impetus for agreement, particularly between the US and the EU.

Part of the reason why LRTAP's values were accepted by a broad range of parties might have been that they were considered to be reasonable values. A U.S. delegate described the process in this way: "I guess you could say from a purist perspective that it independently got to the same place, but I think that the LRTAP criteria were seen by a lot of the parties as being in the ballpark of where you're likely to end up" (Interview 2 1999). A similar comment on the reasonability of the LRTAP values was made by a delegate from the EU: "Everybody was aware of the results of LRTAP because this LRTAP information was part of the basic information given to the participants for the first meeting, and it was just a question of debate between the experts, which resulted in that nobody really had good arguments to deviate from that" (Interview 7 1999).

Another impact of LRTAP assessment and negotiation that accelerated the CEG process was the existence of previous assessment and agreement between the US and the EU. One US delegate spoke particularly about this:

The two squabbling...northern hemisphere large economic units didn't squabble as much as they would have. Especially at the first CEG.... Because there was an agreement to work on amongst certain countries, and there was also a history amongst those people in the negotiation of having gone through the squabbles. (Interview 1 1999).

The CEG meeting, by most accounts, was particularly harmonious, especially at its first session. Though there were questions and concerns raised by the strong influence of LRTAP, which will be further explored in the next section, it was clear that LRTAP's influence was strong. On the matter of criteria, another U.S. delegate said of the areas of agreement and disagreement, "There's been a broad acceptance of the LRTAP model for UNEP....We're basically haggling over a couple of threshold criteria but not over the basic approach, which is a flexible, parameter-based screening process" (Interview 3 1999). He indicated of this acceptance, "I was very surprised; I didn't expect LRTAP to be picked up necessarily in UNEP as easily as it was."

Across the four case studies examined – the framing of the POPs problem, the establishment of the substance list, the background assessment, and the Criteria Expert Group – the existence of LRTAP and its assessments served to accelerate the pace of global negotiations. Part of this was due to the political-level conclusions of a regional agreement, but particularly in the early assessments in the global process, a large part was due to the substantive assessments conducted as part of LRTAP's negotiations. As a strong assessment-based precedent for global negotiations, the results of the LRTAP agreement remained largely unchallenged by a larger set of participants; LRTAP's assessment-fueled conclusions made it through the global process with at least its scientific credibility, and salience to the direct negotiating tasks, relatively intact. The influence of the US and the EU, and the existence of agreement between these two strong negotiating powers, also contributed to the acceleration of the process. A representative of the LRTAP Convention noted that the global process "likely would have taken much more time had they tried to start from scratch" (Interview 26 2000). One LRTAP country delegate summed up the influence of LRTAP in his assessment of his experience of the global negotiations:

I'd hate to do this without LRTAP. I think LRTAP served a very valuable purpose, interestingly....Would we have a better agreement if we didn't have LRTAP as a model? I doubt it. Where would we be now? Far behind where we are (Interview 3 1999).

3.1.2. Sidestepping Concerns about Legitimacy

One might expect that the greatest pitfall a regional assessment might face when actors attempt to apply it in a global process would be lack of legitimacy. By definition, the idea of globalizing a regional assessment means that many parties who did not, and could not, participate in conducting the assessment, are to become potential users of the assessment. As one might predict, legitimacy concerns were raised when LRTAP parties attempted to use LRTAP assessments in the global POPs assessment and negotiating processes. However, a few interesting findings emerge from this case that complicate the simple hypothesis that there is a somewhat direct relationship between participation and legitimacy. For example, while global parties questioned the legitimacy of LRTAP's assessment in the global process, the degree to which this actually stalled negotiations was highly dependent on the strategies employed by LRTAP parties for applying LRTAP's experience in the global forum. As well, regional assessment was much more likely to be seen as legitimate in earlier policy stages, such as agenda-setting and problem-framing, and more likely to be questioned on the basis of legitimacy in later negotiating phases.

LRTAP parties, who sought to bring LRTAP's POPs assessments to the global negotiators, became sensitized to legitimacy issues very early in the process. Several delegates from LRTAP countries in the UNEP process mentioned specifically the concern that LRTAP's assessment and results might not be seen as legitimate in the global process. A U.S. delegate said of this concern:

We and the EU were pretty careful not to be seen to be pushing LRTAP as the answer. I think it did serve as a good framework, and it was brought into the discussion as a regional agreement which was in place and did have relevance to this, but I don't think anybody went in carrying the view that that fact would cause it to give them automatic acceptance (Interview 2 1999).

Another LRTAP country delegate at the 3rd Intergovernmental Negotiating Committee said of this sensitivity in the negotiations themselves:

Virtually any country which was involved in the LRTAP negotiations, if it wants to propose a piece of text, will never say "well, this is how we did it in the LRTAP protocol." It'll instead say, "well, maybe you might want to consider, this is a way of doing it," and it'll be the way we did it in LRTAP (Interview 11 1999).

