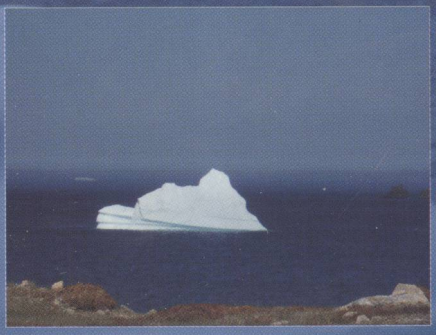
Global Warming and Climate Change

Ten Years after Kyoto and Still Counting



Volume 1

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Introduction

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CHAPTER

Introduction: Climate Change and Kyoto Protocol

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Scientists: Warming a major global security threat

Global warming should be recast as a security threat to help spur more active support to cut greenhouse gas emissions, climate change experts from around the world said at a meeting Tuesday. "The Cold War was the last big problem the world faced on so many fronts – economic, political, industrial ...[yet] we're not yet collectively grasping the scale of what we need to do."

John Ashton
British climate change ambassador[1]

The Nobel prize for 'An Inconvenient Truth' to Al Gore and to the Intergovernmental Panel on Climate Change, (IPCC) has brought climate change into the limelight and the IPCC report has put an urgency into dealing with the climate change impacts right away. The UN has played an important role in supporting the most advanced science on climate change. Through the IPCC, it has brought the phenomenon's likely impacts and probable costs to the attention of governments and the

[1]UN Wire, August 22, 2007, Internet Edition

*The views expressed in this Chapter are those of the author and not of the Institute.

general public. 'Unequivocal' is the word it now uses to describe the links between human activities – from the burning of fossil fuels to clear-cutting of forests – and climate change. Climate change literature suggests that even if greenhouse gas emissions stopped today, some level of climate change is inevitable.

INTRODUCTION

Climate change is one of the most significant and controversial environmental problems the human race presently faces. It is controversial because conflicting views[2] about the subject raise more questions. Is climate change good or bad? Has climate change already started, or is it part of our future? Are we doing anything about it? Should we be concerned? Is climate change caused by natural phenomena? Is it cyclical, or is it only caused by anthropogenic activities?

Although 'climate change' is used interchangeably with 'global warming', climate change is a more descriptive term. Greenhouse gases, i.e. carbon dioxide, methane and nitrous oxide, are naturally occurring gases in the atmosphere. What concerns scientists is the increase in the amount of these gases in the atmosphere. This increase, caused by anthropogenic activities, traps the heat which leaves the earth thus warming it up . Higher amounts of gases in the atmosphere trap more heat; this extra heat is reflected back to the earth. This so-called 'greenhouse gas effect' causes temperatures on the planet to rise. For example, if these gases double by 2050, as predicted, the earth's temperature could increase by 1.5

[2] There is a sharp difference of opinion among scientists about global warming and the risks it may pose. A few scientists say scenarios of rapid climate change are unwarranted. Others, however, are worried that rising levels of carbon dioxide could trigger a sharp and painful change in the Earth's climate. Scientists are influenced by the way they interpret data, but also by their broader world views.

Richard Alley (a Penn State University glaciologist) discovered a two-mile long ice core pulled up from the centre of Greenland. The core contained trapped air bubbles as old as 10 years, but revealed that bubbles of similar composition as those found 100,000 years ago - one of the earlier glacial periods. He predicts drastic changes. However, John Christy, a University Alabama climatologist, feels that global warming is not a problem; he found no sign of global warming in the satellite data. Based on this, research Senator James Inhofe [R-OK] went to the extent of calling global warming a hoax during debate on a bill for creating regulation to combat global warming in the fall of 2003. Wallace Broecker, a Columbia University oceanographer, is using his considerable stature to advocate a far-out scheme to slow global warming: giant machines would absorb carbon dioxide from the atmosphere, and the concentrated gas could be either pumped deep underground or turned into carbon-rich rocks. This certainly would not be cheap, but he says it would be easier than social engineering.

http://www.enn.com/news/enn-stories/2001/07/07242001/warming_44399.asp

to 4.5 degrees. This increase could create changes in global precipitation, which would have great consequences[3]. It is important to note here that studies focus on greenhouse gases generated by human activity because, as mentioned earlier, greenhouse gases are naturally present in the atmosphere. The effects of climate change include changes in rainfall patterns, raised sea levels, potential droughts, habitat loss, heat stress, migration of people, food security threats and changes in disease patterns.

