

**Let's Clear the Air:
Keys to Successful International Environmental
Agreements**

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For the future.

Contents

Acknowledgements		i
Abstract		ii
1	Introduction	9
1.1	Political Science	11
1.2	Economics	14
1.3	Sociology	17
1.4	Plan	20
2	The Current Epistemology	21
3.1	The Vienna Convention for the Protection of the Ozone Layer and The Montreal Protocol: A Background	23
3.2	The Vienna Convention and The Montreal Protocol: An Analysis	26
3.3	The Montreal Protocol: A Wild Success	28
4.1	The United Nations Framework Convention on Climate Change and the Kyoto Protocol: A Background	32
4.2	The United Nations Framework Convention on Climate Change and the Kyoto Protocol: An Analysis	36
4.3	Why the Kyoto Protocol Failed	39
5	What Works? Toward a New Success Framework	43
6	Looking Ahead	48
Appendix		52
References		54

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Abstract

Climate change poses a real threat to our future. Because climate change affects the globe regardless of borders, it requires more than the action of a single nation. Multilateral international environmental agreements thus have the greatest potential to impact climate change. Understanding elements to successful agreements should inform our future decisions. While the mainstream social sciences have been divided in their approach to the problem and solutions, the keys to successful agreements will need to be interdisciplinary. This work, through a research method of testing the current mainstream social sciences' theories and finding their inaccuracies against the Montreal Protocol and Kyoto Protocol, seeks to find the keys to successful multilateral environmental agreements. These keys are participation, distinction of parties, funding, incentive mechanisms, specificity, transparency, reporting, and the definition of a social cost. This paper will add to and refine similar scholarship that has been done.

1

Introduction

Climate change is real and it presents a threat to the well-being and survival of humanity, as we know it. The situation we face is strikingly similar to the tragic, natural disaster movie Hollywood puts out year after year. However, where we currently find ourselves is before the movie has started – we have the opportunity to do something about environmental degradation before it goes that far. We need to take action; there is no planet B.¹

Some cities have implemented sustainable measures on a local scale, but to do so on an international scale is difficult as nations find sustainable measures threatening to their political and economic strength. While grass-roots organizing, technology, markets, and individual state reforms provide some support for climate change initiatives, multilateral international environmental agreements (IEAs) constitute the current mode of large-scale discourse and strategy.

IEAs are recognized in international law as treaties that create legally binding rules in relations among multiple states. Accordingly, these agreements must be acceptable to and accepted by all kinds of states: “by autocracies as well as democracies, by poor as well as rich states, by superpowers and by weak states.”² Further, international law has the difficult task of reconciling the independence of each state with the interdependence, in this case, of the environment.³ IEAs create international organizations, which can create international law or

¹ This is not about science; it assumes the widely accepted notion that climate change is real. Instead, the focus is on how we as a human race address a truly global problem.

² Barrett, Scott. 2003. *Environment and Statecraft: The Strategy of Environmental Treaty-Making*. Oxford; New York: Oxford University Press.

³ Swanson, Timothy M., and Johnston, Sam. 1999. *Global Environmental Problems and International Environmental Agreements: The Economics of International Institution Building*. Northampton, MA. Published in association with UNCTAD.

may be legally binding themselves. If they are not legally binding, IEAs can affect treaty obligations, which are legally binding. However, IEAs are effective under international law only as long as a nation has signed and ratified the agreement according to their national laws. But not all aspects of IEAs are legally binding, hence the use of terms like 'commitment' instead of 'obligation' and 'non-compliance' instead of 'breach.'⁴

International law gives rise to the current convention-protocol structure of IEAs. The conventions become the "regulatory regimes" of the IEA, requiring further protocols for specificity.⁵ In a simplified view, nations party to an IEA are like children playing in a sandbox according to the rules of the protocol while one of the child's parents, the framework, deals with any misstep.

The existing social science literature reviewing IEAs may be divided by area of study: political science, economics, and sociology. Political scientists spend much of their time focusing on the structure, regime, and power politics. This approach is limiting because it lacks consideration for the economic or social factors that regimes inherently affect and incorrectly assumes rational actors. Economists dig in to cost-benefit analyses and frequently attempt to quantify otherwise qualitative features of IEAs. This process, as we will see, is often speculative, cannot include every qualitative aspect necessary, and wrongly assumes rational actors. Finally, sociologists approach the subject from the most interdisciplinary perspective considering how the politics and economics of IEAs affect people on a micro level. Social justice and environmental justice emerge here as key considerations. The sociological approach lacks the high, macro-level analysis that political scientists and economists provide. The way

⁴ Bodansky, Daniel. 2010. *The Art and Craft of International Environmental Law*. Cambridge, Mass: Harvard University Press.

⁵ Birnie, Patricia; Boyle, Alan; and Redgwell, Catherine. 2009. *International Law and the Environment*. 3rd ed. Oxford; New York: Oxford University Press.

scholars have trained in their respective fields and approach their research differs and informs each respective analysis.

These tools, which comprise a current epistemology, will be applied to current IEAs to test the current epistemology. I then deduce what the keys to IEA success really are and suggest a revised epistemology to apply to the future. This work will study IEAs that focus on air pollution. The choice to focus on air pollution is an obvious one because (1) there have been a significant number of IEAs that focus on air pollution; (2) air pollution has no boundaries, making it a truly global problem; (3) the solution provides a truly global good; (4) air pollution agreements have been received as wildly successful as well as utter failures; and (5) because it is one of the largest threats to climate change. In particular, the air pollution agreements this work will analyze include: Vienna Convention for the Protection of the Ozone Layer and the Montreal Protocol as well as the United Nations Framework Convention on Climate Change and the Kyoto Protocol.

1.1

Political Science

Political scientists suggest that we analyze IEAs by studying the position of the competing political parties – are they realist thinkers and only concerned with power or more globally interested? What is the structure of the agreement? Who initiated the agreement? How is it managed? As these questions illuminate, regimes and their structure are critical factors to a political scientist's analysis of IEAs. Helm and Sprinz explain that political scientists go as far as suggesting that regime design and structure is a more important determining factor of success

in terms of carrying out the goal than whether or not the problem is hard to solve.⁶ The structure of both the agreements and the parties themselves are the focus of political scientists. This perspective is useful, but lacks consideration for outside factors like economics and how the politics affect people on a local level.

From a regime standpoint some have taken the position that “the anarchic character of international society of sovereign states constitutes a barrier to successful governance at the international level.”⁷ However, to address the problem at hand as uncorrectable is pessimistic and does not leave room for IEAs, which we know to exist. Instead, Helm and Sprinz more productively attribute the anarchic nature of the international world as leverage for flexibility.⁸

Given the existence of IEAs, it is important to understand why the regimes (IEAs) exist. Oran Young finds that “regimes form in situations where no dominant power is present. With regard to the case of climate change, this is just as well, since no single participant in the process unfolding...qualifies as a dominant power.”⁹ The absence of an international climate power requires regimes to fill the gap. IEAs function as a tool of international law to establish a regime for a particular cause.

According to political scientists, several key factors to successful regimes are: inclusivity, access, voting style, transparency, compliance, and enforcement.¹⁰ The multilateral nature of these agreements and anarchic structure of international politics makes compliance and enforcement particularly important factors. Chayes, Chayes, and Mitchell suggest that the best

⁶ Helm, Carsten and Sprinz, Detlef. “Measuring the Effectiveness of International Environmental Regimes.” *Journal of Conflict Resolution* 44, no. 5 (October 1, 2000): 630–52.

⁷ Young, Oran. “Effectiveness of International Environmental Regimes: Existing Knowledge, Cutting-Edge Themes, and Research Strategies.” *Proceedings of the National Academy of Sciences* 108 (50): 2011.

⁸ Helm and Sprinz.

⁹ Young, Oran. “Negotiating an International Climate Regime: The Institutional Bargaining for Environmental Governance.” In *Global Accord: Environmental Challenges and International Responses*, edited by Nazli Choucri. Global Environmental Accords Series. Cambridge, Mass: MIT Press, 1993.

¹⁰ Helm and Sprinz.

form of compliance is managerial compliance. After all, parties make agreements with the intent to comply.¹¹ According to their thinking, effective management of compliance relies on “a transparent information system and a response system.”¹² Not only does transparency assist in compliance, but it also reassures other parties that everyone is doing their part. “A party disposed to comply needs reassurance. A party contemplating violation needs to be deterred. Transparency supplies both.”¹³ In addition, further structures must exist for the collection, analysis, and dissemination of the reports.¹⁴ Without these structures, reports and progress are merely letters and numbers on a page.

Although these requirements seem practical and achievable, the necessary structures and players do not always exist. Nations may lack the resources for reporting; and on the other side of the coin, the agreement may lack the resources to complete its responsibilities.¹⁵ This structural analysis is important for the assessment of IEAs according to political scientists.

Even given these metrics, success of IEAs is not obvious. As Haas and Sundgren explain, “the causal relations between emissions and environmental concentrations are seldom well understood, so that even when measures of environmental concentrations exist, their changes cannot be confidently ascribed to policy actions.”¹⁶ This leads to a similar point, made by Mitchell, that “environmental quality and behavior are functions of numerous factors, and improvements often arise from fortuitous economic or technological changes unrelated to a

¹¹ Chayes, Abram; Chayes, Antonia; and Mitchell, Ronald. “Managing Compliance: A Comparative Perspective.” In *Engaging Countries: Strengthening Compliance with International Environmental Accords*, edited by Edith Brown Weiss and Harold Karan Jacobson. Global Environmental Accords. Cambridge, Mass: MIT Press, 1998.

