

WHY THE MONTREAL PROTOCOL IS NOT A TEMPLATE FOR MULTILATERAL ENVIRONMENTAL AGREEMENTS: AN EXAMINATION OF WHY CHINA AND INDIA RATIFIED

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ABSTRACT: *The Montreal Protocol is widely considered one of the most successful multilateral environmental agreements to date. The success of the Montreal Protocol can be attributed to negotiations between developed and developing countries, which led to the establishment of the Multilateral Fund and guidelines for the transfer of ozone depleting substance (ODS) replacement technologies, incorporated into the London Amendment of 1991. Further examination indicates that large developing countries, specifically China and India, faced complex decisions prior to ratifying, but that the negotiated changes, or side payments, shifted each country's cost-benefit ratio in favor of ratification. China was primarily motivated by economic growth and a relatively seamless transition from ODS to more environmentally safe substitutes. Consequently, China quickly ratified after negotiations and agreeable side payments were established. India, however, was reluctant to sign the Protocol even after revisions to Articles 5 and 10, due to concerns about equity, state sovereignty, green imperialism, and the challenge of regulating India's ODS-utilizing businesses. Ultimately, India ratified because the Protocol was the best way to gain the benefits of side payments and avoid economic sanctions. These differing perspectives illustrate the complexity of each country's decision, and indicate that beneficial side-payments were the dominant factor encouraging China and India to ratify. Further analysis indicates that current international environmental problems, involving developed and developing countries, which do not have clearly defined and feasible side payments, appropriately balanced with the threat of economic sanctions, will likely be unable to follow the model set forth by the Montreal Protocol. In the end, ODS phase-out is a unique problem with factors that are unlikely to be replicated.*

Keywords: *Montreal Protocol, India, China, Multilateral Environmental Agreement*

BACKGROUND

The *Montreal Protocol on Substances that Deplete the Ozone Layer* (known henceforth as the Montreal Protocol or the Protocol) was the culmination of fifteen years of scientific research, political debate, and international bargaining. It was a global response to a new type of danger to the international community: looming ecological disaster and the inherent associated security risks (Benedick, 1998). Today, the Montreal Protocol is widely known as one of the most successfully implemented multilateral environmental agreements (MEAs). Indeed, 2010 marks the year in which all developing countries are scheduled to completely phase-out the first of the ozone depleting substances: CFCs, halons, and carbon tetrachloride. The success of the Protocol is directly related to the negotiations between developed and developing countries, such as China and India. While many authors have examined the Protocol in depth, and several have analyzed the Montreal Protocol with regards to large developing countries (many of whom are cited in this paper and provide a foundation for this analysis), no author has taken the additional step to examine if the factors involved in China and India's ratification make the Protocol a template or guideline for other MEAs.

Stratospheric ozone provides a layer of protection for living organisms on the earth's surface by absorbing harmful ultraviolet (UV) radiation. Without the ozone layer, life on earth could not be maintained in its current state (Jacobson, 2002). The first ozone-depleting substance, dichlorodifluoromethane (CFC-12), was created in 1928 and used by General Motors as a refrigerant (Jacobson, 2002). Since then, CFCs, and a number of other substances identified as ozone depleters, have been used in a variety of applications including spray-can propellants, blowing agents for foam production, degreasing agents, and air conditioning coolants. By the early 1970's, nearly 2 billion pounds of CFCs were being produced and distributed annually (Liften, 1994; Benedick, 1998). In 1974, two American scientists, Molina and Rowland, postulated that chlorinated compounds, such as CFCs, initiate a catalytic

chain reaction that destroys stratospheric ozone. Since chlorinated compounds have no natural removal mechanism in the stratosphere, Molina and Rowland alarmed many scientists and politicians by reporting that CFCs can persist between 40 and 150 years, continually destroying ozone (Molina and Rowland, 1974). Despite these conclusions, several years of additional scientific study produced inconclusive results, and many countries chose not to regulate ODS usage in the late 1970s and early 1980s (Liften, 1994).

