

Analysis of a complex environmental decision: Global
regulation of persistent organic pollutants

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2014-12-04

In May 2004, the Stockholm Convention on Persistent Organic Pollutants (POPs) came into force, with participation from 151 signatories (128 of whom had ratified domestic legislation to support it at that time).¹²³⁴⁵ The treaty was designed to address a problematic type of organic molecules which persist in the environment. POPs can be transported across long ranges through the atmosphere, water, and migratory species; they bioaccumulate in living things; and they have impacts on human health and many non-human animals. When widely dispersed through agricultural and industrial use, POPs are ingested by living things, growing more concentrated at each successively higher trophic level. They become highly concentrated in top predators like marine mammals and human beings. As initially formulated, the convention targeted a “dirty dozen” group of specific molecules and chemical classes, largely comprised of certain pesticides and unintended waste products from behaviours like burning garbage. Chemicals regulated include Heptachlor, a pesticide found to severely affect Canadian Geese and American Kestrels at low doses⁶⁷; Hexachlorobenzene, an antifungal agent associated with severe medical conditions in human beings⁸; and Polychlorinated biphenyls (PCBs), which have been shown to have intergenerational effects in human beings.⁹ At the time of the convention’s negotiation, a substantial body of scientific evidence showed that POPs were accumulating in human beings and causing detrimental health impacts. Since the convention came into force and was widely ratified, successive negotiations have broadened the set of POPs scheduled for elimination or reduction.

Structurally, this analysis will begin with a general historical description of the Stockholm Convention. This will be followed by a breakdown of the decision to regulate POPs in this way, as opposed to in other ways

¹Parties to the Stockholm Convention on Persistent Organic Pollutants, *Stockholm Convention on Persistent Organic Pollutants*.

²The single most informative book on the topic is likely: Downie and Fenge, *Northern lights against POPs: combatting toxic threats in the Arctic*.

³For a discussion of the POP issue as one case study pertaining to problem identification and investigation, consensus formation in science and politics, and remedy design see: Ilnyckyj, “Expertise and Legitimacy: The Role of Science in Global Environmental Policy-Making”.

⁴See also: Ilnyckyj, *Competing Perspectives: the Role of Arctic Native Groups in the Formulation of the Stockholm Convention on Persistent Organic Pollutants*.

⁵The protocol became legally binding 90 days after the 50th state (France) ratified it. See: Bouwman, “South Africa and the Stockholm Convention on Persistent Organic Pollutants: science policy”, p. 323.

⁶Blus, Henny, and Lenhart, “Effects of heptachlor-and lindane-treated seed on Canada geese”.

⁷Henny, Blus, and Stafford, “Effects of heptachlor on American kestrels in the Columbia Basin, Oregon”.

⁸See, for instance: Cam and Nigogosyan, “Acquired toxic porphyria cutanea tarda due to hexachlorobenzene: Report of 348 cases caused by this fungicide”.

⁹Quinn et al., “Investigating intergenerational differences in human PCB exposure due to variable emissions and reproductive behaviors”.

or not at all. This portion of the analysis will consider who the decision-maker was, which stakeholders were involved, what the timeline of events was, and what alternatives existed and were considered. On the basis of these raw materials, explanatory factors for this outcome can be identified, including in terms of efficiency, participatory access, the use of scientific data, and the recognition of relevant values. Some consideration can then be given about the implications of the history of the Stockholm Convention for the regulation of global environmental problems in general.

1 | General background

The history of scientific research and international regulation of POPs has special relevance for Canada. POPs disproportionately affect people living in the far north for two reasons. In the atmosphere, they experience a “grasshopper effect”, where repeated evaporation and precipitation cause POPs to become distributed all around the world, as well as to concentrate in cold polar areas.¹⁰¹¹ Also — because POPs bioaccumulate and bioamplify in successively higher trophic levels of predators — these chemicals are unusually concentrated in the bodies of land and marine animals used as “country food” sources by northern peoples.¹² These aspects of the POP issue were widely considered relevant to the normative case for POP regulation, with groups including the Inuit Circumpolar Conference emphasizing how northerners were bearing a health burden from toxins produced elsewhere.¹³ This strong and emotionally resonant moral case (many references are made to the contamination of breast milk with POPs, and how that motivated action) likely contributed to the successful effort to formulate a widely-adopted convention.