¹² *Ibid.*

¹³ *Ibid.*

¹⁴ *Ibid.*

¹⁵ *Ibid.*

¹⁶ *Ibid.*

treaty.”¹⁷ In other words, regimes do not operate in a vacuum; there are other forces at work.¹⁸ Further, political scientists rely on the assumption that actors are rational, which is not the case in today’s political climate. The required structures and measurement of success as laid out above according to mainstream political science theory provide sturdy ground for analysis of IEAs. However, it is not a comprehensive view.

1.2

Economics

Political structures matter for economists, too. Beron, Murdoch, and Vijverberg echo the importance of political structures; they suggest that the higher degree to which a nation is democratic, the greater they will perceive the benefits to be.¹⁹ For example:

Autocrats desire to maximize tax revenues, thereby increasing their share of the national income. Given this, we might expect that autocrats are less likely to perceive positive net benefits [of an IEA]...Olson also suggested that dictatorships are ‘susceptible to succession crises and uncertainty about the future,’ making them less interested in long term investments.²⁰

Although economists do consider political structures, they consider the structures’ impact fiscally, which is different from political scientists.

Economics is an important factor for both developing and developed countries in their decision to participate in IEAs. Developing countries do not want to be penalized for harm others have done and conversely, developed countries don’t want to set themselves back

¹⁷ Mitchell, Ronald. 2003. “International Environmental Agreements: A Survey of Their Features, Formation, and Effects.” *Annual Review of Environment and Resources* 28 (1): Page 429–61.

¹⁸ Young, “Effectiveness of International Environmental Regimes.”

¹⁹ Beron, Kurt; Murdoch, James; and Vijverberg, Wim. “Why Cooperate? Public Goods, Economic Power, and the Montreal Protocol.” *The Review of Economics and Statistics* 85, no. 2 (2003): 286–97.

²⁰ *Ibid.*

competitively. It is important to note, the difference between developing and developed nations is not wealth, but timing.

Economists focus their work on two areas: tragedy of the commons and cost-benefit analysis. Discussion of the tragedy of the commons is particularly relevant as the environment is a truly global issue. In a report made to the UN Conference on the Human Environment in 1972, it was made clear that “ecological realities made national borders irrelevant for the control of international destiny.”²¹ For economists, similar to the political scientist, the tragedy of the commons is where liberal institutions may arise to bring governance, accountability, and/or information to an otherwise anarchic space. Thus, economists reinforce the idea that IEAs are the appropriate model to address climate change.

Economists suggest that understanding the costs and benefits of an IEA is very complicated, but necessary. According to basic economic theory, no country will spend more on the costs of preventing climate change than the benefits it gains in doing so. Beron, Murdoch, and Vijverberg elaborate the basics that cooperation only comes about if it is in both parties' benefit to cooperate.²² However, the international world is more complex than this simplification. Increased interdependence, globalization, and decreased rationality complicate cost-benefit analysis. Beron, Murdoch, and Vijverberg consider the interdependence and globalization through a trade perspective. They suggest that one country (A) has more power over another country (B) if A has the ability to “disrupt the flow of goods... Thus, if country A is likely to ratify the Protocol, it can increase the likelihood of country B ratifying the Protocol to

²¹ Haas, Peter, and Sundgren, Jan. 1993. “Evolving International Environmental Law: Changing Practices of National Sovereignty.” In *Global Accord: Environmental Challenges and International Responses*, edited by Nazli Choucri, 401–29. Cambridge, Massachusetts: Massachusetts Institute of Technology.

²² Beron, *et al.*

the extent that B is dependent on A as an export market.”²³ While this perspective is useful, it is certainly not exhaustive and omits numerous other factors.

In other cost-benefit attempts, some economists have created quantitative scores for nations. Most successfully, Nordhaus and Boyer utilize the RICE model (Regional Integrated model for the Climate and the Economy) to create quantitative outputs of qualitative factors. The RICE model divides the world into 13 regions, each with explicit preferences and each “is assumed to maximize its social welfare function.”²⁴ Nordhaus and Boyer argue that this is crucial as costs and benefits vary widely region by region. They make the most concerted attempt to quantify impacts of IEAs.

Despite even these attempts, cost-benefit analyses fail to be consistent. First, this type of analysis is dependent on discount rates, which vary greatly model to model.²⁵ Second, McKibbin and Wilcoxon explain, “Uncertainty is the single most important attribute of climate change as a policy problem.”²⁶ Christoph Böhringer vehemently criticizes any formulaic approach to assessing IEAs. He suggests that the science is too complex for economists to fit it into their models and thinking. The myriad perspectives on value conflate the cost-benefit analysis.²⁷

Böhringer and Vogt together go on to outline the extent to which countries should manage their air pollution. They reiterate basic economic theory: “According to standard game theory, no country should have an incentive to abate greenhouse gas emissions above its non-

²³ Beron, *et al.*

²⁴ Nordhaus, William and Boyer, Joseph. “Requiem for Kyoto: An Economic Analysis of the Kyoto Protocol.” *The Energy Journal* 20 (1999): 93–130. Page 96.

²⁵ Dunlap, Riley and Brulle, Robert. 2015. “Sociology and Global Climate Change: Introduction.” In *Climate Change and Society: Sociological Perspectives*, edited by Riley E. Dunlap and Robert J. Brulle. New York, NY: Oxford University Press.

²⁶ McKibbin, Warwick and Wilcoxon, Peter. “The Role of Economics in Climate Change Policy.” *Journal of Economic Perspectives* 16, no. 2 (June 2002): 107–29.

²⁷ Böhringer, Christoph. “The Kyoto Protocol: A Review and Perspectives.” *Oxford Review of Economic Policy* 19, no. 3 (2003): 451–66.

cooperative level.”²⁸ Instead, they ought to manage pollution to the point at which their costs equal their benefits. However, to reiterate Böhringer’s own criticism, costs and benefits are not easily calculated. Further, “all evidence to date suggests that the marginal cost curve for reducing greenhouse gas emissions is very steep, at least for developed countries. At the same time, the nature of climate change indicates that the marginal benefit curve for reducing emissions will be very flat.”²⁹ The lag between up-front costs and the realized benefits makes any IEA difficult to see as successful from an economist’s perspective.³⁰

In summary, economists provide useful metrics to consider. First, agreements must take into consideration the basic efficiency criteria (costs < benefits) and also focus on distributional concerns (i.e. who is responsible, who can/should pay to fix it, and who gets the benefits).³¹ Second, there must be freeloader incentives in non-participation or violation of the agreement to help deal with the tragedy of the commons.³² Finally, economic analyses must be executed in a local or regional manner (as the RICE model suggests) to avoid cost-benefit analysis failure.

1.3

Sociology

Economics has and continues to treat the natural environment as a free resource – one that exists for our exploitation. Similarly, until the advent of environmental sociology, sociology had only considered humans impact on other humans and not that the environment or other

²⁸ Böhringer, Christoph and Vogt, Carsten. “Economic and Environmental Impacts of the Kyoto Protocol.” *The Canadian Journal of Economics / Revue Canadienne d’Economie* 36, no. 2 (2003): 475–94.

²⁹ McKibbin and Wilcoxon, *The Role of Economics in Climate Change Policy*.

³⁰ Helm and Sprinz

³¹ *Ibid.*

³² Böhringer, “The Kyoto Protocol: A Review and Perspectives.”

nonhuman factors could have an impact on society and people.³³ Dunlap and Brulle explain the position and development of environmental sociology in comparison to other environmental disciplines. As scientific evidence of climate change became clearer and more mainstream, the mainstream social sciences largely ignored this new discovery.³⁴ This forced environmental sociology to struggle initially on the periphery of the field of sociology. However, this was to environmental sociology's benefit. It allowed, "Environmental sociologists [to] frequently collaborate with climate scientists, geographers, limnologists, economists, political scientists, urban planners, historians, legal scholars, anthropologists, psychologists, and biologists producing much more robust and defensible accounts of socioecological reality."³⁵

Sociologists fundamentally study fairness. Although it could be argued that the core of the problem is that modernization and capitalism bring about threats to equality, there is more to this discussion. For example, one extreme, free-market argument claims that the same processes that lead to modernization and environmental harm simultaneously create new technology and practices to abate those harms.³⁶ Thus, it is the capitalistic progress that – instead of being a threat to equality and well-being – can actually lead to improved ecological equality and fairness. This free market approach requires guidance. If we are to allow the market to be completely free, it will mediate in favor of the largest return, typically as soon as possible, instead of the best and fairest return over a long run with considerations for equity. At the other extreme, it is impractical to suggest the only solution is to change the capitalist system. The object of this piece is not to take the easy way out and suggest new economic systems, but to find solutions within it and that might transcend it.

³³ Pellow, David N., and Brehm, Hollie. "An Environmental Sociology for the Twenty-First Century." *Annual Review of Sociology* 39, no. 1 (2013): 229–50.

³⁴ Dunlap and Brulle, "Sociology and Global Climate Change."

