EcoRes Forum *Seeking first to understand…*

From Anthropocentrism to Ecocentrism: Making the Shift
Online E-Conference | 14-30 April 2007

PANEL PERSPECTIVES

Climate Change: A Commentary on the IPCC's "AR4" Report and Use of the Precautionary Principle

John Lemons*
Professor of Biology and Environmental Science, Department of Environmental Studies, University of New England, Biddeford, ME 04103

Introduction

On 2 February 2007 the International Panel on Climate Change (IPCC) released its "Summary for Policymakers" as part of the IPCC Working Group I Fourth Assessment Report (AR4).[1] This report describes progress in understanding the human drivers of global climate change, observed climate change, and estimates of future climate change. The AR4 differs from prior IPCC assessments insofar as there is greater scientific confidence concerning estimates of climate sensitivity, earth–atmosphere warming, sea level increase, and human attribution to climate change. The type of information used in making decisions about climate change has ethical implications because it influences decisions on whether and/or how humans take action to mitigate and adapt to climate change and because the decisions obviously affect human and environmental welfare for both present and future generations.[2] Following, I describe the mission of the IPCC, some of the contents of the AR4 and their implications, and the potential use of the precautionary principle in climate change assessments.

The Mission, Structure, and Function of IPCC

The United Nations Environment Programme and the World Meteorological Organization convened the IPCC in 1988. Any member of the United Nations is or can be a member of IPCC. (No individual scientists or other individuals are members). Scientists participating in the IPCC are chosen by their respective governments and currently there are about a thousand who participate. Undoubtedly, the IPCC represents the world's most expert group on climate change.

The UN–mandated charge for the IPCC is to review the scientific and technical peer–reviewed literature on climate change in an unbiased comprehensive manner and to reduce speculation when possible; it does not conduct original scientific research.[3] Consequently, when using information from peer–reviewed literature the IPCC defaults to the norms used in scientific literature and almost all scientific journals require the use of evidence about which there is a high degree of confidence; this means that speculation is reduced when possible. In its use of scientific literature the IPCC also tries to assign probability statements to the conclusions it reaches.

Typically, every five years or so the IPCC issues detailed reports on "The Scientific and Physical Basis for Climate Change," "Impacts, Adaptation, and Vulnerability of Climate Change," and "Mitigation of Climate Change." In addition, a shorter synthesis report also is published by IPCC that is intended for policy makers; the AR4 is an example. The IPCC reports are used by national governments to inform climate change policies. The IPCC also supports the United Nations Framework on Climate Change (UNFCCC) and the Kyoto Protocol by providing scientific and technical advice. The summary reports are produced on the basis of a consensus of IPCC member governments and such reports receive much attention by policy makers and the media. All of the reports include analysis of various scenarios that describe future development paths in various sectors such as energy and projections of future greenhouse gas emissions.

* *Email: jlemons@une.edu*

IPCC AR4 Summary Report

The IPCC's AR4 concludes with high confidence (90 percent) that the globally averaged net affect of human activities since 1750 primarily has been one of human–induced warming. According to the IPCC, such warming is virtually certain (greater than 99 percent probability of occurrence) to contribute to warmer and fewer cold days and nights over land areas; virtually certain to contribute to warmer and more frequent hot days and nights over most land areas; very likely (greater than 90 percent probability of occurrence) to contribute to increased frequency of warm spells over most land areas; very likely to contribute to heavy precipitation events; and likely (greater than 66 percent probability of occurrence) to increase the incidence of extreme high sea levels.

Despite the fact the IPCC in AR4 unequivocally documents global climate change and attributes a significant amount of change to human activities, there is risk that the impacts of climate change could be worse than stated in the AR4. One example is that the IPCC decided to limit its projections of temperature changes within a 90 percent confidence level and, therefore, discounts a comparatively small but significant risk of larger temperature increases than those projected; if larger than projected temperature increases occurred this would, among other things, disproportionately affect regions in high latitudes as well as exacerbate climate change problems for future generations. A second example is that the IPCC (primarily) decided to exclude comparatively lower probabilities of rapid dynamical melting of the Greenland and Antarctic Ice Sheets and therefore discounts serious and irreversible damages, e.g., sea level rise on the order of, say, four to six meters over a period of decades.[4] Finally, a third example is that IPCC decided to exclude non–linear events that might result in higher or more rapid increases in temperature or sea level rise.