This political sensitivity, throughout the global POPs process, has affected the way LRTAP's assessment has been viewed by parties who weren't involved in LRTAP. It is possible through looking at various aspects of the global assessment process, however, to tease out systematic differences in the degree to which LRTAP's assessment encountered pitfalls of legitimacy.

The most surprising finding that emerges from the case studies examined is that the list of substances – a clearly identified product of the LRTAP context – was not subject to controversy on the basis of legitimacy. The impacts of this lack of controversy on accelerating the global POPs agreement were examined in the previous section. However, the finding that this product of what was then an ongoing LRTAP assessment process avoided legitimacy concerns in a global process is unexpected. It seemed that no party questioned the initial list of substances in the context of the UNEP Governing Council, and after the UNEP mandate to assess these substances, the list was not modified.

There are several reasons why this list was seen as legitimate in global context. Representatives familiar with the process offered several explanations. One hypothesis is that the weight-of-evidence assessment of the substances was so compelling that the countries were convinced of the need to address them. However, the controversy that the emergence of a list in the LRTAP process, where a ranking scheme and numerous assessments were done to develop a report, and where the substance list was an area of much negotiation, seems to indicate that the weight-of-evidence was not so straightforward and unproblematic.

A representative of UNEP posited that the list might have been agreed to easily because countries wanted an agreement more than they wanted to argue about what chemicals were included. The degree to which countries have haggled over other, less significant details of phase-outs and restrictions on substances, however, question the idea that countries would give up such a significant decision.

The most convincing determinant was likely that the substances were agreed to on a political level first, and that this mandate was considered authoritative throughout the process. One reason why these chemicals were relatively easy to accept politically was that they had already been banned or severely restricted by the majority of nations involved. Whatever the particular reason the list made it through the UNEP Governing Council, once it had the imprimatur of this ministerial-level conference, the list gained legitimacy because a highly representative international forum had officially approved it. It would have been difficult, for example, for a country delegate in the UNEP POPs process to question the UNEP mandate, given that its minister had officially agreed to the mandate in 1995.

The advantage of having assessments reviewed by a representative, international forum showed in the background assessment of POPs as well, but in a slightly different way. The substance list was an example of a situation where a regional assessment was reviewed by a global forum and earned a global stamp of approval. The background assessment was constructed ostensibly from scratch in the global process, but many of its participants brought their experience from the LRTAP process, and LRTAP's assessment was utilized in constructing this assessment.

The area where legitimacy concerns were raised most prominently, however, was the Criteria Expert Group process. In its mandate, the Criteria Expert Group was tasked with considering the criteria and procedure for adding substances to the POPs convention, and it considered the UNECE procedure in its deliberations. The IFCS Ad Hoc Working Group on POPs had recommended in its report the establishment of an expert group to develop science-based criteria and a procedure for identifying POPs in addition to the 12. The IFCS recommendation explicitly stated that the expert group should consider the criteria and procedure being considered by the UN-ECE (IFCS 1996a).

LRTAP's criteria, the result of much assessment and negotiation in the UN-ECE forum, were greeted with much controversy from the very start of the CEG discussions. One LRTAP country delegate said, in describing the first CEG, "Several times when people would raise LRTAP, eyes would roll, amongst other delegates from developing countries.... The LRTAP protocol was shown, and somewhat rejected by certain people, saying 'where do I sign' in a very sarcastic tone" (Interview 1 1999).

There was a great deal of sensitivity among LRTAP parties, however, in their citation of LRTAP's results. The way in which LRTAP information was considered in the global process indicates that delegates from LRTAP countries were paying particular attention to concerns about legitimacy in the

CEG process. One LRTAP country delegate's view of how LRTAP was used in the CEG process was the following:

The LRTAP as such didn't play as a term of art, if you will, in the discussions. LRTAP would come up occasionally and the point would be made that this value was consistent with that which had been developed in LRTAP, but people were very careful not to be seen as advancing the view that merely because it was in LRTAP the case was closed. We recognized that this is a separate forum that we're operating in, that many of the parties to this negotiation weren't parties to LRTAP, and that you would otherwise have to convince them of the merits of the case for a given criterion value (Interview 2 1999).

Another LRTAP country delegate spoke of the hesitancy of LRTAP countries to put forward LRTAP's assessments, saying, "In the first meeting, when we started to discuss [the criteria] LRTAP people didn't dare to put forward this criteria, and other people didn't speak. So nobody would speak, because everybody was afraid to put forward the northern hemisphere data" (Interview 7 1999).

Despite this sensitivity, LRTAP's results were well-known among delegates to the CEG. The LRTAP Executive Body decision establishing criteria for substance selection was translated and distributed to global participants.⁹ In some cases, parties proposed LRTAP values without referring specifically to LRTAP. One example of such a proposal was a conference room paper (CRP) circulated by France at the first CEG. In its CRP, France proposed the LRTAP half-lives in air, water, soil, and sediment for selection criteria, but did not distinguish them as LRTAP's values (UNEP 1998a). A German proposal at the first CEG identified the UNECE POPs protocol as an "important starting point for the discussion of criteria," but proposed slightly modified criteria for the global agreement (UNEP 1998b) Once the LRTAP values were on the table, however, discussion coalesced around this precedent, and the numerical criteria values eventually agreed in the CEG to were quite similar to the LRTAP values. A LRTAP country delegate said that once the LRTAP criteria were on the table, "in the end then on the level of a contact group [LRTAP's criteria] was actually the basis for discussion, and...it was not challenged" (Interview 7 1999).