³⁵ Pellow and Brehm, "Environmental Sociology for the Twenty-First Century."

³⁶ *Ibid.*

Bunker and Ciccantell suggest that the current state of environmental degradation is a result of a North-South dichotomy – wealthy nations (North) exploiting developing countries (South).³⁷ Rice, in agreement, explains this thinking using a core-periphery model (North-South, accordingly). “Not only are some core nations dumping toxic waste in and exporting the most hazardous production facilities to the periphery, they are also extracting energy and other forms of ecological wealth from the periphery and paying less than market value for it.”³⁸ Further, other sociologists including Bonds, Downey, and McKinney also argue that although “core” nations may appear to be successfully abating environmental harms and the peripheral nations are less committed to doing so, but the truth is that the core nations are simply exporting the hazards. For sociologists, IEAs must not simply displace or move the problem to a place with more flexible laws regarding the environment.

Environmental justice, which is concerned with equality in environmental conditions throughout the world, can be difficult to reconcile in a capitalist world. Dunlap and Brulle even suggest that we may need to rethink our capitalist, binary system.³⁹ However, short of completely changing our political and economic systems, the practical sociologist would argue that there must be some sort of minimum environmental quality that is ‘fair.’

To summarize, there are several redeeming qualities for analysis. First, how does the IEA affect day-to-day life? Second, does the IEA merely push the problem to another place in the world that does not get as much attention? Does the IEA truly improve socioecological equality?

³⁷ *Ibid.*

³⁸ Pellow and Brehm.

³⁹ Dunlap, Riley and Brulle, Robert. 2015. “Bringing Sociology into Climate Change Research and Climate Change into Sociology: Concluding Observations.” In *Climate Change and Society: Sociological Perspectives*, edited by Riley E. Dunlap and Robert J. Brulle. New York, NY: Oxford University Press.

1.4

Plan

As the above sections show, the mainstream social sciences – political science, economics and sociology – each examines the situation from their perspective, which is inherently biased. Political scientists are focused on the political, economists on the economic, sociologists on the social, all of which are helpful as they go. However, the very nature of climate change requires a broader scope of analysis that combines these factors in a more comprehensive approach.

Scott Barrett's work, "Environment & Statecraft: The Strategy of Environmental Treaty-Making," is a good example of a more comprehensive approach. Barrett approaches the topic by building a theory based on principles and then applies that theory to cases. Unfortunately, due to the timing of his publication, his analysis and its application relate to the Montreal Protocol, but not the newer and broader Kyoto Protocol. By stating his principals first and then testing it to see how IEAs reflect those principles, Barrett limits his analysis. I seek to build on Barrett's thinking. My suggestion is to study IEA successes or failures and then see if the conditions that created success or failure can be replicated or eliminated. In other words, rather than letting the analysis form the agreement, I propose seeing what each agreement can teach us.

As section one has laid out the differing views of keys to success, section two will compile them in a new epistemology. Sections three and four will then test the historical and current epistemology to see if these factors are in fact keys to success. Next, section five proposes a revised set of keys to success. The work concludes with a look into what the future may hold in section six.

2

The Current Epistemology

As the review of current literature has shown, the existing tools for analysis of IEAs are disjointed. Keys to success are examined entirely on a case-by-case basis and often by the mainstream schools of thought in the social sciences. Section two strives to define, explicitly, standards for success of IEAs by the joining political, economic, and sociological criteria from section one.

Based on scholarship from section one, the following are intertwined, key attributes for IEA success. First, the structure of the agreement must be *open and inclusive*. In other words, all relevant nations must be party to the agreement. Considering air pollution knows no bounds and moves freely, any successful IEA should include every nation. Political scientists explicitly make this recommendation. Similarly, sociologists find openness and inclusivity to be important to ensuring environmental justice and that the harms are not exported to another part of the world. Second, every party must have an *equal voice*. This is crucial so that certain countries – namely the United States, China, and Russia – do not dominate every single discussion without the need for consideration from other nations. Political scientists make this recommendation because they see democracy as the best system. An equal voice is crucial to allow for equal participation and voting to balance the forces at play.

Next the agreements – their requirements, reporting, and compliance – must be *transparent*. Transparency discourages foul play and reinforces the parties' mission. Many argue today that governments should not be entirely transparent; that there are things the public should not know. However, in the case of climate change, everyone is on the same team – there is nothing to hide. Political scientists and sociologists both suggest transparency to ensure

fairness and encourage compliance. Accordingly, there must be *penalties in place for noncompliance as well as the ability to enforce those penalties*. It would be naïve to assume that transparency cures all bad apples, thus the ability to penalize those out of line is crucial. Political scientists point out that without the ability to enforce penalties, the IEA has merely encouraged local governments to change their policies toward climate change. But we are past the point of mere encouragement instead we need to ensure change. Economists also recommend compliance penalties, which could help fund the agreement and influence cost-benefit analyses.

In order for compliance and monitoring mechanisms (examining reports, issuing reports, and penalties those out of line) to function effectively, *funding is required*. Funding the IEA is crucial; money is an important driver. The form in which this takes is unimportant. Economists insist that funding can help developing countries, influence cost-benefit analyses, and are a natural part of a working agreement.

Economists, natural to their field, also require the *benefits to outweigh the costs*. Different countries will of course utilize their own value systems. Costs and benefits are a useful metric and allow flexibility in coercing nations to join IEAs. Incentives may be created by the IEA through tools like the funding aspect, which can also influence cost-benefit analyses.

Finally, the last key to success according to sociology is *environmental justice*. The IEA must reduce the effects of the target by reducing emissions globally, not by moving them elsewhere. In this way, environmental sociology helps to ensure meaningful change on a global scale and ensure equity.

These requirements pool the different schools of thought into one standard set of keys to success, but just how well do they hold up? Are all of these requirements crucial for success?

3.1

The Vienna Convention for the Protection of the Ozone Layer and The Montreal Protocol: A Background

In sections three and four, I outline and analyze IEAs against the current, comprehensive epistemology as described in section two.

The Vienna Convention for the Protection of the Ozone Layer (Vienna Convention) functions as a framework to house the Montreal Protocol. In 1985, 197 nations gathered at the Vienna Convention to negotiate protections for the ozone layer, a key piece of our atmosphere that certain air pollutants were harming.⁴⁰ The Vienna Convention was and is “intended to protect humans and the environment from the harmful effects of activities which modify the ozone layer.”⁴¹

At the time of its creation, there was explicit knowledge of the dangers of the disappearing ozone layer. Accordingly, the Vienna Convention recognizes the harms of changing the ozone layer and declares that states have a right to exploit their resources as they please as long as it does not harm others. It also makes clear that the damages from ozone depletion have no bounds.

The Vienna Convention created the foundation for the Montreal Protocol, which is, to date, the only protocol to the Convention. The Montreal Protocol was created in 1987 at the Conference of the Parties (COP) – a regular meeting of the Convention – and entered into force in 1989. It has been amended and adjusted several times as a living document.

⁴⁰ “United Nations Treaty Collection.” 2017. Accessed April 24.

https://treaties.un.org/pages/ViewDetails.aspx?src=TREATY&mtdsg_no=XXVII-2&chapter=27&lang=en.

⁴¹ Sands, Philippe, and Galizzi, Paolo, eds. 2004. *Documents in International Environmental Law*. 2nd ed. Cambridge, UK ; New York: Cambridge University Press.

To be a party to the Montreal Protocol, you must be a party to the Vienna Convention. The COP is tasked with reviewing the actualization of the Protocol, adjusting and reviewing the controlled substances, establishing reporting guidelines, assessing requests for assistance or noncompliance, reviewing reports, and making adjustments to the Protocol. In addition to the COP, the Convention also establishes a secretariat that is to organize the COP, receive reporting data, disseminate information, and encourage the participation of non-parties. Each party at the COP is granted an equal vote.

The Montreal Protocol is very specific. Its purpose is to phase out CFC, HFC, and HCFC pollutants, which have been proven to harm the ozone layer. For each pollutant, the Montreal Protocol establishes a clear timeline. For example, certain “parties are required to phase out production of Group I Annex A CFC’s by 1 January 2010, with intermediate reductions of 20% by 2003, 50% by 2005 and 85% by 2007.”⁴² As this example shows, the Montreal Protocol very carefully groups nations and controlled substances in order to achieve its mission. In other words, the Montreal Protocol takes the larger problem of ozone layer depletion and breaks it up into much smaller, more specific, and more manageable problems and then proceeds to methodically target controlled substances one by one.