Technically, climate change can be defined as a statistically significant variation in either the mean state of the climate or in its variability. This change persists for an extended period—typically decades or longer. Climate change may be caused by either natural internal processes or external forces, or may be attributed to persistent anthropogenic changes in the composition of the atmosphere or land use. In Article 1 of the United Nations Framework Convention on Climate Change (UNFCCC) 'climate change' is defined as "a change of climate which is attributed directly or indirectly to human activity that alters the composition of the global atmosphere and which is in addition to natural climate variability observed over comparable time periods." The UNFCCC thus makes a distinction between 'climate change' attributable to human activities altering the atmospheric composition and 'climate variability' attributable to natural causes.[4]

At this stage, the debate has shifted from if climate change is for real or not (or has the natural cyclical process accelerated due to anthropogenic causes) and how to deal with the changes and how we do we mitigate or adapt to the changes.

THE IMPACT OF CLIMATE CHANGE[5]

Global warming is impacting the whole planet: life on both land and in water is affected. Global warming is warming up the seas, causing thermal expansion, and melting the planet's ice caps, causing a rise in sea level. According to the recent TOPEX/POSWINDON satellite data, sea level is rising by 2.1 (plus or minus 1.3) mm/year on a global basis. People, agricultural land, tourist resorts and infrastructure are concentrated in coastal zones, making them especially vulnerable to the rise in sea level.

The rise in sea level may lead to the submergence of small islands. Representatives of the 26 countries that make up the Alliance of Small Island States said that they are working on a joint declaration to frame climate change as an issue affecting the human right to a safe, secure and

[3]www.hireskip.com/enviro/key3glossary.htm
[4]www.greenfacts.org/studies/climate_change/toolboxes/glossary.htm
[5]http://www.unescap.org/mced2000/pacific/background/climate.htm

sustainable environment. This group of countries says that they hope applying a human rights designation to the issue will force developed countries to view rising sea levels in a new light.[6] Melting of glaciers can cause flash floods at this time and shortage of water supply (for areas dependent on the glaciers for water supply) at later times.

The socio-economic impact of climate change on tourism, freshwater availability and quality, aquaculture, agriculture, human settlements and human health will be immense, devastating and negative. A rise of average sea level by one meter, when superimposed on storm surges, could easily submerge low-lying islands. Some islands are concerned that their entire culture, and perhaps the lives of their citizens, are at a risk.

Global warming is also shifting rainfall patterns, causing extended drought in some areas and excessive rainfall in others. This can also lead to food shortages in areas facing drought. El Niño events are believed to be associated with global warming and are bringing increased rainfall in the Northeast Pacific and a rainfall decrease in the Southwest.

Marine organisms live within a narrow temperature regime and depend on coral life. Even a short-term extreme temperature increase can have a dramatic impact, including the bleaching of corals and the disruption of organisms such as fish, which depend on the living coral structure. Temperature also regulates the distribution of plants and animals. An increase in temperature leads to the disappearance of some species and the redistribution of others.