How did the CEG ultimately end up at the LRTAP values? Put another way, what allowed the LRTAP values to avoid what might have been a serious controversy over their legitimacy? There were two significant factors: the perceived "rationality" of the LRTAP values on a scientific and political basis, and the strategy of emphasizing the global nature of the process over the LRTAP precedent.

Several delegates from LRTAP countries proposed that the LRTAP values were accepted because they were considered "rational" – that is, the selection of these criteria resulted in a sensible policy outcome regarding which chemicals were included or not. One delegate from a LRTAP country credited this to the "scientific" nature of the LRTAP process, saying, "I think that many of the other parties... seemed to be of the view that the LRTAP process had a pretty fair scientific component behind it, and that the LRTAP values were not...the result of a political process, that [they] in fact had a scientific foundation" (Interview 2 1999). Another said of the perception of the LRTAP process by other countries, "The countries that weren't part of LRTAP looked at it and seemed to think, oh yeah, this is the way it ought to be done. Now is that science? Probably not. I mean, it's policy. But...it's based on certain scientific assumptions" (Interview 3 1999). Though the idea that the LRTAP results were considered particularly credible is not one that comes out strongly from statements by non-LRTAP country delegates, the LRTAP criteria did serve to isolate those chemicals that were widely agreed to be global problems. A

representative of UNEP Chemicals said of the process, “I think a lot of experts looked at a set of relatively well-studied chemicals to see...if you used such and such a criteria for persistence, and such and such a criteria for bioaccumulation, what’s in and what’s out...on that sort of basis, you get a good sense of whether you’re catching the right chemicals or not” (Interview 9 1999). Figure 2 (reproduced from Rodan et al. 1999) shows an example of this sort of analysis, a visual representation of where certain chemicals of international concern fall with regard to bioaccumulation and persistence criteria. The chemicals that exceed the threshold levels are in the top right corner of the figure; the threshold values proposed separate these chemicals generally considered of global concern from a zone of increasingly dense clustering of chemicals below the threshold values. From this figure, it is clear that if these values are lowered, many more chemicals would perhaps be subject to global action. Since it was generally accepted that the UNEP 12 POPs were of global concern, it is plausible that countries would see values that separated these chemicals from other organic chemicals of less concern to be rational or reasonable.

The strategy employed by LRTAP parties of de-emphasizing the LRTAP connection of their proposals emerged as one that substantially elevated the legitimacy of the assessments they cited. Though the eventual criteria ended up very similar to the LRTAP values, the global nature of the exercise seemed to allow delegates to accept this, because the process was ostensibly a fair one. An Australian delegate said of this concept, “[We] were aware of LRTAP but consciously put it aside because we weren’t part of the process. We didn’t want it actually affecting us. When [LRTAP and global] naturally coaligned, the various elements of...what we were doing, that was fine, it was supported” (Interview 5 1999). Thus, lack of participation, in his view, was a crucial element that meant that LRTAP’s result was not legitimate to his country: they didn’t want LRTAP actually affecting them. He explained LRTAP’s effects on the process in more detail by allowing:

Maybe other parties and countries because they’d been involved in [LRTAP] brought that with them, and that’s natural, and that’s understandable, and that might have been in some ways valuable to the process. As long as you’ve got enough other people questioning that process you develop a rigor in there (Interview 5 1999).

More broadly, in the globalization of LRTAP assessment in the UNEP POPs process, avoiding problems of legitimacy became a matter of ensuring that the strategies for the application of LRTAP’s assessment had enough questioning to develop sufficient rigor. At the early stages of negotiation, in the selection of chemicals, a review and approval by a global, political body was sufficiently rigorous for a LRTAP assessment product to be copied into the global forum. The background assessment, though fueled by LRTAP’s assessment and science, needed a global review and reassessment. The CEG process ostensibly started from scratch, but was steered by LRTAP countries who were particularly sensitive about where and how they cited LRTAP’s conclusions.

A few major conclusions about legitimacy emerge from these case studies. Issues of legitimacy seemed to be more prominent when the regional assessment was globalized at later stages of the global policy process. Through strategies such as global review and de-emphasizing regional information, the regional assessment was able to minimize the risk that its legitimacy would be questioned; such strategies needed to be more explicit at later policy stages (e.g. in the CEG process). Given concerns that legitimacy would be the major problem, it appears that global negotiators learned a toolbox of strategies to deal with this problem successfully, such that it had minimal impact on the progress of negotiations. It was not necessary for the global process truly to conduct an assessment from ground zero; provided LRTAP was presented in the correct way, global delegates could learn from LRTAP while ensuring legitimacy.