With the harms of a depleted ozone layer being widely accepted, all 197 parties to the Vienna Convention joined the Montreal Protocol. It was not difficult to get developed nations to agree to the Montreal Protocol, especially because cheap alternatives for the controlled substances exist. Developing nations required a bit of coercion because they argued that they are being required to solve a problem they did not create. The Montreal Protocol was able to incentivize developing countries to join through a fiscal mechanism and the recognition that these developing countries face different circumstances as is explained below. By taking into

⁴² Sands and Galizzi.

account the domestic economic needs of countries, the Montreal Protocol is able to provide a clear plan of attack. A second incentive for developing countries is a 10-year grace period to join the Montreal Protocol. Part of the grace period allowance is that these developing countries are allowed to use a different base year for reduction targets. The idea of this adjustment is to level the playing field between developed and developing countries and the potential harms to their economies. Finally, the Protocol creates trade restrictions between parties and non-parties. Parties to the Montreal Protocol are restricted from trading banned substances with non-parties. Additionally, parties are allowed to trade controlled substances amongst themselves, but are restricted by their production and consumption limits.⁴³

Given these incentives to join the Montreal Protocol, it is fitting that the Protocol also considers compliance. The Montreal Protocol establishes a separate document: the Non-Compliance Procedure. According to the document, uncooperative parties may be discovered through the secretariat, through complaints, or self-recognition. A party failing to comply will be forced to participate in fact finding and cooperate with the secretariat to share the findings with the Implementation Committee, which is established by the Non-Compliance Procedure for enforcement. The Committee is made up of a 10 geographically diverse nations and changes every two years. The compliance mechanism lacks any punitive measures and instead is best described as a guiding procedure. The purpose of the Implementation Committee is to put uncooperative nations back on track, and may even use funds to do so.

The Montreal Protocol is funded through a financial mechanism that creates a number of funds to meet the costs of the enacting the Protocol. It is explicit in what the funds are for. Developed countries party to the agreement provide the funding – most notably through the

⁴³ Goldberg, Donald. 1992. "Provisions of the Montreal Protocol Affecting Trade." The Center for International Environmental Law. http://www.ciel.org/wp-content/uploads/2015/04/Provisions_Montreal_Trade_Jan1992.pdf.

Multilateral Fund, which helps to cover incremental costs to the Montreal Protocol and its implementation on the national level.

3.2

The Vienna Convention and The Montreal Protocol: An Analysis

The above description provides a brief summary of the purpose and mechanisms of the Vienna Convention and Montreal Protocol. But how does it stand up against the measures of success outlined in section two? First, is the agreement open and inclusive? Quite simply, both agreements were open and inclusive – notably so! In particular, the Montreal Protocol even created mechanisms to incentivize developing countries. Thus, nobody was excluded from the agreement. Second, do the Parties have an equal voice? Again, the simple answer is yes. The Vienna Convention and Montreal Protocol stipulate one nation, one vote. Further, the committees created by the Protocol involve parties from each different type of nation in an attempt to consider all parties.

Third, is the agreement transparent? Both the Vienna Convention and Montreal Protocol uniquely require significant continued research. The research reports to the secretariat acknowledge modesty about the problem. Further, the implementation committee's public reporting is indicative of transparency. Both agreements facilitate the transparency of scientific research as well as compliance.

Fourth, are there penalties for noncompliance? The Vienna Convention, existing solely for the creation of protocols, cannot force compliance, as it has no requirements. This is not to its fault, though. The Montreal Protocol, on the other hand, does have compliance mechanisms, which appear to be weak. The compliance mechanism is not punitive, but instead guides

countries toward cooperation. While this poses a potential problem, as we will see it is not problematic.

Fifth, is the agreement properly funded? Again, the Vienna Convention and Montreal Protocol are properly funded. However, they draw their funds from developed countries, which can create a lopsided view and power in the agreement.

Sixth, are the costs and benefits explicit and do the benefits outweigh the costs? In the case of the Montreal Protocol, cheap alternatives to controlled substances do exist. This, coupled with the fact that cancer rates are expected to dramatically drop with a repaired ozone layer, tips the scale toward the benefits outweighing the costs. Cass Sunstein, a friend and legal scholar with environmental expertise, summarizes that even if the US was the sole participant of the Montreal Protocol, their costs (in 1985 dollars) would be \$21 billion while their benefits (mainly from reduced cancer rates) would be approximately \$1,373 billion. If the entire world participates, the costs remain the same but the benefits skyrocket to \$3,575 billion.⁴⁴ These estimates are, of course, speculative. However, it is abundantly clear that through the reduction in cancer cases as well as the affordability of alternatives, the Montreal Protocol is extremely cost effective.

Lastly, how does the agreement take environmental justice into consideration? This factor, again, is more targeted toward the Montreal Protocol than the convention that supports it. The answer to this question lies in what the Montreal Protocol refers to as the “special situation of developing countries.” By allowing developing countries to delay their removal of controlled substances (recall the grace period and support through funding), it involves the developing and developed countries and attempts to put them on a level playing field.

⁴⁴ Sunstein, Cass. 2008. “Of Montreal and Kyoto: A Tale of Two Protocols.” *Environmental Law Review*. <https://law.vanderbilt.edu/files/archive/Sunstein-2008.pdf>.

On every front, according to the current epistemology, both the Vienna Convention and Montreal Protocol were slated for success. Both agreements have been regarded as monumental in what they achieve in recognizing and formalizing an attempt to restore the ozone. What is more, is that the Montreal Protocol, and by proxy Vienna Convention, has been regarded as the most successful environmental agreement, ever.

3.3

The Montreal Protocol: A Wild Success

While the Montreal Protocol fulfills the criteria outlined above, it is only successful if it effectively removes ozone damaging emissions as it is intended to. Fortunately, it has been made clear that the banned substances have been decreasing in parts per million in the atmosphere. The figure to the right clearly

shows that.⁴⁵

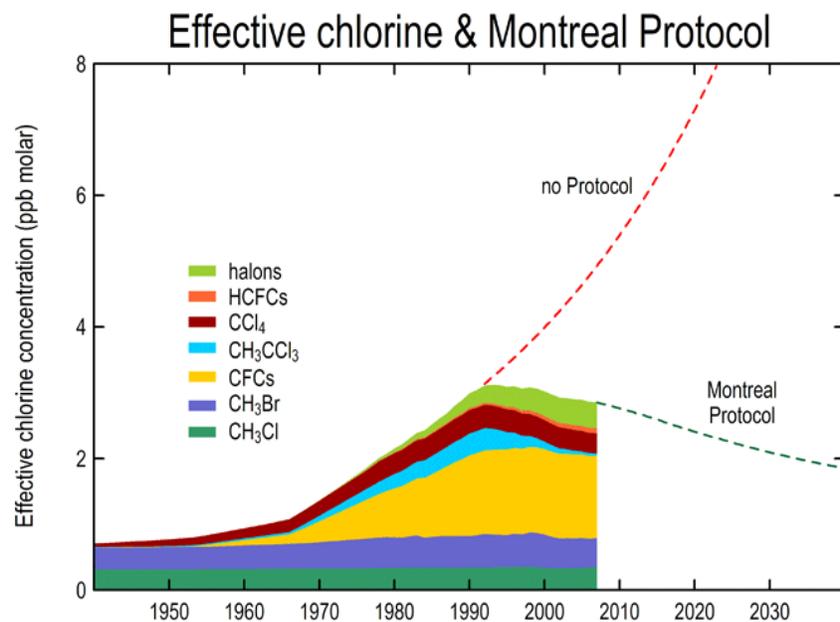


Figure 1

More than just this graph illustrating the success of the agreement in reversing emissions of damaging chemicals to the ozone layer are expert opinions backed by more data. One climatologist, Durwood Zaelke, in an op-ed piece for the *New York Times*

⁴⁵ Commonwealth of Australia; Department of Sustainability, Environment. 2017. "Montreal Protocol on Substances That Deplete the Ozone Layer, Australia - Graphs." Accessed March 19, 2017. <http://155.187.2.69/atmosphere/ozone/legislation/montp-graphs.html>.

reports finding that the Montreal Protocol has successfully reduced “nearly 100 damaging chemicals by nearly 100 percent.”⁴⁶ Further, banned substances under the Montreal Protocol have short life-spans and the ozone layer repairs itself, so further success is reflected in the fact that “the ozone layer is expected to return to 1980 levels between 2045 and 2060 as long as all countries continue to meet their obligations.”⁴⁷

The Montreal Protocol has been successful, but what is so exciting is that it continues to be successful. The Kigali Accord, which was agreed upon in late 2016, is an extension of the Montreal Protocol and thus enjoys the same methods and framework. As was explained above in abstracting the Montreal Protocol, it broke up the larger problem into many smaller problems. HFCs (a commonly used coolant, especially in older refrigerators and air conditioners, for example) are targeted in the Kigali Accord and are another step toward eradicating ozone damaging substances. The Kigali Accord, which was swiftly agreed upon, phases out HFCs in the same manner as other substances under the Montreal Protocol, thus it is reasonable to expect success.

It is clear that the Montreal Protocol has been successful, but how and why is of particular interest and will help to inform the keys to successful IEAs. First and foremost, the cooperation encouraged in the Vienna Convention and Montreal Protocol set both up for success. This is widely recognized. The Montreal Protocol is the only agreement under the United Nations that enjoys universal participation. In fact, with 197 signatories, “it has more signatories

⁴⁶ Molina, Mario, and Zaelke, Durwood. 2012. “A Climate Success Story to Build On.” *The New York Times*, September 25. <http://www.nytimes.com/2012/09/26/opinion/montreal-protocol-a-climate-success-story-to-build-on.html>.

⁴⁷ Rae, Ian. 2017. “Saving the Ozone Layer: Why the Montreal Protocol Worked.” *The Conversation*. Accessed March 19. <http://theconversation.com/saving-the-ozone-layer-why-the-montreal-protocol-worked-9249>.

than any other international agreement or body, including the United Nations.”⁴⁸ The Montreal Protocol achieved participation a few ways. First, it relied on scientific information and continued research. Second and more importantly, it relied on an economic consequence. “The threat of punishment came in the form of a ban on trade between signatories and nonsignatories in substances.”⁴⁹ As soon as a few major nations became party to the agreement, it was only natural that others follow suit. Global cooperation was crucial for the success of the Montreal Protocol.