In 1977, the first international meeting to address ODS, led by the United Nations Environmental Program (UNEP), was held in Washington, D.C. and resulted in the “World Plan of Action on the Ozone Layer.” This plan focused on cooperative research, but did not address further coordination to assess ozone depletion and the phase out of ODS (Sell, 1996; Kelly, 2004). The next international meeting was the Vienna Conference (1985), which was instrumental in coordinating international efforts and establishing a general responsibility for all countries to protect the ozone layer. While the Vienna Conference did not establish a specific timetable or create any legally binding targets for reduction of ODS, it did effectively set the stage for the Montreal Protocol and designated UNEP as the official secretariat (Patlis, 1992; Benedick, 1998).

THE MONTREAL PROTOCOL

Between the Vienna Convention and the Montreal Protocol, a British Antarctic Survey presented stunning evidence showing that springtime stratospheric ozone levels had dropped severely, creating an ozone hole that drifted northward during the Southern Hemisphere summer, mixing with other air masses. The consequence was a reduction in worldwide ozone concentrations (Jacobson, 2002; Murdoch and Sandler, 1997). As negotiations began in Montreal, the ozone hole served as the “driving force” and the “dread factor” that spurred developed nations to act (Benedick, 1998).

The Montreal Protocol established timetables to immediately begin reducing the production and consumption of ozone depleting substances, and called for the adoption of international trade sanctions to achieve its targets (Ozone Secretariat, 2000). Article 5 of the Protocol defined a developing country as “a country that annually consumes less than 300 per capita grams of controlled substances [ODS].” (Ozone Secretariat, 2000) By this definition, most of the developing world, including India, China, Brazil, and Indonesia, fell under Article 5. In Article 5, the Protocol adopted a policy of “common but differentiating responsibility” where all nations were obligated to meet ODS phase-out targets, but under different conditions (Kelly, 2004). The only concession given to developing countries in Article 5 was the ability to delay phase-out by 10 years, allowing them until 2010 to implement ODS-reducing technologies. Article 10 of the Protocol listed a second concession, calling for an increase in the exchange of research and information concerning ODS replacement technologies and the provision of subsidies as required, specifically to developing nations (Ozone Secretariat, 2000; Patlis, 1992). This statement, however, amounted to little more than a promise in the eyes of many developing nations, who did not believe that the concessions stated in Articles 5 and 10 gave them the ability to meet ODS phase-out targets (Sell, 1996).

Ultimately, forty-five states and the European Community signed the Montreal Protocol in 1989 (Patlis, 1992). Key developing countries, however, such as India and China, refused to sign insisting that industrialized nations should pay all the incremental costs incurred by developing nations as they reduced consumption and production of ODS (Barrett, 2003; Kelly, 2004). China and India’s refusal to sign was seen as a blow to the effectiveness of the Protocol due to enormous potential of each country to utilize ODS. Although they only consumed a small fraction of the world’s ODS in the late 1980s, the two countries contained 35 percent of the world’s population and had a drastically increasing demand for ODS-utilizing technologies. Due to the ten-year delay given in Article 5 of the Protocol, the projected increase in ODS consumption from China, India, Indonesia, and Brazil would double the 1986 baseline CFC production *even if they adhered to the Protocol’s guidelines* (Patlis, 1992; Sell, 1996). Developed countries were consequently prompted to reexamine the effectiveness of Articles 5 and 10 and negotiate changes.

DEVELOPING SIDE PAYMENTS: REVISIONS TO ARTICLES 5 AND 10

For many developing countries, protecting the ozone layer was secondary to economic development. Developing countries viewed the cost of converting ODS-dependent industries to ozone friendly alternatives as too high without foreign assistance. This viewpoint was especially true for China and India, where recent economic growth had stimulated an increase in both the production and consumption of ODS (Multilateral Fund [MLF] Report, 2007). Throughout the 1980’s, both China and India invested money in ODS industries. By 1989, China

possessed twelve CFC-producing factories and India possessed four (Sell, 1996). Additionally, many developing countries were frustrated with the idea of forcibly giving up ODS, believing that the problem was created by developed countries, and should, therefore, be the responsibility of developed countries to solve (Biermann, 2002). To reconcile the positions of developed and developing countries, compromises in the provision of financial support (Article 5) and technology transfer (Article 10) were necessary. At the 1989 London Conference, China's Commissioner for Environmental Protection proposed a global monetary fund to help China phase-out ODS. China's position was that industrialized nations should fully finance the fund and "provide the Third World with more expensive substitutes for CFCs 'free of charge'" (Sell, 1996). Between the 1989 London Conference and the 1991 London Amendment, China and India became increasingly insistent about their demands. After a lengthy debate over the semantics of the funding proposal, the U.S. and other developed nations agreed that a side-payment, in the form of a monetary fund, was warranted to assist developing nations achieve ODS phase-out. The subsequent establishment of the MLF prompted China to sign the Protocol and London Amendment in June of 1990. Despite lingering objections to the Protocol, India signed the day after China (Sell, 1996).

