INTERNATIONAL NEGOTIATIONS AND AGREEMENTS ON CLIMATE CHANGE

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Contents

Summary

The negotiations surrounding climate change have been among the most contentious discussions at the international level. The ramifications of a change in the earth's climate due to humanity's actions have been described as both the greatest threat short of nuclear war or as a nonexistent phenomenon. This entry traces the history of the scientific understanding of anthropogenic impacts on the climate as well as international negotiations between governments to address the issue. While the Framework Convention on Climate Change was opened in 1992 and entered into force in 1995, the subsequent Kyoto Protocol opened in 1997 entered into force in February 2005, but without the ratification of the United States. Though some countries view the effects of climate change to be their greatest security threat, many countries see limitations on greenhouse emissions as a significant obstacle to their economic development or as a threat to their current levels of consumption and behavior patterns.

Beyond questions of scientific uncertainty, the perceived political and economic costs to greenhouse gas reductions continues to provide serious obstacles to decisive action on climate change beyond and apart from Kyoto. The establishment of multilateral projects that would allow developing nations to industrialize in a cleaner way than their predecessors with a portion of those emission reductions being credited to the developed nations may be the most viable avenue for obtaining greenhouse reductions without extreme costs to already developed nations.

1. Introduction

The debate over climate change may be the most contentious single issue in international environmental politics at the beginning of the twenty-first century. The debate encompasses questions of uncertainty, the intersections between scientific and political risk, as well as issues of intergenerational equity. Arguments are found from whether climate change is occurring at all, what consequences to climate change might there be, to finally whether this is all simply beyond human control. Taking the issue of regulating greenhouse emissions seriously requires a deep examination of the lifestyle and consumption patterns of developed nations and the philosophy of development internationally. Establishing the UN Framework Convention on Climate Change (UNFCCC, or simply FCCC) in 1992 was viewed as an important first step in bringing about significant action in addressing climate change. The ratification of the FCCC in 1995 initiated the subsequent annual Conference of Parties (COPs) to make clear what the actual commitments and timetables would be for the various countries to reduce and/or limit their greenhouse emissions. Many industrialized countries made specific promises for emission reductions in the Kyoto Protocol established in 1997, though the Protocol has not yet entered into force. While the Conferences have continued, significant progress has been stalled as some developed nations calculate that reducing their domestic greenhouse emissions will have devastating effects on their economies. Oil producing nations worry about a decline in the use of petroleum. On the other side of the debate, the small island nations fear that climate change has already led to more frequent, more intense cyclones and that a rise in sea level will drown them altogether. The international task now is broken into two different streams. First, there is the obligation to work towards the implementation of Kyoto. Second, and perhaps even more important, it is necessary to draw noncompliant states (particularly the United States) back into the international climate change negotiations, even if not necessarily within the framework of Kyoto.

2. Basic Science

Approximately one-third of the sunlight that strikes the earth is reflected back towards space. Gases in the atmosphere absorb some of that reflected radiation, which serves to warm the surface of the earth. The analogy often used is that of a greenhouse, though this is not scientifically accurate. Greenhouses work by blocking convection while in the atmosphere warm air rises and moves the heat to other areas. The term has gained such popular usage, however, that to change it now would no doubt lead to unnecessary confusion. The most prominent greenhouse gas is water vapor, which accounts for more than 90% of the observed warming by the atmosphere. The natural warming caused by the atmosphere makes it possible for life to exist on the Earth. This “natural greenhouse

effect" is *not* the focus of international negotiation. There are other gases that play a part in the warming of the earth, the key ones among them being carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), chlorofluorocarbons (CFCs), and ozone (O_3). Human activity has no direct connection to the amount of water vapor in the atmosphere, but clearly plays a part in the production and emission of these other gases.