Additionally, the clarity of the agreement is a strong point. As I have already pointed out, taking the larger problem and breaking it down to smaller, more approachable problems has been a strength. Doing so has also provided much more clarity and specificity for each controlled substance and the goals of every nation.

Further success – and another example of encouraging participation and creating clarity – comes from how the Montreal Protocol handles developing countries. The Montreal Protocol divides nations into groups and assigns certain targets and dates accordingly. By creating explicit timelines and groups of countries, the Montreal Protocol avoids the resistance of developed countries fearing an unfair economic advantage from developing countries. Additionally, it avoids the complaint from developing countries that it is not fair that they have to stop using the pollutant since the other developed countries are developed thanks to their ability to use such a pollutant.

⁴⁸ “Why the Montreal Protocol Is the Most Successful Climate Agreement Ever.” 2016. *South China Morning Post*. October 26. <http://www.scmp.com/business/article/2040177/why-montreal-protocol-most-successful-climate-agreement-ever>.

⁴⁹ Marjorie Mygrants. 2015. “Analysis of the Success of the Vienna Convention for the Protection of the Ozone Layer and the Montreal Protocol.” *Michigan Journal of International Law* 36 (April 2015). <http://www.mjionline.org/analysis-of-the-success-of-the-vienna-convention-for-the-protection-of-the-ozone-layer-and-the-montreal-protocol/>.

The Vienna Convention and Montreal Protocol have been so successful because they act in a manner that is understanding of the differences between developed and developing countries. One way the Montreal Protocol shows this is through the understanding that reducing and replacing controlled substances not only takes time and money, but also takes more time and money in developing countries.⁵⁰ Beyond being specific and dividing responsibility to phase out controlled substances according to economic ability, the Montreal Protocol's Multilateral Fund has also seen enormous success. The funds distributed by the Executive Committee helps the developing countries comply, which in turn helps the developed countries. The office of the secretariat to the Montreal Protocol acknowledges that the fund has raised about \$4 billion and that "most eligible developing countries have relied heavily upon funding from the Multilateral Fund to support their phase-out efforts"⁵¹

Discussion of the Montreal Protocol would be remiss without consideration for the black market trade of banned substances. As some countries transition to CFC alternatives and others are allowed to continue producing CFCs, the demand and illegal trade of the substances arose. For example, to retrofit a car's air conditioning system from a CFC based one (using Freon) to a CFC alternative costs approximately \$1,200, while purchasing the necessary CFC illegally for your air conditioner costs just \$80 (in 1997 dollars).⁵² The demand exists because of the existence of equipment requiring CFCs, which are no longer being created.⁵³ In researching the topic, there have not been reports of any illegal trade since the late 1990s and early 2000s. I reached out to the UNEP secretariat for comment, who recognizes the need to crack down on

⁵⁰ "Why the Montreal Protocol Is the Most Successful Climate Agreement Ever."

⁵¹ Ozone Secretariat. "Montreal Protocol – Achievements to Date and Challenges Ahead." Accessed March 20, 2017. <http://ozone.unep.org/en/focus/montreal-protocol-achievements-date-and-challenges-ahead>

⁵² *Bloomberg.com*. 1997. "The Black Market Vs. The Ozone," July 7. <https://www.bloomberg.com/news/articles/1997-07-06/the-black-market-vs-dot-the-ozone>.

⁵³ "Illegal CFCs Imperil the Ozone Layer." 2017. *New Scientist*. Accessed March 21. <https://www.newscientist.com/article/dn8475-illegal-cfcs-imperil-the-ozone-layer/>.

illegal trade of controlled substances, but have not heard back from them. Even if the illegal trade still exists, as countries develop new technology and phase out the old equipment using CFCs, the demand for CFCs will diminish. Thus, the threat of illegal trade in the turn of the millennium was concerning yet disappearing. Furthermore, the Montreal Protocol has the ability to be a part of the solution to the black market by utilizing the multilateral fund to assist in the accelerating the phase out of CFCs and to buy up the remaining stock piles.⁵⁴

In conclusion, the Montreal Protocol has been exceptionally successful. It fulfills most of the requirements according to the current scholarship in section two. Further, the Montreal Protocol is as open and inclusive as any agreement has ever been, the parties are given equal voices and are encouraged to be transparent with information, the noncompliance mechanism exists and works despite being punitively weak, the agreement is well funded and the funds are well utilized through the multilateral fund, the benefits heavily outweigh the costs, and lastly the agreement is for global benefit and uniquely does not disadvantage developed or developing countries. Its success, however, is attributed to fewer qualities than the aforementioned. These qualities include cooperation, coercion through trade threats, explicit goals, fair treatment to developed and developing countries, and effective funding.

4.1

The United Nations Framework Convention on Climate Change and the Kyoto Protocol: A Background

⁵⁴ Landers, Frederick Poole Jr. "The Black Market Trade in Chlorofluorocarbons: The Montreal Protocol Makes Banned Refrigerants a Hot Commodity." Alexander Campbell King Law Library. Accessed March 21. <http://digitalcommons.law.uga.edu/cgi/viewcontent.cgi?article=1486&context=gjicl>.

In 1992, 172 nations gathered in Rio de Janeiro to participate in the groundbreaking Earth Summit.⁵⁵ The Summit's goal was to discuss economic development and halt destruction of the natural environment. In doing so, the Earth Summit produced the United Nations Framework Convention on Climate Change (UNFCCC). The UNFCCC has 197 parties to it and is the first major step toward recognizing climate change caused by carbon dioxide on a wide scale on the international stage.

The ultimate objective of this Convention and any related legal instruments that the Conference of the Parties may adopt is to achieve, in accordance with the relevant provisions of the Convention, stabilization of greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system.⁵⁶

The idea of the UNFCCC, as its title elucidates, is to establish a base for future IEAs similar to the Vienna Convention. The UNFCCC sets out some basic criteria. This includes reporting emissions levels, creating and updating national and international climate change programs, promoting efficient technology, promoting preservation management, preparing for the necessary adaptations to the changing climate, taking climate change into consideration in the decision making process, and promoting research and education. Leading by example, developed countries made further commitments to adopt national policies to mitigate climate change by reporting emissions levels and aiming to reduce emissions to 1990 levels, establishing a methodology for measuring emission levels, and reviewing the categorization and involvement of countries.

⁵⁵ "Earth Summit: UN Conference on Environment and Development" 1992. Department of Public Information. Accessed March 17, 2017. <http://www.un.org/geninfo/bp/enviro.html>.

⁵⁶ Sands and Galizzi

The UNFCCC grants each nation equal voting power. Like the Vienna Convention, it also establishes a COP to govern the agreement. The COP's role is specifically to review the obligations of the parties periodically, encourage information flows, facilitate negotiations, review measurement techniques and methodology, assess the effects of the agreement, create and publish reports on the agreement, make revisions to the agreement, study and review reports from the Parties, and handle the finances of the participating countries. The funding aspect of the COP is to be transparent and must ensure that finances go to projects that are in line with the policies and address climate change. The finances are also to be used for funding reports. Each party to the COP is granted one, equal vote.

At the head of the COP and overseeing the agreement is the secretariat. Their responsibilities include making arrangements for the COP, filing and presenting reports, assisting developing countries in creating information flows, and coordinating with other players at that level.

These roles constitute the very basic self-governing set up of the UNFCCC. The UNFCCC, similar to the Vienna Convention, was to be used as a base for the creation of protocols to utilize this structure. The UNFCCC enjoys near global participation, giving serious potential in future protocols and agreements since "only Parties to the Convention may be Parties to a Protocol."⁵⁷ The Convention entered into force in 1994 and at the Kyoto Protocol was established at the third COP in 1997.

The Kyoto Protocol to the UNFCCC asserts a plan and targets for pollution reduction. It strives to establish information, ensure transparency, and establish efficacy in reducing emissions. One of the most important things the Kyoto Protocol strives to establish, similar to monitoring pollution, is a baseline of emissions from each nation. Nations are responsible for

⁵⁷ Sands and Galizzi

reporting this data through a national mechanism and are expected that by 2005 (the start of the commitment period as explained below), every Annex I country (see appendix) would have made “demonstrable progress in achieving its commitments under this Protocol.

The Kyoto Protocol establishes a commitment period from 2005-2012 before being renegotiated for a second commitment period. The emissions reduction target was to reduce greenhouse gases emitted by committed parties to 5% below the 1990 levels as reported. Countries can reduce emissions in a number of ways. First, countries can utilize Joint Implementation, which allows developed countries to create programs to reduce emissions in other developed countries. The COP must approve Joint Implementation projects. Second, countries that are party to the agreement but do not use all of the allotted pollution credits may trade them to another country that is over their limit to offset the difference. A third option is the Clean Development Mechanism, which is similar to the Joint Implementation mechanism, except instead of creating a project in another developed country, it creates a project in a developing country. This mechanism to the Kyoto Protocol encourages developed countries to assist the developing countries to ensure sustainable development.