The POP issue connects directly to the origins of modern environmentalism, often identified with the American biologist Rachel Carson’s book *Silent Spring*.¹⁴ In this classic work, Carson highlighted the unintended impact of pesticide use on many bird species, threatening the “silent spring” described in the title. These pesticides included Dichlorodiphenyltrichloroethane (DDT), which ended up as one of the specific

¹⁰Bartlett et al., “Modeling source-to-receptor atmospheric transport: Atrazine, PCBs and dioxin in North America”.

¹¹Bouwman, “South Africa and the Stockholm Convention on Persistent Organic Pollutants: science policy”, p. 324.

¹²See: Kuhnlein, “Canadian Arctic Indigenous Peoples, Traditional Food Systems, and POPs”.

¹³Watt-Cloutier, “The Inuit Journey towards a POPs-Free World”.

¹⁴Carson, Darling, and Darling, *Silent Spring*.

substances regulated by the Stockholm Convention. In particular, Carson criticized the indiscriminate use of toxic pesticides, and drew attention to the consequences that use had on various animal species. Carson's analysis was challenged by major pesticide companies, but ultimately led to both a major public movement in support of environmental protection and the institutional embodiment of protecting practices, notably through the creation of the U.S. Environmental Protection Agency in 1970. While the emergence of the Stockholm Convention cannot necessarily be directly tied to *Silent Spring*, it seems that the emphasis on pesticide and toxic chemical dangers present in the North American environmental movement after 1960 may be reflected in the objectives of the convention, as well as the wide range of political support it ultimately received.

POPs and *Silent Spring* are also connected in terms of their major implications for environmental decision-making. Carson's book helped to produce an increased public recognition that the commercial choices of industry and agriculture may sometimes produce environmentally problematic outcomes when they cause serious market externalities. In response, much of the overall design of environmental regulation has taken the form of various incentives for industry to conform more closely to the behaviours which are optimal from the perspective of society as a whole. This includes restrictions on the production and release of toxic and radioactive substances, regulations intended to protect habitat, Pigouvian taxes, mandating the use of particular technologies, and other widely-employed environmental policy tools.¹⁵¹⁶ To differing degrees in various countries, all of these tools are now widely accepted by mainstream political parties as effective and legitimate ways to address environmental externalities.

The Stockholm Convention incorporates a variety of provisions to reduce global POP contamination.¹⁷ These include measures to reduce or eliminate releases from unintentional production, as well as measures to reduce or eliminate releases from existing chemical stockpiles and waste reserves. The convention also provides for the creation of national implementation plans; mandates information exchange; encourages public information, awareness, and education campaigns related to POPs; calls for further research into POPs; calls

¹⁵While some environmentalists see market-based policy tools as efficient ways of achieving environmental outcomes, others see a market-based understanding as poorly matched with the ecological character of the world. See: Meyer, "Changes in Population and Society", p.45.

¹⁶For an alternative perspective, see: Reinhardt, "The Environment as a Business Problem", p. 1–15.

¹⁷For a more detailed discussion, see: Bouwman, "South Africa and the Stockholm Convention on Persistent Organic Pollutants: science policy", p. 325–6.

for the provision of technical and financial resources to assist developing countries with compliance; makes provision for reporting and the iterative evaluation of the convention's effectiveness; establishes procedures for the settlement of disputes; establishes a process of Conferences of the Parties; and creates a secretariat to administer the convention. The text provides that equally authentic Arabic, Chinese, English, French, Russian, and Spanish versions "shall be deposited with the Secretary-General of the United Nations".¹⁸

Understanding why the Stockholm Convention was negotiated successfully, came into force, and was followed up by expanded restrictions on POP use (which arose through mechanisms established in the convention) requires consideration of the technical characteristics of the problem and the interests of relevant stakeholders. The analysis here focuses on the international negotiations, though relevant Canadian domestic decisions include establishing the six-year Northern Contaminants Program, through which the federal government scientifically studied the toxic burden of POPs on those living in the north.¹⁹ There are also important regional precursors for the Stockholm Convention, including the Convention on Long-range Transboundary Air Pollution in Europe.²⁰