3.1.3. Less Salience to Non-Participants

Whereas legitimacy emerges as less of a risk than one might at first anticipate in globalizing a regional assessment, it is lack of salience that seems a more pervasive problem. One non-LRTAP country delegate expressed a general concern of the lack of salience in globalizing regional precedents in speaking of the discussions of the Criteria Expert Group. The delegate said of a process that bases itself on a regional precedent:

If everyone comes in and says, “Oh, that thing that we developed over there was ideal, let’s just adopt it,” then you can sometimes make the wrong decision by simply adopting something that really at the end of the day isn’t quite what you want (Interview 5 1999).

The risk of lack of salience in an assessment process, where an assessment produced does not address the particular concerns of a user, and could be considered irrelevant, is that the ultimate decision based on such an assessment would not be quite what that user would want. In the global POPs process, LRTAP assessments addressed Northern hemisphere, largely developed country concerns; their assessments had difficulty gaining salience with developing countries, tropical countries, and countries from the Southern hemisphere. One LRTAP country delegate described the particular concerns in the early stages of the process:

The countries that had done the LRTAP assessment brought it to the global process. We very soon found, though, that we had to be extremely careful, because of an immediate reaction that there’s a problem with high levels in northern temperate boreal and arctic regions with POPs, and there isn’t a problem in developing countries or in the southern hemisphere, and that the North wants to basically have the rest adopt ... a protocol which has been designed in the North to meet northern needs. And that was a sensitivity that continues. (Interview 11 1999).

The sensitivity mentioned by this delegate is an indicator of a lack of salience of LRTAP’s assessment in the global forum. One prime example of LRTAP’s difficulty in gaining salience to a larger set of parties is in the framing of the POPs issue. LRTAP’s framing of the POPs issue is that POPs are on the global agenda because they pose global risks due to long-range transport, tend to accumulate in remote areas, and pose risks to human health and the environment there. On the other hand, many developing countries, for example, look at POPs problems on a more local level. POPs are significant local problems for many countries. A number of countries have significant stockpiles of obsolete POPs and/or contamination problems in local areas. Technical and financial assistance to deal with pesticides and chemicals is a priority for several countries. LRTAP’s assessments, which dealt with issues such as long-range transport, toxicology, and best techniques for reducing byproduct POPs, did not address what particularly developing country users needed out of an assessment.

This perspective can be seen from the statement of one delegate from a developing (non-LRTAP) country, who emphasized that salient information would be an output of, rather than an input into, the POPs convention:

I think when the convention is in place is when you’ll start to have more scientific effect that will be meaningful to the countries, rather than before the convention. So I believe the convention will trigger scientific effects that will trickle throughout the globe, rather than having scientific data that will be used for the convention. I think it will be the other way

around, where the convention in fact will cause information to flow. As you know, it's a very important part of the convention, the transfer of information, so it will force the developed world to provide more information (Interview 27 2000).

The sort of salient information that such countries are seeking is not the sort of information provided, for example, in the background assessment of POPs. Information on alternatives, management, and destruction that is useful to developing countries was not assessed in the LRTAP process.

As well, there continue to be significant gaps in understanding of POPs substances in tropical environments. Most of the scientific investigations of POPs characteristics have been undertaken in the north, and values such as persistence have been evaluated in temperate or arctic, but not tropical, environments. One LRTAP country delegate spoke in particular about the impact of this knowledge gap:

There is a major gap in the science, and that is that we do know and understand reasonably well how POPs behave in the northern hemisphere, or at least the northern temperate hemisphere and further north. We have very little information for the rest of the world. So whether or not POPs are a problem elsewhere really and truly we don't know....There is a lack of knowledge about significance in the south, or in tropical countries. And that is unfortunate in these negotiations, because we're not operating from a common information base (Interview 11 1999).

Asked if anything could have been done to alleviate this, the delegate replied, "Practically, no," but emphasized a proposal to integrate global monitoring and assessment work into the research and development section of the convention (UNEP 2000).

The type of assessment put forward in the CEG also may not have fulfilled the needs of a number of delegates. Some delegates questioned whether all of the "experts" who attended the CEG meeting were fully aware of the scientific background and terms of the issue. One delegate emphasized the gap in information and expertise between developed and developing countries in these forums; another proposed that it would be useful for several delegates if a conference paper could define the meaning of several commonly-used scientific terms like "log Kow" (Interview 14 1999; Interview 27 2000).

In contrast to the results about legitimacy, strategies for applying the regional assessment to the global process did not seem to have any impact on salience. Though a broad range of parties participated in global review of assessments such as the background assessment, and in the CEG process, it seemed that this sort of participation did not lead to the assessments' being salient to these parties.

If parties truly were not operating with a common information base, and if LRTAP assessments lacked salience to other parties in the global negotiation, then why was the negotiation able to proceed relatively harmoniously through the initial assessment and negotiation phase? Clearly, something convinced delegates from non-LRTAP countries that they should be at the negotiating table. Was this purely a political decision, or did scientific assessments play a role? Section 4 will examine the issue of salience in more detail, posing these and other questions about assessment salience in the global POPs negotiations.