In the event of failure to meet the agreed targets, there is a non-compliance mechanism in place. There are two committees responsible for ensuring compliance with the Kyoto Protocol. First is the Facilitative Branch, which exists to promote and ensure compliance and second is the Enforcement Branch, which determines the penalties for non-compliance. Each branch includes representatives from each UN region, small island developing states, and Annex I and II countries. There are two basic scenarios in which a country would not be complying with the agreement: (A) the country failed to meet its reduction targets or (B) the country has failed to meet the reporting requirements. In both cases, the Enforcement Branch makes public any non-

compliance issue and seeks to guide compliance. However, if (A) occurs, the Party will be required “to make up the difference between its emissions and its assigned amount during the second commitment period, plus an additional deduction of 30%.”⁵⁸ Additionally, the Party must submit a plan of action to the secretariat and is suspended from any emissions trading.⁵⁹

Lastly, the Kyoto Protocol is funded by developed nations with the aim of assisting developing nations. The funds are managed by the Green Climate Fund, which is a global initiative to restrict temperature changes by +2 degrees Celsius, reduce emissions in developing nations, and help those directly affected by climate change adapt.⁶⁰ Additionally, funds are exchanged through Joint Implementation and the Clean Development Mechanism.

4.2

United Nations Framework Convention on Climate Change and the Kyoto Protocol: An Analysis

This section will move through examining the IEA utilizing the current epistemology from section two (it will proceed in a similar manner to section 3.2). First, is the agreement open and inclusive? The UNFCCC has a remarkable near universal acceptance. The world clearly seeks to address climate change. However, the Kyoto Protocol is a different story. There are a few crucial countries that are not part of the Kyoto Protocol, most notably China and the United States, which are the two largest greenhouse gas emitters. China is not bound to the agreement in the original text because it can be considered a developing nation and is also transitioning to a market economy. Thus, it was excluded from the reduction targets. The United States, on the

⁵⁸ “An Introduction to the Kyoto Protocol Compliance Mechanism.” *UNFCCC*. Accessed April, 2017. http://unfccc.int/kyoto_protocol/compliance/items/3024.php

⁵⁹ *Ibid.*

⁶⁰ “Homepage.” 2017. *Green Climate Fund*. Accessed April 20. <http://www.greenclimate.fund/home>.

other hand, was to be bound by the Kyoto targets. The United States' participation, influenced primarily by the lack of guaranteed inclusion of developing countries and associated costs is examined below. In brief, while the UNFCCC is as open and inclusive as possible, the Kyoto Protocol was open but it was not inclusive as it left out two of the world's largest population centers (China and India)⁶¹ and the world's two largest greenhouse gas emitters (China and the United States). Despite this, the Kyoto Protocol received enough support to be entered into force.

Second, do the Parties have an equal voice? The answer to this is quite simply yes. The bylaws of the both the UNFCCC and the Kyoto Protocol explicitly state that each country gets one vote. Additionally, committees are inclusive of a variety of parties to represent all interests.

Third, is the agreement transparent? The UNFCCC and Kyoto Protocol strive to be transparent – and they are. Transparency exists in the national reporting of emissions levels for monitoring. This is then supported by the UNFCCC and the secretariat, who reviews, disseminates, and reports on the progress of nations and the agreement as a whole.

Fourth, are there penalties for noncompliance? The penalties in the Kyoto Protocol are explicit, which is good. However, the penalties are only in effect for the next commitment period. Without penalty for withdrawal from the agreement, if a country fails to meet their target reduction, they could just withdraw from the agreement without fault.

Fifth, is the agreement properly funded? The Kyoto Protocol has a number of funds controlled by the COP. Funds are intended to support the implementation of the Kyoto Protocol with the developed countries financing the costs in an appropriate manner. This mechanism

⁶¹ Hovi, J.; Sprinz, D; and Bang, G. 2012. "Why the United States Did Not Become a Party to the Kyoto Protocol: German, Norwegian, and US Perspectives." *European Journal of International Relations* 18 (1): 129–50.

works to make the developed nations pay for the damage they already have done by funding the Protocol and developing parties.

Sixth, are the costs and benefits explicit and do the benefits outweigh the costs? Although costs and benefits have been made clear, they are troubling. Sunstein estimates that if the US participated in the Kyoto Protocol, the benefits would amount to roughly \$12 billion (1990 dollars), but would cost \$325 billion (1990 dollars).⁶² These costs are so high due to the lack of participation by developing countries. If the whole world participated, the net benefits for the US would be \$96 billion (1990 dollars) and the costs would be \$217 billion (1990 dollars).⁶³ Alas, the Kyoto Protocol comes with a “prohibitively high price.”⁶⁴ Scott Barrett compiles “selected estimates of global marginal abatement benefit and global CO₂ marginal abatement cost (\$US 2001-2010 per ton C).”⁶⁵ Barrett’s table is below and highlights cost estimations hovering around \$100 while the benefits are around the mid teens just to stabilize emissions.

Benefit Study	Marginal benefit	Cost study	Marginal cost of stabilization	Marginal cost of 20% cut
Ayres & Walter	\$30-35	Jorgenson-Wilcoxon	\$20	\$50
Nordhaus	\$6.8	Edmonds-Reilly	\$70	\$160
Cline	\$7.6-154	Manne-Richels	\$110	\$240
Peck & Teisberg	\$12-14	Martin-Burniaux	\$80	\$170
Fankhauser	\$22.8	Rutherford	\$150	\$260
Maddison	\$8.25	Cohan-Scheraga	\$120	\$330

Figure 2

⁶² Sunstein.

⁶³ *Ibid.*

⁶⁴ Manning, Alexis. “An Economic Analysis of the Kyoto Protocol.” *The Park Place Economist* Volume X. <https://www.iwu.edu/economics/PPE10/alexis.pdf>.

⁶⁵ Barrett

Lastly, how does the agreement take environmental justice into consideration? The Kyoto Protocol's Clean Development Mechanism shows support for environmental justice. The thinking behind the Clean Development Mechanism is to encourage sustainable development. Fully developed countries will take time and significant capital to shift from the heavy industry that is so embedded in the economy. However, if developing countries can build infrastructure sustainably, they can develop sustainably. To quote Frederick Douglass, "It is easier to build strong children than to repair broken men." In addition to the Clean Development Mechanism, the financing and funding from developed countries to less developed countries is also a nod to environmental justice.

4.3

Why The Kyoto Protocol Failed

The purpose of the UNFCCC is to provide support for the further creation of IEAs. Thus, its success here is measured by its support and creation of further agreements, not by actual emissions reductions whereas the Kyoto Protocol's success will be measured by emissions changes. Kyoto is an obvious example, but further evidence of the success of this living framework can be seen as recently as 2015 in the Paris Agreement. The Paris Agreement, an extension of the UNFCCC, has been regarded as "The World's Greatest Diplomatic Success"⁶⁶ and a "Landmark Climate Accord."⁶⁷ The Paris Agreement, to be discussed in depth later, illustrates the success of the UNFCCC by its creation, but also by its commitment by 195 nations

⁶⁶ Harvey, Fiona. 2015. "Paris Climate Change Agreement: The World's Greatest Diplomatic Success." *The Guardian*, December 14. <https://www.theguardian.com/environment/2015/dec/13/paris-climate-deal-cop-diplomacy-developing-united-nations>.

⁶⁷ Davenport, Coral. 2015. "Nations Approve Landmark Climate Accord in Paris." *The New York Times*, December 12. <https://www.nytimes.com/2015/12/13/world/europe/climate-change-accord-paris.html>.

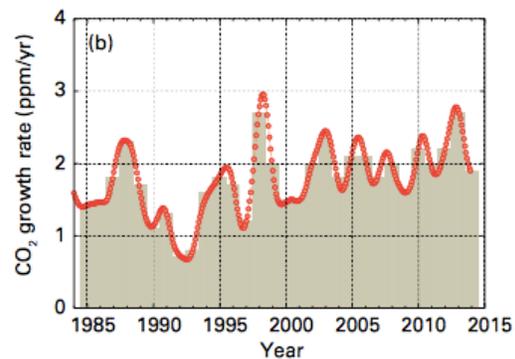
to participate. Clearly the Framework provides a strong backbone and constant support for more and more IEAs.

The Kyoto Protocol, on the other hand, is not adequately inclusive, has ineffective non-compliance mechanisms, and a troubling cost-benefit analysis. After all, the more participants to the agreement, the greater the perceived benefits.⁶⁸ While it isn't perfect, the Kyoto Protocol fulfills some of the requirements. But despite these shortcomings, has it actually been successful?

In terms of the IEA success, which this paper is intended to analyze, the Kyoto Protocol was a failure. The Kyoto Protocol intended to reduce greenhouse gas emissions by targeting developed countries and major polluters. Most consider carbon dioxide to be the first place to look because "Among the six dominant

greenhouse gases (GHG) mentioned by the UNFCCC, carbon dioxide emissions are the main contributor to the bulk of accumulated GHG emissions, representing more than 62 per cent of total GHG in the 2000s and showing the highest growth rates over time."⁶⁹ The graph above shows that parts per million of carbon dioxide have been growing consistently.⁷⁰ "The treaty hasn't dramatically reduced global carbon dioxide emissions, nor caused any noticeable change

Figure 3



⁶⁸ "What Makes Environmental Treaties Work?" 2008. *Conservation*. July 29.