The second major concession, or side-payment, given to developing countries was the transfer of ODS substitute technologies. The London Amendment modified Article 10 of the Protocol to state that developed countries were required to transfer the best available and most environmentally safe ODS substitutes and technologies to developing countries. This requirement was designed to prevent developing countries from becoming economically dependent on the technology of developed countries as they transitioned from ODS (Patlis, 1992).

CHINA: FACTORS INFLUENCING RATIFICATION

Beginning in the late 1970's, during the later stages of its Cultural Revolution, China transitioned from a state-administered, closed economy to an open economy that allowed for free market trade (Warburton and Horn, 2007). The shift to free market trade allowed for China's economy to rapidly expand; however, the shift also resulted in a concurrent increase in environmental degradation and health-related problems (Ross, 1998; Zhao and Ortolano, 2003). China's State Environmental Protection Agency (SEPA, known as NEPA prior to 1998), did not wield the influence of other Chinese ministries and was chronically under-resourced; which is one major reason environmental concerns about ODS were a secondary consideration (Warburton and Horn, 2007). A quote from a SEPA spokesman taken prior to China's signing of the Protocol summarized the perspective of the Chinese government: "There are 1.1 billion Chinese, so if the ozone layer breaks down, the one-fifth of the world's population that is Chinese will be hurt and we'll suffer the most." He also stated, however, that "the call for modernization is so irresistible that China will continue to produce these ozone depleting chemicals." (Sell, 1996)

China's ODS utilizing business sectors evolved along two lines: large sectors, such as refrigeration, that had substantial export revenues, and small sectors, such as the foam industry, that produced few exports and mainly catered to China's domestic needs. By signing the Protocol after the London Amendment, China hoped to keep abreast of changes in ODS technologies and to obtain substitute chemicals, which would allow their businesses a relatively seamless transition from ODS. Additionally, China believed the technical assistance mandated by the Protocol would allow their export businesses to remain competitive in international markets and to trade with countries that also ratified the Protocol (Zhao and Ortolano, 2003). The Chinese government had a positive relationship with many of its ODS-utilizing businesses and understood the challenges they faced with the impending transition. In retrospect, the MLF covered the majority of costs associated with switching from ODS to substitute technologies; therefore the transition had a relatively small impact on the growth of the Chinese economy and export trade – exactly what the Chinese had hoped (Zhao, 2005). Additionally, the MLF proved to be the key factor for business sectors that sold products only on the domestic market. Since no external market demand was driving an immediate switch from ODS, funds from the MLF provided the motivation necessary for smaller business sectors to transition (Zhao and Ortolano, 1999).

While continued economic growth was the primary factor that led China to ratify the Protocol after revisions to Articles 5 and 10, other factors further contributed to China's decision. First, China faced internal pressure from several stakeholders to ratify. SEPA (then NEPA) had a vested interest in expanding its responsibility and authority by administering and coordinating the implementation of MLF funding and projects. Through the MLF, SEPA was able to increase its administrative capacity and receive critical technical training, thereby becoming a key actor in the transformation of several industries (Zhao, 2005; Sims, 1996). Second, China's scientific community played a role in convincing politicians that ozone protection was a priority. China appeared to be concerned about the negative effects of ozone depletion as early as 1986, as it sent observers to attend a UNEP led

Ozone Layer Protection Working Group, mainly due to the urging of its scientific community (Zhao and Ortolano, 2003). Third, China saw an opportunity to take a leadership role in the negotiations concerning Articles 5 and 10, which occurred between the Protocol and the London Amendment. In doing so, China showed responsibility to the international community and therefore increased its legitimacy and prestige (Zhao and Ortolano, 2003). This legitimacy has since led to further negotiating leverage with other MEAs, such as the Kyoto Protocol.