While it is tempting to hope that the comparative success of the Stockholm Convention makes it a model for multilateral treaty-making in other areas of environmental policy, there are important technical and economic features of the POP problem that arguably made it simpler to secure consensus around. Compared to climate change, for instance, POPs benefit from being a lot easier and less costly to replace than the use of fossil fuels. Also, no group of stakeholders was necessarily entirely opposed to the regulation of certain especially dangerous chemicals, since both the chemical manufacturing industry and pesticide-users had access to alternatives. As a consequence, the lessons that can be drawn from examining the background, purpose, and outcomes of the Stockholm Convention cannot necessarily provide clear guidance for those seeking to promote other improved environmental outcomes through multilateral negotiation between governments.

¹⁸See Article 30: Parties to the Stockholm Convention on Persistent Organic Pollutants, *Stockholm Convention on Persistent Organic Pollutants*.

¹⁹See: Shearer and Han, "Canadian Research and POPs: The Northern Contaminants Program".

²⁰See: Fraenkel, "Convention on Long-Range Transboundary Air Pollution: Meeting the Challenge of International Cooperation, The".

2 | Summary of decision

The decision-makers responsible for the Stockholm Convention on POPs were the nation-state signatories, represented in multilateral deliberations by professional diplomats. The states involved include liberal-democratic states with a strong record of environmental protection (Germany, Japan, Canada, etc) as well as more authoritarian states and those with poorer environmental records (Russia, China, Saudi Arabia, etc). Some of the state signatories had citizens who were being disproportionately exposed to POPs; others had major chemical manufacturing or agricultural industries. The very widespread ratification of the convention suggests that, while complex trade-offs were associated with its content, the final document proved acceptable to states in a wide variety of circumstances.

Three major sets of subnational stakeholders were involved with this decision: companies responsible for the production of POPs, pesticide users, and victims of POP contamination. From a less anthropocentric perspective, the set of stakeholders could be broadened to include the living things and biological systems impacted by POPs. Even from an entirely human-focused perspective, impacts on charismatic species like bald eagles are a widespread source of public opposition to the indiscriminate use of chemicals like DDT. As Carson explains:

To the bird watcher, the suburbanite who derives joy from birds in his garden, the hunter, the fisherman or the explorer of wild regions, anything that destroys the wildlife of an area for even a single year has deprived him of pleasure to which he has a legitimate right. This is a valid point of view.²¹

POPs have local uses and global consequences. As a result, there is a complex associated set of stakeholders, including those who derive an immediate benefit from their production and use, those who experience direct personal health consequences either nearby or at great distances, and all those concerned with the ecological systems they affect.

Companies responsible for producing POPs can broadly be broken down into pesticide manufacturers,

²¹ Carson, Darling, and Darling, *Silent Spring*.

those generating dioxins and furans through waste incineration, and industrial PCB users. For these stakeholders, the key issue at stake in relation to further regulation is the existence and affordability of alternative chemicals and processes. In the case of pesticides, many alternatives exist to the specific chemicals prohibited or restricted by the Stockholm Convention. Furthermore, in specified applications where alternatives are not present or less effective, many exemptions are included in the convention. Article 4 of the convention's text establishes a register of specific exemptions and establishes a process through which requests for exemptions can be submitted by signatory states and then considered at a future Conference of the Parties. In the case of dioxins, one major source is inadvertent production as a result of waste incineration, a problem that can be mitigated to varying degrees through the redesign of waste-burning facilities. By installing adequate air pollution control measures, places like hospitals and municipal incineration facilities can minimize these toxic releases.²² PCBs have various industrial purposes, including as coolants and insulating fluids.²³ Alternatives to PCBs do exist, but the chemicals remain widely employed in applications like transformer fluid and use as an insulator. Notably, the Cold-War-era Distant Early Warning Line of RADAR facilities in the Canadian Arctic has been identified as a source of PCB contamination originating in the Arctic itself.^{24,25}