As pointed out by Sir Nicolas Stern, the following figure "*summarises the scientific evidence of the links between concentrations of greenhouse gases in the atmosphere, the probability of different levels of global average temperature change, and the physical impacts expected for each level. The risks of serious, irreversible impacts of climate change increase strongly as concentrations of greenhouse gases in the atmosphere rise.*"[7]

"Figure 1 illustrates the types of impacts that could be experienced as the world comes into equilibrium with more greenhouse gases. The top panel shows the range of temperatures projected at stabilization levels between 400 ppm and 750 ppm CO_2 at equilibrium. The solid horizontal lines indicate the 5-95% range based on climate sensitivity estimates from the IPCC 2001 and a recent Hadley Centre ensemble study. The vertical line indicates the mean of the 50th percentile point. The dashed lines show the 5-95% range based on eleven recent studies. The bottom panel illustrates the range of impacts expected at different levels of warming. The relationship between global average temperature changes and

[6]UN Wire, Internet Edition, November 13, 2007.
[7]STERN REVIEW: The Economics of Climate Change

regional climate changes is very uncertain, especially with regard to changes in precipitation. Figure 1 shows potential changes based on current scientific literature."[8]

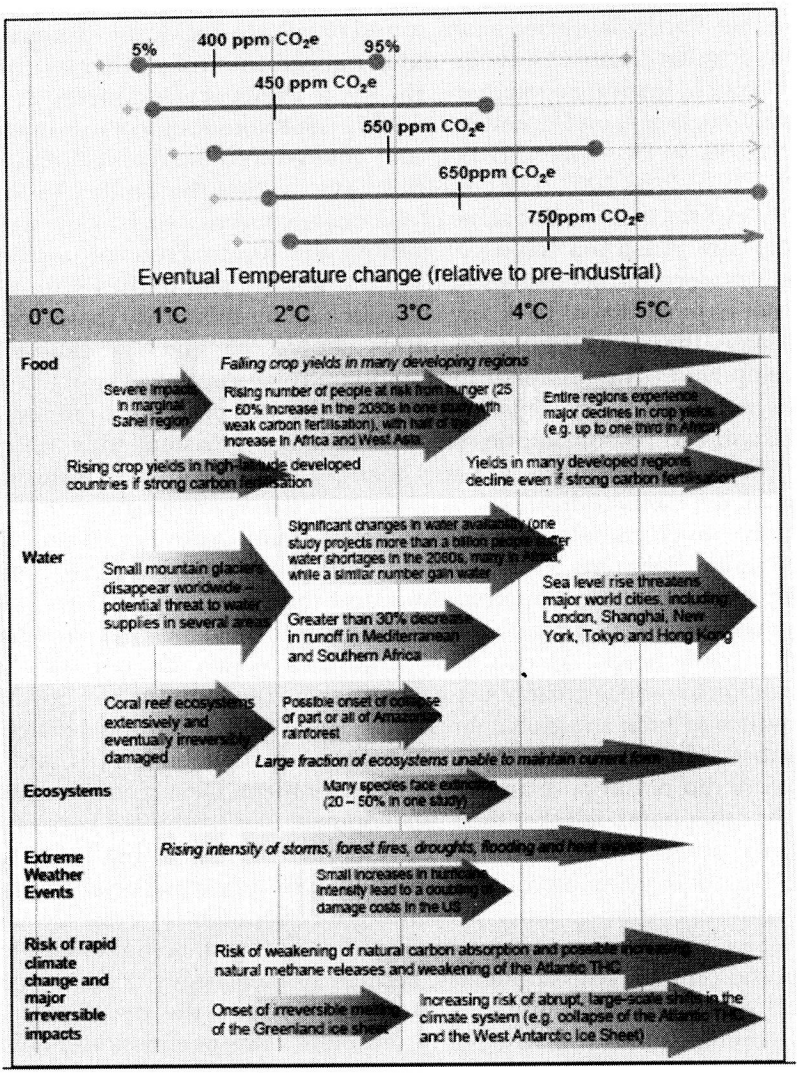

Fig. 1 Impact of increase in temperature.[9]

[8]STERN REVIEW: The Economics of Climate Change
[9]STERN REVIEW: The Economics of Climate Change