INDIA: FACTORS INFLUENCING RATIFICATION

Unlike China, Indian government officials cautiously approached the Protocol and were apparently reluctant to sign even after the London Amendment. Like China, India ultimately ratified the Protocol because the Protocol provided the financial and technological support India required for continued economic expansion and to avoid trade sanctions with Protocol-ratifying countries. Whereas China had begun free market and export trade practices in the late 1970s, India began the process of liberalizing its economy in the late 1980s and early 1990s, just as the Protocol was first implemented (Sims, 1996). Consequently, the Indian government, unlike China, did not see any immediate economic opportunity in the MLF. Two-thirds of India's ODS users were in small-scale and informal business sectors, scattered across the country. The Indian government was not certain how to begin identifying ODS users, let alone how to successfully phase ODS out. The Indian government was unprepared to address the social, economic, and political repercussions of disrupting the number of businesses required to phase-out ODS (Sims, 1996).

Indian government officials were also very concerned about the issue of equity, and they relayed their frustration in London during the 1989 Conference and 1991 Amendment meetings. To India, the problem of ozone depletion was one caused by developed countries, and it was, therefore, a problem that developed countries should be responsible for solving (Biermann, 2002). Indeed, in 1987, when the Protocol was first signed, ODS consumption in developed nations was 20 times that of developing nations. Despite possessing less than 25 percent of the world's population at the time, developed nations consumed 88 percent of CFCs produced (Benedick, 1998; Dore, 1997).

In addition to equity, India felt that its sovereignty was threatened by developed nation pressure, and was afraid of becoming dependent on chemicals it could not produce. India viewed this possible dependence as green imperialism, or the forced imposition of environmental views for economic or political gain (Driessen, 2005), and this fear was the major reason they pushed for rewriting Article 10 of the Protocol. India was especially worried about the transitional substitute chemicals that would replace CFCs for only several decades. By accepting these transitional chemicals, India potentially opened itself up to some level of financial control by developed nation manufacturers (Sims, 1995). The probability of technological dependence alarmed the Indian government, Indian manufacturers, and the small percentage of the public that paid attention to the issue. India believed the only way to solve the issue was outright technology transfer, which many developed nation manufacturers were reluctant to do because of intellectual property rights (Sturli gross, 1999; Sims, 1995).

The Indian governmental structure also contributed to their reluctance to sign the Protocol. For many years, India had employed an "organizational initiative" model whereby decisions were made privately and involved only politicians and interested parties (Sturli gross, 1999; Sims, 1995). Public pressure, therefore, was very limited concerning most issues, and ozone protection in the late 1980s and early 1990s fell into this category. Most citizens simply felt that ozone depletion was not a compelling topic (Sims, 1995). The political ramifications of accepting money from developed nations for an issue such as ODS, however, was a powder keg that incited a very vocal minority segment of the Indian public that monitored "North/South" power relations (Sims, 1995). These citizens were concerned, much like the Indian government, that developed nations were creating a "moral basis for green imperialism, which shifted blame from CFC manufacturers such as Du Pont to millions of poor CFC users in India..." (Shiva, 1993). The mounting pressure to resist developed nation interference, while at the same time addressing ODS phase-out, placed the Indian government in an unfamiliar and uncomfortable position.

Lastly, India was less motivated than China to sign the Protocol because it did not face the same internal pressure from its environmental protection agency, scientific community, and business sectors. In fact, the Indian reaction was almost diametrically opposite to the Chinese, in that very few stakeholders wanted the Indian government to jump headlong into ODS phase-out. Like SEPA, India's Ministry of Environment and Forests (MOEF) was still a relatively new ministry and did not view ODS as a means to gain prestige. Instead, they viewed ODS phase-out as costly, difficult, and unpopular (Biermann, 2002). Similarly, Indian environmental scientists preferred not to spend their limited resources on the ODS problem. They preferred to work on national and local pollution problems rather than a project they felt developed countries should be solving (Biermann, 2001). India's

ODS-utilizing businesses, which consisted of many small-scale operations, were largely reluctant to change due to the effort involved. Many barely profitable small businesses viewed ODS phase-out as a road to financial bankruptcy (Sims, 1996).