Agriculture is the main global purpose for pesticide use. Restricting the use of certain chemicals risks raising costs or decreasing yields for farmers, with potential consequences ranging from effects on the viability of local economies to global food prices. Detailed analyses of the impacts of the Stockholm Convention on global agriculture have either not been carried out or are not especially easy to find. Such analyses would be complicated by the many simultaneous trends that also impacted food prices and agricultural production, including changing land use patterns, any changes in the use of chemical fertilizers, the genetic modification of crops, weather, changes in population, and so on. Nonetheless, it is evident from the successful ratification of the Stockholm Convention by states including major agricultural producers (Brazil, China, Australia, Canada) suggests that either the opposition from the agricultural lobby wasn't sufficiently strong to prevent ratification, or that the agricultural lobby wasn't sufficiently well-organized to assert its preferences. Close personal

²²Bouwman, "South Africa and the Stockholm Convention on Persistent Organic Pollutants: science policy", p. 323.

²³Ibid., p. 324.

²⁴See: Stow, Sova, and Reimer, "The relative influence of distant and local (DEW-line) PCB sources in the Canadian Arctic".

²⁵Poland, Mitchell, and Rutter, "Remediation of former military bases in the Canadian Arctic".

exposure to the pesticides used on their crops may also partly explain the limited opposition of farmers to POP regulation.

Another important class of pesticide users are those living in malarial areas and seeking to control the disease by killing the *Anopheles* mosquitos which transmit the parasite. The harshest critics of the Stockholm Convention are those who allege that restrictions on pesticide use impair malaria-control efforts, causing human suffering and death.²⁶ These criticisms are themselves contested, partly on the basis that alternative methods of effective mosquito control exist^{27,28}, and partly on the basis that mosquitos were already developing resistance to DDT before the regulation took place.²⁹ Defenders of DDT regulation also describe how indoor residential spraying remains permitted, how it is the most effective way to control mosquitos actually in contact with humans, and how it avoids the rapid development of resistance since only a small subset of mosquitos are exposed to the toxin.³⁰ By fostering increased resistance in insects, large-scale agricultural use of DDT may actually reduce the chemical's utility as a means of protecting human health. In addition, novel new approaches may allow for malaria control without toxins, including the use of genetically modified sterile mosquitos to manipulate population sizes³¹, or a vaccine for humans.³²

A short timeline illustrates some of the precursors and consequences of the Stockholm Convention. Key events relating to the convention include:

1962 — *Silent Spring* published Rachel Carson's book created widespread public awareness about the hazards posed by synthetic pesticides to human beings and non-human animals

1985 — Contaminated breast milk first collected Researchers first identified high levels of polychlorinated biphenyls (PCBs) in the breast milk of women living in Broughton Island, in what is now Nunavut³³

1989 — Basel Convention The Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and Their Disposal introduced standards for the transnational exchange of hazardous

²⁶See, for instance: Attaran, Maharaj, et al., "DDT for malaria control should not be banned."

²⁷See: Curtis, "Should DDT continue to be recommended for malaria vector control?"

²⁸Chanon et al., "Cooperative actions to achieve malaria control without the use of DDT".

²⁹An extensive discussion is included in: Oreskes and Conway, *Merchants of doubt : how a handful of scientists obscured the truth on issues from tobacco smoke to global warming*, p. 229, 236.

³⁰*Ibid.*, p. 225.

³¹Pearce, *Genetically altered mosquito may spell end of malaria*.

³²The Economist, *Malaria vaccines: The long war*.

³³Shearer and Han, "Canadian Research and POPs: The Northern Contaminants Program".

wastes, particularly in terms of their transfer from rich to poor countries. This is listed as a precedent in the Stockholm Convention text

1992 — Rio Declaration The Rio Declaration on Environment and Development included an authoritative description of the precautionary principle, and is cited as the source of the idea in the Stockholm Convention

1997 — Decision 19/13 C The Governing Council of the United Nations Environment Programme (UNEP) decided to initiate international action to control POPs

1998 — Negotiations on the Stockholm convention begin in Montreal

1998 — Rotterdam Convention The Rotterdam Convention on the Prior Informed Consent Procedure for Certain Hazardous Chemicals and Pesticides in International Trade introduced labeling, disclosure, and other requirements for hazardous chemicals traded internationally

2000 — The final text of the Stockholm Convention is negotiated This is the result of a 27-hour session in Sandton, South Africa.