<http://www.conservationmagazine.org/2008/07/what-makes-environmental-treaties-work/>.

⁶⁹ Grunewald, Nicole, and Inmaculada Martinez-Zarzoso. 2016. "Did the Kyoto Protocol Fail? An Evaluation of the Effect of the Kyoto Protocol on CO₂ Emissions." *Environment and Development Economics*; Cambridge 21 (1): 1–22.

⁷⁰ WMO Greenhouse Gas Bulletin: The State of Greenhouse Gases in the Atmosphere Based on Global Observations through 2014. World Meteorological Organization. Number 11. November 9, 2015.

in the composition of Earth's warming atmosphere.”⁷¹ In fact, in 2012 greenhouse gas emissions had risen 58% globally since 1990.⁷²

There are several places to point to in the Kyoto Protocol to attribute to its failure. The first and most major one is the lack of participation by the United States and lack of participation by developing countries. There are two major arguments as to why the United States did not ratify the Kyoto Protocol, which have been studied extensively by Hovi, Sprinz, and Bang. The first obstacle to the US ratification of the Protocol was the Byrd-Hagel resolution, which was passed in 1997 (months *before* the Kyoto Protocol). It stated:

The United States should not be a signatory to any protocol ... which would (A) mandate new commitments to limit or reduce greenhouse gas emissions for the Annex I Parties, unless the protocol ... also mandates new specific scheduled commitments ... for Developing Country Parties within the same compliance period, or (B) result in serious harm to the economy of the United States.⁷³

Although Byrd-Hagel was not legally binding, it captured the sentiment of the senate and, with a vote of 95-0 in its favor, made clear that the US would not participate in an agreement that did not take into consideration future development and competition. In 2000, George Bush rejected the Kyoto Protocol citing Byrd-Hagel. He said: “the Senate’s vote, 95–0, shows that there is a clear consensus that the Kyoto Protocol is an unfair and ineffective means of addressing global climate change concerns.”⁷⁴

⁷¹ “Twelve Years Ago, the Kyoto Protocol Set the Stage for Global Climate Change Policy.” 2017. *Smithsonian*. Accessed March 16. <http://www.smithsonianmag.com/science-nature/twelve-years-ago-kyoto-protocol-set-stage-global-climate-change-policy-180962229/>.

⁷² “Kyoto Climate Change Treaty Sputters to a Sorry End.” 2017. *CBC News*. Accessed March 16. <http://www.cbc.ca/news/politics/kyoto-climate-change-treaty-sputters-to-a-sorry-end-1.1184986>.

⁷³ Hovi, *et al.*

⁷⁴ *Ibid.*

The second potential explanation for the lack of US ratification is that the Senate was relatively split along party lines and thus, Clinton and Gore gave up pushing it through. Signing the Kyoto Protocol and knowing it would not be ratified nationally allowed the US to appear climate-friendly without having to make any potentially costly commitments.⁷⁵

Another problem for US ratification was that developing countries were not involved in the agreement. *The Guardian* depicts this well in the chart to the right.⁷⁶ Developing countries, including China, increased emissions greatly – they make up over 80% of the net change in emissions.

Change in CO2 emissions (GT), 1990 to 2011

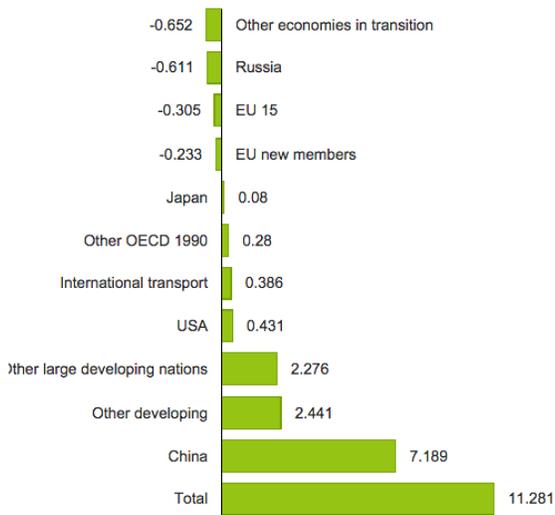


Figure 4

With penalties for noncompliance merely requiring a greater reduction of emissions in the next commitment period, there is nothing stopping countries from just quitting the Protocol. This is exactly what happened in Canada’s case. The penalties for non-compliance are so aggressive that leaving the Agreement – a process with no consequences – is seen as a better alternative. An advisor to the Canadian delegation advised the then Prime Minister: “if we ratify this thing we’ll never hit our targets.”⁷⁷ The liberal government went ahead and ratified the Kyoto Protocol anyway. Then, in 2005 the government transitioned from liberal leadership to more conservative leadership who tried to reduce the targets set. However, with fears of

⁷⁵ Hovi, *et al.*

⁷⁶ Clark, Duncan. 2012. “Has the Kyoto Protocol Made Any Difference to Carbon Emissions?” *The Guardian*, November 26, sec. Environment. <https://www.theguardian.com/environment/blog/2012/nov/26/kyoto-protocol-carbon-emissions>.

⁷⁷ “Kyoto Climate Change Treaty Sputters to a Sorry End.”

economic and political consequences, the government decided to abstain and instead set targets to stay in line with their ally, the United States. After the COP in Durban in 2011, the Prime Minister of Canada returned home and announced their withdrawal from the Kyoto Protocol. The same was true for Japan and Russia, which also failed to meet their targets and withdrew from the second commitment period, which is when the noncompliance penalties would have kicked in.

A final, less discussed issue is the cost-benefit analysis in conjunction with environmental justice. The cost-benefit analysis, as outlined by Sunstein above, clearly is a roadblock. The Kyoto Protocol is simply too costly. Further, one of the consequences of ensuring environmental justice throughout the Clean Development Mechanism is that developed countries are footing the bill for developing countries to compete on the world stage. Increased competition is perceived as costly.

In summary, the Kyoto Protocol failed due to lack of adequate participation, lack of effective mechanisms for ensuring noncompliance, ease of withdrawal, uneven cost-benefit structures, and unfair competition.

5

What Works? Toward a New Success Framework

The Montreal Protocol continues to be a success story, while the Kyoto Protocol is a flop. To put the difference into context, consider that the Montreal Protocol has had 20 times the impact that Kyoto has had.⁷⁸ The United Nations Environment Programme (UNEP) estimates

⁷⁸ Molina and Zaelke.

that the emissions that have been averted thanks to the Montreal Protocol, which while damaging the ozone layer are also greenhouse gases, are equivalent to 135 billion tons of carbon dioxide.⁷⁹

The previous sections outline the current scholarship in examining IEA success (sections one and two). Section one recognizes similar scholarship by Scott Barrett, but insists on a different research method and scope. Section two established the current epistemology and sections three and four examined historical success and failure in the Montreal Protocol and Kyoto Protocol, respectively. Section five, this section, is my contribution, seeking to define the key factors of a successful IEA and add to the scholarship on the subject as they may have been deduced from the preceding work.

Scott Barrett makes a number of useful conclusions in his interdisciplinary approach to IEAs yet limits himself. I seek to build on his work. At the end of “Environment and Statecraft,” Barrett summarizes his conclusions on what he describes as ‘treaty-making’.

1. Treaties are created to rearrange incentive structures to coerce behavior.
2. Treaties must ensure cooperation, compliance, and prevent non-participation.
3. Regional or bilateral problems are easier to solve than global, multilateral ones.
4. The measures by which treaties change behavior are conscious choices.
5. Treaties must balance the depth of the targeted change with the level of participation.
6. Linking different instruments to coerce parties to cooperate, i.e. trade restrictions for non-participation, are successful tools.

⁷⁹ Ozone Secretariat. “Montreal Protocol – Achievements to Date and Challenges Ahead.” Accessed March 20, 2017. <http://ozone.unep.org/en/focus/montreal-protocol-achievements-date-and-challenges-ahead>

7. The level of participation required for treaties to enter into force is a conscious choice.
8. Treaties can utilize 'side payments' to require wealthy, developed nations to help poorer developing ones. This is again a conscious choice.
9. It is a realistic assumption that treaties only achieve a second best outcome.
10. "Customary law determines whether a treaty is needed and what a treaty is able to achieve."⁸⁰

My work, focused on IEAs with regards to air pollution, finds more specific, clear-cut keys for IEAs. My conclusions overlap with some of Barrett's scholarship, but also expand and develop other relevant ideas.

So what are the keys to success in an IEA? *Participation* is the first crucial step to success in an IEA. Without adequate participation, no matter how strong the commitments to the IEA, the problem will be exported. Since the focus here is on multilateral air pollution agreements, regional participation is not adequate either. Thus, I urge for truly global participation. That means including countries at all stages of development: any country participating on the world stage – politically and/or economically – no matter their size needs to participate in the IEA. As we learned in the cases of Montreal and Kyoto, it is important that we do not treat all participating nations the same. *Divisions of nations* ought to be created to establish a distinction in need and ability. The classic solution to this is developed and developing countries, but other distinctions may be made as well. These countries ought to all participate in the IEA, but their requirements should be adjusted accordingly. Along the same lines, *funds* may be drawn from nations to propel the IEA according to the division of nations. In

⁸⁰ Barrett

the IEAs examined here, both emphasize the success of the funding systems. These funds serve most largely to help developing countries. More so, I argue that they also should to be used to bring the benefits closer in line with the costs of an IEA.