While the term "greenhouse effect" can mean either the "natural" or "enhanced" greenhouse, it is the latter which is the focus of international discussion. Also, although the terms "greenhouse effect," "global warming," and "climate change" are used at times interchangeably, it is this last term which has become preferred in international discussions, due to its being considered the most politically neutral. It is unquestioned that the natural greenhouse helps sustain life on this planet. The question is whether the enhanced greenhouse is literally too much of a good thing. While the direct human contribution to the total greenhouse effect is minor in terms of percentage, many scientists express caution that the relationship between greenhouse emissions and their effect on the climate may not be linear. Indeed, the relationship may be such that the anthropogenic contribution could have drastic, cascading effects.

While there is little question that concentration of greenhouse gases (GHGs) are increasing in the atmosphere, some debate still exists as to what consequences that increase will have on the earth's surface. The scenarios being developed have been drawn from global circulation models (GCMs), a method that is not without controversy.

2.1 Global Circulation Models: Issues and Problems

Most of the reports on the consequences of increased carbon dioxide and other greenhouse gases in the atmosphere are taken from analyzing GCMs. These massive computer programs simulate the increase of carbon dioxide into the earth's atmosphere. Most GCMs use carbon dioxide as the primary greenhouse gas, using its increase to also simulate the warming caused by other GHGs, such as methane. The use of GCMs has been the preferred form of analysis by the major international bodies involved in the climate debate, most notably the Intergovernmental Panel on Climate Change (IPCC). There are, however, at least two major issues in regards to GCMs that need to be taken into account.

First, most GCMs provide a simulation of climate change at the global level. GCMs have so far not proven very useful in the analysis of regional consequences of climate change. This shortcoming contributes to some uncertainty in the models, and has allowed policymakers (and nay-sayers of climate change) to dismiss many of the conclusions drawn from the models. Critics have pointed out that there may be some regional benefits to climate change, such as an increased fertile zone in some regions. For example, Russia is often cited as potentially becoming the new breadbasket of the world.

Second, GCMs, like many computer models, have to simplify some of the variables it takes into account. The most problematic simplification may be the effect of clouds. While more clouds are caused by more water vapor (a greenhouse gas), this increased

cloud cover has an overall cooling effect on the surface of the earth. This feedback between water vapor and cloud cover has been difficult to incorporate into GCMs.

3. A Brief History of the Debate: The Early Discussions

While concern over humanity's impact on the atmosphere may have only captured the larger publics attention in the last quarter century or so, many scientists have given it some significant consideration in times past. French scientist Jean Baptiste Fourier first coined the term "greenhouse effect" in 1827. British scientist John Tyndall would later conduct experiments on the absorption of heat by carbon dioxide and water vapor. Tyndall posited that the reduction of some of these gases in the atmosphere might have weakened the natural greenhouse effect, bringing about the ice age. Perhaps most famously, in 1896, Swedish scientist Svante Arrhenius hypothesized that the increased use of coal due to the industrial revolution would lead to an increase in the concentration of carbon dioxide in the atmosphere. His conclusion that a doubling of CO_2 in the atmosphere would increase the average temperature of the earth 5–6 degrees centigrade are a little high by today's estimates, but still remarkable for the time. In 1938 G.S. Callender of Britain presented his measurements from 200 weather stations around the world showing an increase in average global temperatures from the 1880s to the 1930s. Callender's argument that this rise was being caused by increased carbon dioxide in the atmosphere did not receive much support from the Royal Society. There was not yet any proof that CO_2 concentrations were actually rising in the atmosphere, and it was argued that due to the turbidity of the atmosphere and the absorption of CO_2 by the oceans, the overall effect would be a cooling of the earth's surface.

3.1 The International Geophysical Year

The declaration of 1957 as the International Geophysical Year brought increased attention to the study of the atmosphere. An article by Roger Revelle and Hans Suess published in the Swedish journal *Tellus* argued that the oceans were not as effective a "sink" (absorbent) of CO_2 as has previously been believed. The University of California at San Diego's Scripps Institute of Oceanography would establish a station on Mauna Loa on the Big Island of Hawaii in 1957 to take measurements of the concentration of CO_2 in the atmosphere, a monitoring that continues today.

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Biographical Sketch

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