2001 — Stockholm Convention opened for signature

2004 — Stockholm Convention entered into force

2009 — Fourth Conference of Parties (COP) Listed an additional nine categories of chemicals to be restricted or eliminated

2011 — Fifth COP Listed Endosulfan for elimination

2013 — Sixth COP Listed Hexabromocyclododecane for elimination

Given the large numbers of parties involved, a complex collection of alternatives to regulation through an international treaty were considered and, in many cases, implemented. In addition to choosing whether or not to sign or ratify the Stockholm Convention, states and sub-national governments have enacted many types of regulations on pesticides and other hazardous chemicals, as well as on behaviours like garbage-burning which produce POPs. When considering complex environmental decisions in general, it may inevitably be the case that multiple policy instruments and levels of government will have overlapping consequences. From the perspective of analyzing the Stockholm Convention as an environmental decision, the most relevant alternative

to consider is perhaps the possibility in which a reasonably effective and widely-implemented multilateral treaty was not brought into being.³⁴ Somewhat related efforts at controlling environmental problems, such as climate change or the anthropogenic degradation of stratospheric ozone, have also employed the multilateral inter-state approach, with varying degrees of success.

The decisions which led to the enactment of the Stockholm Convention can be interpreted according to the criteria for good environmental decision-making enumerated by Thomas Dietz.³⁵ The clear scientific case provided strong grounds for assessing the choice in terms of human and environmental well-being, and simplified questions about competence about facts and values. Fairness in process and outcome played a role in terms of the special weight given to the concerns of northern and aboriginal people. It is also reflected in the provisions for technical and financial assistance to developing countries, as called for in the convention. Human strengths demonstrated through the success of the instrument include a willingness to take scientific evidence seriously when making decisions, even when some commercial pressures might make the evidence convenient to ignore. The magnitude of the impacts from POPs (both in terms of deliberate use and unintended damage) also varied significantly between state partners. The achievement of an agreement despite that shows a capacity for cooperation. Finally, the opportunity to learn and efficiency are highlighted through the compromises and exemptions included in the convention, along with the establishment of institutions and ongoing processes to gauge effectiveness and amend the agreement as necessary across time.

3 | Explanatory factors

A number of factors help explain why the Stockholm Convention was chosen as a response to the problem of POPs. In most cases, alternatives to the “dirty dozen” chemicals were available, and options existed for reducing the unintended production of POPs from activities like garbage burning and leakage from existing stockpiles. Regulating or eliminating the use of these chemicals did not create a major economic problem for the companies producing them, the countries where they were produced and used, or for the people who

³⁴The idea that a multilateral approach being appropriate for an environmental problem with a global magnitude conforms with the conclusions of: Moran, “Environmental Decision Making”, p. 142–2.

³⁵Dietz, “What is a good decision? Criteria for environmental decision making”.

formerly employed some of them as pesticides.³⁶ Supporting the decision to regulate was a large body of credible scientific evidence, accompanied by a strong moral case from the people living in the north who were disproportionately affected.

3.1 Efficiency

The Stockholm Convention grants many specific exemptions from the requirement to reduce or eliminate POP production. Many of the “dirty dozen” pesticides remain permissible for use in specific circumstances, including the use of DDT for malaria control.³⁷ Exemptions were also included for substances listed in subsequent COPs, including for human health purposes.

While a more detailed examination of the preferences and lobbying approaches of various agricultural and industrial actors would be a worthy undertaking, the widespread ratification of the treaty can be taken as evidence that their objections ultimately weren’t very strong, or didn’t seem sufficiently important to policy-makers to outweigh the benefits from POP regulation.