3.2. Summary of Lessons Learned

A summary of the conclusions of the role of LRTAP assessment, and its relative degree of credibility, legitimacy, and salience in these four case studies, indicate that LRTAP's regional precedent played a critical role in the global POPs process. LRTAP's assessments were widely credible, and issues of legitimacy could be avoided by the skillful application of regional assessment in a global forum, with increasing sensitivity at later policy stages. LRTAP had more difficulty gaining salience to a broad range of parties.

4. PATHWAYS TO SALIENCE

One of the more interesting findings of section 3 was that salience, not legitimacy, was the more pervasive problem facing LRTAP's regional assessments in the global negotiations. It became clear as the negotiations progressed that LRTAP's assessments did not have a very high degree of salience among non-LRTAP countries, particularly among developing countries.

This scenario raises important questions about salience in the global POPs process. If LRTAP's assessments were accelerating the process, yet they were not gaining salience among all parties, why did this lack of salience not stall the negotiations? Put another way, if LRTAP's assessment wasn't relevant to developing countries, why were they participating in the negotiations at all? This section will ask the question of what it was that convinced non-LRTAP parties, particularly developing countries, to negotiate a convention on POPs. Were there salient assessments that were employed in their decision-making on POPs? It will analyze other assessments that gained salience to non-LRTAP parties, and their impact on the POPs assessment and negotiating process. It will explore the question of whether LRTAP's assessment truly needed to gain salience, or whether alternative pathways to salience through separate assessments were sufficient. It will also raise questions about the possible long-term impacts of the lack of a common information base in the eventual POPs regime.

4.1. Salient Assessments in Global POPs

Asked what convinced them that POPs were a problem, and that their countries should be involved in global POPs negotiations, delegates from developing countries did indeed cite scientific evidence as a key factor in their decision-making. However, they were unlikely to cite the assessments of LRTAP countries or the global assessments that grew out of LRTAP. National and regional assessments, in which they had participated substantively, were much more likely to be salient to these parties.

As part of the preparation and assessment in advance of the POPs negotiations, UNEP held a series of subregional workshops on POPs during 1997-1998. These workshops involved national decisionmakers who presented case studies on POPs problems in their countries, as well as experts from international organizations and countries beyond the region. Eight of these meetings were held in different regions: locations included Bangkok, Buenos Aires, St. Petersburg, and Bamako. This series of meetings functioned as an alternative regionally-based assessment process for POPs. The holding of these meetings prompted many countries to assess the status of POPs in their domestic regulatory authorities, and collect their own scientific information and assessments about the substances. The proceedings of these meetings were published as information documents for POPs delegates (e.g. UNEP 1997b). The

meetings also provided a forum in which chemicals regulators could meet their counterparts from other countries, with whom they would be negotiating the POPs treaty.

One advantage of the sub-regional workshops was that they allowed delegates to become familiar with locally- and regionally-produced assessments of POPs; it was local and regional assessments which delegates most often cited as convincing them that they should negotiate a global instrument to address them. Asked which scientific assessments he found particularly useful in negotiations, a delegate from Thailand spoke of long-term monitoring of POPs done on a national basis, which showed contamination in breast milk and linkages to species extinction (Interview 28 2000). A delegate from India noted in an interview that he felt the information given to delegates was adequate, but that what information was not available internationally was supplied domestically (Interview 14 1999). A delegate from southern Africa referred to consultation workshops held by the SADC countries, with invited experts from UNEP and the U.S. EPA, as particularly useful technical information (Interview 29 2000).

In addressing POPs, delegates from developing countries looked towards practical information on local problems that might help enable better chemicals regulation. Though the globally-produced information was credible, and many delegates mentioned that there was significant science that said that POPs were a problem, its utility to these countries was not as great as regional assessments in which they were active participants.

4.2. Participation, Legitimacy, and Salience

The linkage between active participation and salience is one that might have broader resonance with scholars and practitioners of assessment. These examples of regional assessments in a global process show that there is a distinction between character of participation and the degree of salience and/or legitimacy. Briefly, it seems that the threshold for the degree of substantive participation is lower for providing legitimacy, and higher for ensuring salience. That is, while mere representation in an international forum might suffice for an assessment produced under it to be considered legitimate, salience requires a significant engagement in the details.

These findings about linkages between participation, and the relative degrees of legitimacy and salience gained by an assessment, are very much related to the conclusions of VanDeveer (1998), who looked at the participation of Central and East European (CEE) countries in the LRTAP Convention as a whole. He found that CEE countries had a significantly lower level of participation in LRTAP assessment than did western European countries, and emphasized the role of assessment in LRTAP as participation in a communication process indicating the direction of future European policies to states on the European periphery. VanDeveer's conclusions about how CEE countries use LRTAP assessments are similar to the ways in which developing countries use international POPs assessment, and the "renationalization" of assessment products that he mentions occurred in CEE countries after LRTAP protocols parallels with the existence of concurrent regional assessments in the global POPs negotiations.