While India had very few factors leading it towards ratification, they ultimately did ratify after the London Amendment. The modifications to Articles 5 and 10 of the Protocol, along with the threat of trade sanctions, shifted India's cost-benefit ratio and overrode every other factor dissuading Indian governmental officials from ratifying. In the end, India did not see any better option to rid themselves of the ODS problem, which they realized was necessary for continued economic growth, than signing the London Amendment and accepting aid from developed countries.

COMPARISON OF WHY CHINA AND INDIA RATIFIED

Stratospheric ozone is a global public good because it provides services that are non-subtractable and non-excludable, meaning that everyone benefits from the existence of ozone. The degradation of the ozone layer harms all nations equally; however, the genesis of the degradation can be traced to developed countries, who acted purposefully to prevent ozone destruction by initiating international action through the Montreal Protocol. The majority of developing countries, including China and India, did not see the thinning of the ozone layer as their fault, and therefore not their responsibility. Consequently, they placed a greater value on economic growth than ODS phase-out. Several large developing countries, including China and India, had significant ODS-producing potential and the power to destroy the work of the Protocol and developed countries. The positions of developed and developing nations, therefore, were asymmetric, placing different values on what constituted the public good. When there is strong asymmetry between positions, there can be a change in the "rules of the game." Side payments, which otherwise might not be as effective, can enable a vastly superior outcome compared to an agreement without side payments (Barrett, 2003). When two sides are asymmetrically opposed, one side may refuse to change their position but nevertheless become committed to a desired course of action due to the payoffs involved (Sell, 1996; Barrett, 2003). This theory suggests why so many nations ratified the Protocol: side-payments created a favorable cost-benefit ratio for each. For China and India, the benefits of financial assistance and technology transfer, in conjunction with the threat of economic sanctions, outweighed any costs they had previously determined and allowed for continued economic expansion. For developed nations, the monetary costs incurred by establishing the MLF did not outweigh the benefit of stopping ozone depletion (Barrett, 2003).

Several conditions outlined in the MLF made the agreement even more palatable for China and India. The MLF recognized the rights of developing countries and their need to be compensated for a problem they did not initiate. This recognition gave developing countries the ability to justify the acceptance of funds from developed nations, which was controversial in the eyes of some of their citizens. Additionally, the MLF solicits input from developing nations in the distribution of funds as it is run by a panel consisting of developed and developing nations (Dore, 1997). Allowing developing countries to vote on the allocation of MLF funds gives them a legitimate sense of empowerment and ensures they are not subjugated to financial control from developed countries.

Analyzing the factors China and India faced prior to ratifying the Protocol indicates that each country had very different perspectives. Table 1 compares the reactions of China and India to each of the major factors that influenced their decisions to ratify. During negotiations prior to the London Amendment, China saw ODS phase-out as an opportunity for economic growth, while India saw it a nuisance and an infringement upon their sovereignty. Ultimately, it was the strength of the modifications to Articles 5 and 10, coupled with the threat of economic sanctions that dominated each country's decision and overrode any of the dissuading influences listed in Table 1. The side-payments forced ODS phase-out to be placed higher on the agendas of China and India. Without the MLF and technology transfer, China and India would have likely focused immediate socioeconomic needs and, at least in the short-term, avoided the problem of ODS phase-out (Biermann, 2002).

CONCLUSION: THE MONTREAL PROTOCOL CANNOT APPLY TO OTHER MEAs

The phase-out of ODS is a unique problem, the solution to which will be extremely difficult to replicate. In writing the Protocol, and subsequent amendments, developed countries were able to find a realistic balance between the threat of economic sanctions and effective side-payments for developing countries such as China and India. This balance is hard to establish and requires appropriate conditions. According to Barrett (2003), "carrots," or side-payments, can promote cooperation only if the positions of the countries involved are sufficiently asymmetric, and