Many molecules and chemical classes which scientists think may have negative impacts on human health remain unregulated under the Stockholm Convention. It is possible that this reflects a prudent approach of not restricting the use of chemicals with agricultural and industrial applications until convincing evidence of harm to health or the environment has been collected. Alternatively, advocates of a more precautionary approach might emphasize the importance of taking risks to human health and environmental quality seriously and insisting that chemicals which are widely dispersed into the environment be proven safe beforehand. Ultimately, this discussion about efficiency reflects uncertainties and disagreements about how to consider the relative importance of different risks, and the relative dangers and advantages of ongoing chemical innovation and unknown cumulative human and environmental effects. Not everyone agrees that the Stockholm Convention gets the balance exactly right, when considering the risks and benefits associated with various molecules, but the design of the treaty at least reflects a conscious and concerted effort to create a mechanism that could

³⁶Contrast with: Macdonald and Houle, *Political implications of the distributive effects of Canadian climate change policy*.

³⁷DDT is listed under a special annex and may only be used for public health purposes. See: Bouwman, “South Africa and the Stockholm Convention on Persistent Organic Pollutants: science policy”, p. 325.

reach justifiable conclusions about which molecules to restrict and in what ways.

3.2 Participatory access

Much of *Northern Lights Against POPs* concerns the various forms of participation associated with the formulation of the Stockholm Convention.³⁸ These include the efforts of the Canadian medical community, governments, and northern and aboriginal communities to investigate the environmental and human health consequences of POP accumulation. They also include domestic programs of consultation, and the direct involvement of northern and aboriginal stakeholders in the negotiation of the convention itself. The chapter written by the chair of the negotiations particularly highlights how the moral force of the arguments brought to bear by these stakeholders influenced the willingness of diplomatic negotiators to develop and support a strong instrument for POP regulation.³⁹

Participatory access was also reflected in the multilateral process of negotiation. States with diverse levels of involvement in POP use, different patterns and degrees of POP contamination, and generally varied political and economic conditions were able to generate an instrument that came into force and which has had at least some success in curtailing the problem that it was designed to address.

3.3 Use of scientific data

Scientific research into the impacts of POPs began producing a substantial body of evidence during the 1960s. By the time the Stockholm Convention was under consideration, a high degree of scientific consensus existed about the nature of the problem and the reality that it would continue to worsen without regulation. Several detailed analyses of the Stockholm Convention process highlight the high level of scientific confidence as one reason why negotiations were successful.⁴⁰⁺⁴¹⁺⁴²

The chemistry of POPs was fairly well understood by the time of the Stockholm Convention. Their

³⁸Downie and Fenge, *Northern lights against POPs: combatting toxic threats in the Arctic*.

³⁹Buccini, "The Long and Winding Road to Stockholm: The View from the Chair".

⁴⁰See: Banks, "The Stockholm Convention in the Context of International Environmental Law".

⁴¹Buccini, "The Long and Winding Road to Stockholm: The View from the Chair", p. 252.

⁴²Downie, "Global POPs Policy: The 2001 Stockholm Convention on Persistent Organic Pollutants".

presence had been measured in a wide variety of places, including on penguins and snow in the Antarctic.⁴³ Furthermore, the causes of their environmental persistence had been convincingly established as their resistance to chemical degradation from photolytic, chemical, and biological processes.⁴⁴ Human health impacts of POPs include disruption of the endocrine system, interference with reproduction, cardiovascular disease, cancer, and other chronic health conditions.

While helpful, a strong scientific case clearly isn't sufficient to produce effective multilateral regulation of pollution, particularly in the face of strong resistance from industry. This is amply illustrated by the world's continued inability to control greenhouse gas pollution. A strong scientific case may therefore be seen as a useful background condition or facilitating factor, when the political and economic barriers to agreement and implementation are not insurmountable.

3.4 Recognition of relevant values

Article 1 of the Stockholm Convention ("Objective"), states:

Mindful of the precautionary approach as set forth in Principle 15 of the Rio Declaration on Environment and Development, the objective of this Convention is to protect human health and the environment from persistent organic pollutants.⁴⁵

This succinctly identifies three of the key values which motivated this collective decision: recognition of the suitability of the precautionary principle, the desire to protect human health (including the health of those in future generations), and the desire to protect nature itself. While the approach to POP regulation adopted here is more stringent than the international regimes that exist to try to control some other environmental problems, the application of the precautionary principle can be criticized as quite weak in this instance. The high degree of scientific knowledge about the environmental and health impacts of POPs at the time of negotiation arguably made this less a matter of erring on the side of cautiousness, and more a case of finally regulating something long-known to be dangerous, including the "dirty dozen".