One of the critical distinctions about salience, in contrast to legitimacy and credibility, is that it is defined with reference to a party's needs and expectations of an assessment. An assessment that does not fulfill the particular needs of a user could gain legitimacy and credibility, but would suffer for lack of salience. For this reason, it makes sense that substantive participation would link directly to increases in salience,

since the more substantively a party is involved in the creation of an assessment, the more likely it is that the assessment will at least address the questions of their concern.

4.3. Multiple Pathways to Salience?

For countries involved in global negotiations on POPs, there is quite a diversity of salient assessments. Salient assessment information in the POPs negotiations comes not from one globally-produced assessment intended to be useful and relevant to all parties, but from a patchwork of regional, sub-regional, and national efforts providing information on very different sorts of concerns. Because of the existence of these alternative regional and local assessments, the lack of salience of LRTAP-influenced assessment was not a problem in the negotiating process. Despite its lack of salience to all parties, LRTAP's assessment and its direct progeny in the global process were able to accelerate the agreement based on their credibility, and, through certain strategies for their use, their legitimacy. However, if there were no salient assessments that existed for these parties to use, perhaps the globally produced assessments' paths would not have been so smooth.

The existence of multiple pathways to saliency becomes an interesting model for the design of assessment processes. The results of this investigation seem to suggest that it would be extraordinarily difficult for a regional assessment to gain salience to users outside the region conducting it. Such gaps in salience, however, might be made up for by the existence of alternate regional assessments. What occurred in the LRTAP case was that a dominant regional assessment provided the framing and accelerated the process, and other regionally-based assessments provided information that was lacking in the dominant assessment. This model of assessment, a combination of dominant and supplementary assessments, clearly made the POPs process a more efficient one. In contrast, the process might have tried to produce one assessment that provided a common base of credible, legitimate, *and* salient information to policymakers from all parties. Both models have their advantages and drawbacks. Whereas the "patchwork"-type model can be more efficient, it could perhaps suffer in the long run because parties do not have a common information base. In the POPs case, the lack of a common assessment-based framing of the issue has resulted in different parties seeing the convention as fulfilling different goals. Northern countries, for example, see the convention as addressing long-range contamination problems; some southern countries see the convention as a vehicle for helping them implement national chemicals management programs to deal with local problems. The actions proposed by the convention thus far – bans and restrictions on particular substances that are of concern both locally and internationally – allow these frames to exist simultaneously. For this reason, the lack of a common framing has not caused problems in the negotiations thus far. However, one might imagine this becoming an issue, for instance, in later scientific assessment of substances proposed for inclusion. Whereas a southern country might propose a chemical which poses particular local problems, and provide information salient to that decision, a northern country would likely find such a proposal would not fit within the scope of the convention. The single-assessment model, if successful, would provide a common information base, but runs the risk of significantly delaying if not derailing the process due to the difficulty of conducting and coming to agreement on such an assessment. Though the analysis of LRTAP's influence in the global POPs assessment process does not result in a recommendation about which sort of assessment model might be more effective, it does serve to identify some of the advantages and pitfalls of the "patchwork" approach.

5. CONCLUSIONS AND LESSONS FOR DESIGN

The cases examined above can provide some insight into how different uses of regional assessment in global processes can impact the credibility, legitimacy, and salience of the global process. Several general conclusions emerge from the analyses presented above, about the prospects for using regional assessments in global forums:

- **The existence of regional assessments can greatly facilitate agenda-setting, assessment, and decision-making processes.** In early policy stages, with the buy-on of key countries, the LRTAP experience shows that regional assessment precedents can be a strong agenda-setting, framing influence. They can push the global process forward more rapidly, and help evade politically costly assessment controversies.
- **Through strategies for using regional information in a global context, concerns of legitimacy might be addressed.** Legitimacy is more likely to be a problem in later policy stages. In order to address legitimacy concerns, parties might take a variety of steps to ensure that assessments are reviewed and/or redone by more fully representative global institutions. However, it is unnecessary for global institutions truly to ignore a regional precedent; even in later policy stages, a façade of global review can sometimes suffice to ensure legitimacy.
- **The biggest problem facing regional assessments in a global context is not legitimacy, but salience.** An early, regionally-based framing of a problem might not have salience to all parties. By using a regional assessment as a basis, the opportunity to address the concerns of a wide range of global parties could be lost. Though the participation of all parties does not need to be particularly substantive in order to ensure legitimacy, this sort of participation is often not enough to ensure salience. For an assessment to be salient, substantive participation is often necessary.