will likely work only when they are coupled with effective “sticks” such as trade sanctions. Since each international environmental problem is distinct, finding the correct balance will likely result in a different combination of carrots and sticks than what was written in the Montreal Protocol. The myriad of factors that China and India faced in making the decision to ratify the Montreal Protocol lend insight into how difficult it may be to achieve this balance. Had any one of the factors listed in Table 1 been more influential than the side-payments (MLF and technology transfer) and the threat of trade sanctions, then it is likely that China and/or India may not have ratified. It is possible to envision a number of alternate scenarios that could occur if a balance between carrots and sticks is not found. For instance, it may be too costly to establish an effective MLF. It is also possible that there may not be available technologies to transfer. The cost-benefit ratio, therefore, would not be shifted for developing countries, and some, perhaps many, would not ratify. Another scenario could occur if either the sticks outweigh the carrots or if the carrots are not equitably distributed between countries (Zhang, 2009). In this case only some countries may choose to cooperate, while others decide to free ride, or chose not cooperate at all. A third scenario could occur in which the positions of the two sides concerning the environmental issue are not asymmetrically opposed. In this scenario side-payments may not be a feasible option because the “rules of the game” may not change.

Table 1. Comparison of the Factors that Influenced China and India to Ratify the Montreal Protocol

Factor Influencing Ratification	China	India
Degree of Economic Liberalization	Shift to free market economy in the mid-1970s	Shift to free market economy in the late 1980s and early 1990s
Governmental Structure	Centralized	Organizational initiative with interested party involvement
State of ODS Utilizing Businesses	Clearly identified with export trade	ODS users not clearly defined; little export trade
Desire to Expand International Legitimacy and Prestige	Saw an opportunity through negotiations to expand	Saw no opportunity; primarily concerned with state sovereignty
Environmental Protection Agency	SEPA saw an opportunity to expand power and influence	MOEF saw ODS phase-out as a costly, difficult, and unpopular
Scientific Community Opinion	Supportive of adopting the Protocol	Felt the problem was developed nations to solve
Environmental Concern	Secondary to economic growth	Secondary to economic growth, sovereignty, and avoiding sanctions

A second reason why the Montreal Protocol cannot universally apply is that the stakes for economic transition from ODS to safer chemicals were relatively low, despite the gravity of the problem. In essence, the transition involved the substitution of one group of chemicals for another. Any logistical issues that arose with distribution were mitigated by the modifications to Articles 5 and 10 of the Protocol; in the end the transfer had only a minor economic impact on developing countries (Barrett, 2003). Additionally, substitutes for ODS were available and economically feasible. Du Pont, and other ODS producing companies, initially complained that it was costly and unrealistic to find alternatives, but were ultimately able to develop substitutes within a relatively short timeframe (Benedick, 1998). Once chemical substitutes were available, the transition was confined to industry. In the end, consumers did not see or care what type of coolant their refrigerator used, as long as it worked (Dore, 1997). If an environmental issue forces consumers to make significant changes to their lifestyle, then public resistance is likely to be greater. This may be especially true if a percentage of the population disagrees about the importance of the environmental issue in question.

ODS phase-out is also unique because *all* ozone depleting substances need to be phased out. There is no debate over allocation; each nation, developed or developing, has to individually achieve phase-out targets. This

type of cap may not be feasible for other types of emissions, such as greenhouse gases, which do not require complete phase-out in a very short timeframe (Victor, 2001). In addition, the science behind ozone depleting substances is less contested. While there was a period in the late 1970s and early 1980s when scientific studies produced inconclusive results, subsequent events, such as the ozone hole, improved computer models, and predicted cancer numbers, served to solidify the importance of ODS phase-out. Since virtually all ODSs are anthropogenic and not regulated by natural biogeochemical cycles, it was clear to delegates at the Montreal Protocol that once the production and consumption of ODS was halted, stratospheric ozone concentrations would begin to recover.

The success of the Montreal Protocol is unlikely to be replicated with current environmental problems, such as greenhouse gas emissions, because it is a fundamentally different problem. While both China and India have ratified the Kyoto Protocol, many questions still remain as to how they will successfully reduce carbon emissions. According to the example set forth in the Montreal Protocol, adequate deterrents and side payments must be available to assist and motivate large developing countries, with enormous pollution potential, in meeting reduction targets. Since the side-payments involved with the Kyoto Protocol are not as clear, and there is no equivalent of the MLF for carbon emissions, the end result may not be as favorable.

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