Universal participation can help avoid compliance issues as seen in the Kyoto Protocol by turning the pollutant into a commodity. By commoditizing the pollutant the IEA seeks to control, the costs of the IEA can be significantly reduced. Reduction targets are also more likely to be reasonable with wide participation because the needs of participation and extent of reduction targets act as a balance to each other.

Next, the perceived costs have to be reasonably close to the perceived benefits. This is a good starting point, but as research has shown, these analyses vary too widely. Instead, the better place to encourage participation is through *incentive mechanisms*. An IEA will be successful if everyone participates, but everyone will only participate if there is a threat in not participating. That threat is created by participation, to begin with. Montreal is a good example where participation from major economies – the US for example – encouraged participation from other, smaller countries threatened by losing certain trade relations with that nation. A successful IEA will not only incentivize nations to join the agreement with funding, but also create a threat to not joining the agreement. This double layer of protection brings costs of participating vs. not participating in line with each other, thus encouraging participation. Further, it prevents countries from leaving the agreement – another measure of compliance.

With incentives and participation universally guaranteed, we can begin to discuss the meat of the agreement. In terms of the actual targets, the agreement must be *particular and specific*. Air pollution is a massive problem, but for IEAs to be effective, it must take the larger problem it wishes to address and break it down into smaller problems. Creating specific targets

for specific pollutants is central to the success of an IEA. The more specific and controlling the IEA, the better the agreement. IEAs can be specific is by targeting a specific pollutant or cause of pollution in piecemeal fashion. Similarly, IEAs can be specific in creating yearly targets for emissions reduction so that non-compliance never gets too far out of hand. Another place for IEAs to be specific is in its designations of different countries by current status or ability (i.e., developing and developed), as mentioned above.

Precise requirements from each nation are effective through *reporting and transparency*, which provide additional measures of compliance. As we saw in Montreal and Kyoto, compliance can come from many different places other than an explicit, punitive, compliance board. Transparency serves to reassure all parties that they are not being duped. Reporting is the simplest form to ensure transparency.

There is one final mechanism that I would encourage IEAs to take into account, which not only solves many problems with cost-benefit analysis, but also ensures equal understanding of the threat. That is *defining a social cost* of the pollutant that IEA targets. Certainly different countries will value the social cost of a pollutant differently, but by creating a floor – similar to a minimum wage – IEAs can ensure that a cost is recognized and can assist in a more consistent cost-benefit analysis. This social cost minimum is something that would be alive and revisited at each COP, since it would likely change throughout time. It would assist in ensuring long term compliance as governments change periodically, which allows views on climate change to shift accordingly.

Consider, for example, the United States. President Donald Trump and his head of the Environmental Protection Agency (EPA), Scott Pruitt, have been explicit about their disbelief in climate change. This paragraph could continue on forever discussing the problems with their

stance, but again, this paper takes the stance of climate change as real and not debatable. As the *New York Times* has reported, the White House is able to revisit a metric called the social cost of carbon. This metric, involved in much budgeting during the Obama Presidency, currently places a value of \$36 of economic impact on each ton of carbon polluted. If Trump were to change this, as he threatens to do, it would drastically shift the cost-benefit analyses that Barrett relies so heavily on. Further, it would provide the Trump administration with justification for withdrawing from climate agreements.

To summarize my findings and highlight the differences of them with the previous scholarship in section one: agreements need to be open and inclusive – they need to have universal participation. Next, the need for transparency through reporting is necessary too. Transparency, reporting, and incentives like trade consequences serve as compliance measures. Thus minimal penalties are necessary for noncompliance. Funding for the agreements is still crucial as past and present scholarship suggests. The definition of a social cost can also help to mitigate cost-benefit analyses that countries utilize.

6

Looking Ahead

The current international climate is ripe for the creation and implementation of IEAs. The next IEA to take action is the Paris Agreement, an appendage to the UNFCCC. This section will examine – using the same methodology as sections three and four, but the updated epistemology of section five – the Paris Agreement.

The Paris Agreement was signed in 2015 to further the UNFCCC and prevent climate change. The agreement aims to (1) restrict the increase in average global temperature to below two degrees Celsius relative to 2015 and to restrict the increase to 1.5 degrees Celsius above pre-

industrial levels, (2) foster clean development and adaptation mechanisms according to the changing climate, and (3) finance the clean development of developing countries. Parties to the agreement are to reduce greenhouse gas emissions as soon as possible. While nations commit to reducing emissions, they do so entirely on their own accord. Targets and the means to that end are entirely left up to the individual nations in what can be described as a bottom up approach to climate change.⁸¹ The Paris Agreement emphasizes the need to act now – the longer we wait to make a change, the more expensive it gets.

Similar to the analysis of the Montreal and Kyoto Protocols, I will utilize the keys to success that this work has laid out on to predict the success or failure of the Paris Agreement. The first factor to examine is participation. The Paris Agreement has been well received, with 139 of 197 the parties to the UNFCCC having ratified the agreement, thus far. More parties continue to sign on to the agreement. Among the nations participating are the United States and China, the two countries most responsible for the failure of the Kyoto Protocol. Many have suggested that with the United States and China participating, the Paris Agreement is sure to be taken seriously.⁸² Participation is a good sign, but it needs to be bolstered by incentives to ensure continued cooperation, participation, and compliance. These incentives do not exist under the Paris Agreement. Without incentives, ensuring compliance and success is poised to be difficult.

Along the same lines of participation is how nations are treated and organized under the agreement. The Paris Agreement involves and includes all types of countries and encourages parties to reduce emissions in a reasonable manner. As Article 3 to the Paris Agreement states:

⁸¹ Birnie, *et al.*

⁸² “U.S., China Ratify Paris Climate Agreement.” 2016. *Reuters*. <http://www.reuters.com/article/us-china-climatechange-idUSKCN11901W>.

“The efforts of all Parties will represent a progression over time, while recognizing the need to support developing country Parties for the effective implementation of this Agreement.”⁸³ It is crucial for the involvement and commitment by major polluters like the United States and China. Treating nations appropriately assists in encouraging participation.

Through the recognition of the difference of national need and capability comes the question of how to support those developing countries that may need financial help or incentives to be on board. As the preamble to the agreement states: the agreement takes into account “the specific needs and special situations of the least developed countries with regard to funding and transfer of technology.”⁸⁴ So is the agreement adequately funded? The Paris Agreement utilizes the Green Climate Fund to assist in the transfer and support of technology and adaptation for developing countries. The Green Climate Fund is well funded per deposits from primary, developed nations. This funding is essential, as delaying the transition to clean energy would make for a costlier transition in the future.

Next, consider the targets set for emissions reduction and the specificity of those goals. The Paris Agreement is exceptionally vague in this regard, but that is intentional. As described, the Paris Agreement takes a bottom up approach by giving nations the ability to set their own goals and report their plan accordingly. This different approach is new, but I argue it is problematic. This reinforces the inclination of parties to only make changes that are economically driven and ignores environmental justice concerns. In the case of climate change and the expensive up-front costs of making change, this is problematic. Separating nations according to their ability and need (i.e., developing and developed countries) and including all

⁸³ “Paris Agreement.”

⁸⁴ *Ibid.*

types in the agreement also allows for greater specificity and assigned targets. The Paris Agreement fails to be specific enough with its goals.

As I have explained, instead of setting specific, compulsory emissions reduction targets, nations create their own plans. The Paris Agreement requires transparency and reporting of these plans and goals to continue to monitor parties to the agreement. Perhaps this transparency and reporting of emissions and plans to reduce them fills in the gap left by the vagueness of targets, but as I explained this will be insufficient to propel real change. Thus, although transparency and reporting mechanisms exist, they are effectively irrelevant without specific goals of how to reduce temperature change.

The final consideration is if there is a price tag on pollution. As countries set their emissions reduction targets independently, they will undoubtedly be calculating their costs vs. benefits. In doing so, it is crucial that there is a commonality in the recognition of the harms of global warming as the preamble of the Paris Agreement suggests. However, there is no explicit mention of a set cost of pollution. This is another failure of the Paris Agreement.

In summary, the Paris Agreement is a step in the right direction, but is unlikely to succeed to the fullest extent according to the keys to a successful IEA. The agreement's strengths include participation, defining and dividing nations according to their need and ability, the transparency and funding. On the other side of the coin, the agreement fails to create incentive mechanisms to be party to the agreement, it fails to create any specific targets for change, and it fails to define the cost of polluting. While the Paris Agreement will not be a success to the fullest extent possible, I remain hopeful and optimistic about IEAs.

Appendix

List of Annex I Countries to the Kyoto Protocol. These countries signed the agreement, but did not ratify it nationally in all cases.

Australia
Austria
Belarus
Belgium
Bulgaria
Canada
Croatia
Cyprus
Czech Republic
Denmark
Estonia
European Union
Finland
France
Germany
Greece
Hungary
Iceland
Ireland
Italy
Japan
Latvia
Liechtenstein
Lithuania
Luxembourg
Malta
Monaco
Netherlands
New Zealand
Norway
Poland
Portugal
Romania
Russian Federation
Slovakia
Slovenia
Spain
Sweden
Switzerland
Turkey
Ukraine

United Kingdom of Great Britain and Northern Ireland
United States of America

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