For assessors and policy makers who might consider conducting a regional assessment in order to influence global priorities, or consider globalizing an existing regional assessment, this work produces a few candidate hypotheses that might inform such decisions:

- Doing regional assessments, and negotiating regional agreements, among powerful countries, can be an efficient way to propel an issue onto a global agenda, often with a particular framing.
- Utilizing regional precedents for global assessments can be a significant benefit in facilitating global action if:
 - Achieving relatively quick agreement on initial global actions is a priority
 - Alternative issue frames can exist simultaneously, without compromising agreement on concrete measures (i.e. agreeing to the contemplated policy options does not require buying on to the framing of the issue as envisioned by the regional assessment)
 - Strategies are applied to ensure the regional assessment's legitimacy, such as review by a representative global institution, or securing initial agreement at ministerial level

Beyond identifying the advantages and pitfalls of certain strategies for using regional assessment in a global context, this case also provides a model of assessment design for addressing the competing demands of making efficient use of existing precedents while addressing concerns of lack of salience. This “patchwork” model of multiple salient assessments, occurring in parallel with a dominant regional assessment serving to accelerate basic scientific consensus and to set a legitimate scientific basis for

future work, could potentially be a useful blueprint for future assessment efforts. In making most effective use regional assessments in global assessment and negotiating processes, the LRTAP case shows that policymakers should pay particular attention to their strategies for ensuring legitimacy, as well as provide alternative opportunities for gaining salience.

The tradeoff between the “patchwork” model – with its risks to a common information base, and the “comprehensive” model, with its accompanying difficulties in constructing any assessment at all, is a difficult one. Must efficiency always come at the expense of salience? The model of distributed assessment systems proposed by Cash (2000) may in fact prove to be a third way, in constructing an integrated decision-support network that extends across multi-scale interactions. At present, however, a growing number of regional assessments and actions indicates that globalizing regional precedents may become a significant strategy in making global environmental policy.

On the whole, is attempting to globalize a regional assessment more effective than attempting to conduct one assessment that is credible, legitimate, and salient to all parties? This remains an open question. It will certainly depend much on the particular concerns of the issue at hand. However, the general tradeoffs of the former approach identified above might provide some insight to policymakers designing future assessment processes.

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TABLES

Table 1: POPs Timeline, 1989-present

Year	LRTAP	GLOBAL
1989	Executive Body charges experts to prepare discussion paper on POPs	
1990	Workshop on long range transport of POPs held in Sweden: POPs Task Force established	
1991	March: First meeting of POPs Task Force, Sweden	
1992	May: 2 nd POPs Task Force meeting, Canada	June: At Rio Conference, Agenda 21 includes Chapter 19 on chemicals management
1993	May: 3 rd POPs Task Force meeting, Germany Dec.: Task Force substantiation report drafted, London	
1994	Feb.: 4 th POP Task Force meeting, Netherlands: substantiation report released June: POPs state of knowledge report finalized; Preliminary Working Group on POPs created	April: Intergovernmental Forum on Chemical Safety (IFCS) created, IFCS Forum I held
1995	Mar.: 1 st session, Preliminary Working Group on POPs July: 2 nd session, Preliminary Working Group on POPs Nov: Executive Body directs Working Group on Strategies to prepare draft protocol	May: UNEP Decision 18/32 initiates global POPs assessment process Oct./Nov.: Conference to Adopt a Global Programme of Action for the Protection of the Marine Environment from Land-Based Activities (Washington) adopts declaration recommending implementation of Decision 18/32 and development of a global legally-binding instrument to control POPs Dec: Draft global POPs assessment report ("Ritter Report") released

1996	<p>April: 3rd session, Preliminary Working Group on POPs, Geneva</p> <p>Oct: Negotiating text completed by Preliminary Working Group at 4th session, Canada</p> <p>Nov: Executive Body directs Working Group on Strategies to accelerate POPs negotiations due to global process</p>	<p>March: IFCS second intersessional group meeting; final version of "Ritter report" presented, IFCS Working Group on POPs established</p> <p>June: IFCS POPs experts meeting, Manila; IFCS ad hoc Working Group on POPs issues final report</p>
1997	<p>Jan: formal negotiations begin in Working Group on Strategies</p>	<p>Feb.: UNEP Governing Council Decision 19/13C on POPs gives a mandate for negotiations; IFCS Forum II held</p> <p>July: UNEP sub-regional POPs workshop, St. Petersburg</p> <p>Nov/Dec.: UNEP/IFCS sub-regional awareness-raising Workshops (2)</p>
1998	<p>June: Århus Conference, POPs protocol signed (Århus, Denmark)</p>	<p>Jan.-Mar.-Apr.-May-Jun.: UNEP/IFCS sub-regional awareness-raising Workshops (5)</p> <p>June/Jul: UNEP POPs 1st Intergovernmental Negotiating Committee (Montreal)</p> <p>Oct: UNEP POPs Criteria Expert Group, 1st session (Bangkok)</p>
1999		<p>Jan.: UNEP POPs 2nd Intergovernmental Negotiating Committee (Nairobi)</p> <p>June: UNEP POPs Criteria Expert Group, 2nd session (Vienna)</p> <p>Sept: UNEP POPs 3rd Intergovernmental Negotiating Committee (Geneva)</p>
2000		<p>Mar.: UNEP POPs 4th Intergovernmental Negotiating Committee (Bonn)</p> <p>Dec.: UNEP POPs 5th Intergovernmental Negotiating Committee (South Africa, anticipated)</p>
2001		<p>May: UNEP POPs Diplomatic Conference (Stockholm, Sweden; tentative)</p>

Table 2. Criteria for adding additional POPs under draft UNEP POPs Convention and LRTAP POPs protocol. Brackets indicate values still under negotiation (UNECE 1998a; UNEP 1999).