⁴³Bouwman, "South Africa and the Stockholm Convention on Persistent Organic Pollutants: science policy", p. 323.

⁴⁴Ibid., p. 323.

⁴⁵Parties to the Stockholm Convention on Persistent Organic Pollutants, *Stockholm Convention on Persistent Organic Pollutants*, p. 2.

Aboriginal groups played an important role in pushing the international community to regulate POPs through a multilateral treaty.⁴⁶⁴⁷⁴⁸ They were empowered to do so in part by the strong moral case they could present; the people producing and using these chemicals were overwhelmingly in other places, yet the impacts fell disproportionately on northern and aboriginal peoples. One special dimension of this is in terms of the cultural and health value of “country foods”, which groups including the Inuit were especially keen to protect.

The controversy about DDT and malaria control illustrates how values which most people would generally endorse (controlling disease, and protecting people and nature from toxins) can potentially conflict. The more complex an environmental decision is, the more likely it is that all available policy choices (including inaction) will have some consequences which are generally regarded as undesirable. That being said, the convention arguably represents a logically conceived mechanism for doing as good a job as can be managed of balancing the various considerations for any particular molecule.

While the desire to protect nature itself may well have been the least pressing motivation for the Stockholm Convention in the eyes of diplomats and politicians, there is a case to be made that it was not entirely irrelevant. While the concern of environmentalists and policy-makers about the impact of POPs on non-human animals may be partly motivated by purely anthropocentric concerns like the value of ecological services, many sources at least reference a preference to protect wild animals that are of no direct use to humanity.

4 | Conclusions

The Stockholm Convention and subsequent efforts to regulate POPs represent one of humanity’s more successful efforts to control a global environmental problem. This is despite how POPs have many of the same characteristics as other problems which have proven intractable: they come from many sources and show no regard for national boundaries, controlling their presence in the biosphere requires multilateral collaboration, and influential stakeholder groups object to their regulation. At the same time, there are characteristics of POPs that help explain why regulation was achieved: alternatives were available and affordable in most cases,

⁴⁶Watt-Cloutier, “The Inuit Journey towards a POPs-Free World”.

⁴⁷Fenge, “POPs and Inuit: Influencing the Global Agenda”.

⁴⁸See also: Ilnyckyj, *Competing Perspectives: the Role of Arctic Native Groups in the Formulation of the Stockholm Convention on Persistent Organic Pollutants*.

and their production and use wasn't central to the operation of national economies. The lessons that can be drawn from the POPs case, therefore, are not fully transferable to problems like climate change, where alternative behaviours are more costly or require behavioural change, and where national economic performance is closely linked to the problematic activity.

Interpreted in a certain light, the success of the Stockholm Convention seems like grounds for cynicism. The delay between identifying the dangers posed by POPs and their partial regulation was several decades. If industry had been sufficiently opposed, it may have been blocked. If no alternatives to the regulated substances had existed, or if they had been very costly, governments may have been unwilling to take action. States could have failed to compromise — instead forming resolutely opposing factions, each insisting on a solution that accorded best with its interests and understanding of the problem. While these possibilities should not be ignored, the convention can nonetheless be interpreted as an example of environmental policy-making functioning in the way it should: with scientists identifying a serious problem, a substantial part of the public becoming concerned as a result of the work of popularizers of science like Carson, and governments eventually working together to produce an agreement with legal force which likely led to better outcomes than we would have seen from less coordinated action. This could be considered “rational-comprehensive decision making”.⁴⁹ Along with stratospheric ozone depletion and climate change, the accumulation of POPs in the atmosphere, hydrosphere, and biosphere of the Earth remains a serious problem. The strong scientific consensus about the “dirty dozen” and other chemicals subsequently regulated through the convention seems to extend to other chemicals which are not yet regulated through a multilateral instrument. Nonetheless, the case of the Stockholm Convention suggests that science and public concern can help to drive policy change, and that governments subjected to domestic pressure and negotiating with other governments with different interests can take tangible steps to ameliorate serious environmental issues.

Word count: 4,481

⁴⁹Roberts, “Environmental Policy Making in Government”, p. 161.

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