Criterion	LRTAP value	UNEP value
log Kow	≥5	≥ [4 or 5]
Bioaccumulation Factor	≥5000	≥5000
Persistence: half-lives		
Air	2 days	2 days
Water	2 months	[2 or 6] months
Soil	6 months	6 months
Sediment	6 months	6 months

FIGURES

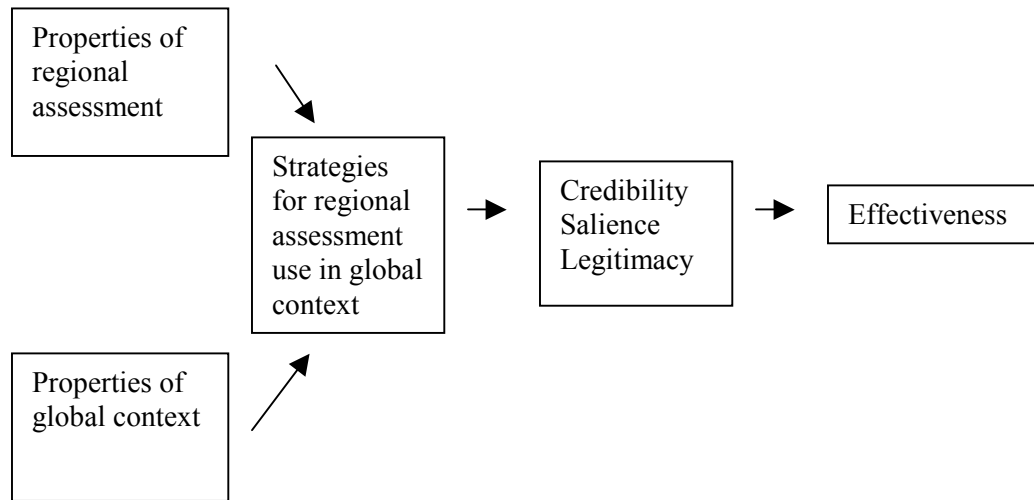


Figure 1. Conceptual model of influences on the effectiveness of regional assessments in a global context (based on Clark 1999)

ENDNOTES

¹ The twelve chemicals currently under negotiation are the pesticides Aldrin, Dieldrin, Endrin, Chlordane, Mirex, Toxaphene, Hexachlorobenzene, Heptachlor, and DDT; the industrial byproducts polychlorinated dibenzo-p-dioxins (PCDDs) and polychlorinated dibenzofurans (PCDFs); and the industrial chemicals polychlorinated biphenyls (PCBs).

² The additional chemicals addressed under the LRTAP POPs protocol are the pesticides Chlordecone and Hexachlorocyclohexane (HCH; including Lindane, the γ -isomer); the industrial chemical Hexabromobiphenyl, and the byproducts polycyclic aromatic hydrocarbons (PAHs).

³ There was some confusion at the time of the UNEP Governing Council meeting about the exact status of the LRTAP protocol's chemical list; UNEP likely based their decision on a list that was not the current working document of LRTAP's assessment process. The most conspicuous discrepancy between the UNEP and LRTAP lists at the time was the chemical Heptachlor, which was later added to the LRTAP list. However, the UNEP Governing Council decision cites UNECE as the exclusive source of its list of 12 POPs.

⁴ The 3rd POPs INC was held in Geneva, Switzerland from 6-11 September 1999; the 4th POPs INC was held in Bonn, Germany from 20-27 March 2000.

⁵ The terminology of POPs has an interesting history in the LRTAP process. Indeed, the phrases "persistent organic contaminants," "persistent semivolatile bioaccumulating organic compounds," "persistent organic compounds" and "POC" were used to refer to POPs in several of the early assessments in the LRTAP process, before the term POP came into exclusive use.

⁶ The outcome of this debate was that pentachlorophenol was left off the initial LRTAP protocol list; however, parties agreed to encourage research on the substance.

⁷ Thanks to Bob Frosch for this description.

⁸ The bioaccumulation/bioconcentration factor is a measure of how likely a chemical is to accumulate in biota, and is a ratio of concentration in biota to concentration in environmental media. Bioconcentration includes chemical assimilated from an organism's environment; bioaccumulation accounts for accumulation as trophic level increases. The octanol-water partition coefficient is a ratio of a chemical's solubility in octanol (a surrogate for lipid) to its solubility in water. POPs are lipid-soluble and hydrophobic; therefore, their Kow values are very large, and are usually expressed logarithmically.

⁹ Working languages of the UN-ECE are English, French, and Russian. The UNEP negotiations are conducted in all six UN languages: English, French, Russian, Spanish, Chinese, and Arabic.