The IPCC's decision to exclude lower probability events that might lead to higher or more rapid increases in temperature or sea level rise is consistent with its mission to avoid speculation. In this sense, the IPCC is conservative insofar as being careful to avoid making attributions about climate change under conditions of scientific uncertainty. The conservative nature of the IPCC's reports probably contributes to their being viewed as authoritative and widely–accepted and might well be necessary given that the reports are produced by consensus. As will be discussed, this kind of a decision is embedded with understudied implications about which many scientists, public policy makers, and members of the media are unaware.

Understudied Implications of the AR4: The Precautionary Principle

In practice, scientific information developed by the IPCC is determined by the capabilities of scientific methods and tools as well as by the policies and agendas promulgated by the IPCC. Because global climate change is incredibly complex it will never be understood with full scientific certainty and decisions therefore must be made on how scientists and public policy makers should deal with the uncertainty. Some of the sources of scientific uncertainty include: (1) informational uncertainty; (2) limitations of available analytical tools and methods; (3) complexity and indeterminacy of climate, ecosystem, and human social/economic systems; and (4) needs to make value judgments at all stages of problem identification, analysis, and solution implementation. In addition, the IPCC policies and agendas include decisions on such things as: (1) evaluation of the needs and requirements of those who use information from emission scenarios; (2) what types of emission scenarios to use and what types are most effective for what purposes; (3) what roles IPCC should play in development and assessment of new emission scenarios; (4) whether to include in its scenarios and reports speculative evidence about serious or irreversible impacts or only include evidence about which there is a high level of confidence; and (5) how to determine and describe uncertainty.

On the one hand, IPCC recognizes an obligation to: (1) summarize what is known about climate change; (2) describe research needed to improve that knowledge; and (3) identify what is unlikely to be known before climate changes actually occur. On the other hand, policy makers prefer simplicity and a focus on "high likelihood" scenarios and projections. Consequently, scientific uncertainty in climate change is derived both from limitations of scientific methods and tools as well as from the judgments of scientists and from IPCC policies and agendas. Because of this, the IPCC decisions to bound temperature projections within a 90 percent confidence level, to exclude

dynamical melting of the Greenland and Antarctic Ice Sheets, and to exclude non–linear events that might result in higher or more rapid temperature or sea level rise are value–laden and normative and not strictly scientific.

The IPCC's aforementioned decisions reflect a "tension" between conventional scientific norms to base conclusions on information about which there is a high–level of confidence in order to reduce speculation and other public policy or other concerns we might have. For example, the IPCC decision to exclude consideration of impacts because of lack of high levels of confidence about information constrains a comprehensive analysis of some impacts that pose serious or irreversible harm to the environment and human health; it also limits a more wide–spread and public discussion about the limitations of science. In other words, had IPCC been willing to be more speculative and, e.g., consider threats from non–linear events or dynamical melting of the Greenland and Antarctic Ice Sheets the public and public policy makers would be better able to recognize and attempt to deal with scientific uncertainties in formulating responses to the threats. Finally, the IPCC decisions increase the chance of some people concluding that there are no risks of some impacts when, in fact, there might be. For example, the fact that IPCC did not consider dynamical melting of the Greenland or Antarctic Ice Sheets already has been interpreted by some that sea level rise greater than projected in AR4 will not happen despite some scientific evidence to the contrary.[5] In my view, all of this increases the likelihood that decisions to reduce greenhouse gas emissions sufficient to avoid serious or irreversible consequences will be postponed.

Alternatively, the IPCC could have used the "precautionary principle" to guide its decisions. The precautionary principle expresses the view that:

> Where there are threats of serious or irreversible environmental damage, lack of full scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation. In the application of the precautionary principle, public and private decisions should be guided by: (1) careful evaluation to avoid, wherever practicable, serious or irreversible damage to the environment; and (2) an assessment of the risk–weighted consequences of various options.[6]

Fundamentally, the precautionary principle stems from ethics, i.e., what criteria ought to be used to promote environmental and human well–being. Essentially, it puts into operation the ethical view that scientific uncertainty should not be used as a reason to postpone actions to protect the environment or human health. By using the precautionary principle, climate scientists and policy makers can promote: (1) preventable actions in the face of uncertainty (e.g., mitigation or adaptation to dynamical melting of ice sheets); (2) shifts in the burden of proof to the proponents of an activity that might have serious or irreversible impacts (e.g., enhanced utilization of fossil fuels); (3) exploration of alternatives to possibly harmful actions (e.g., renewable energy resources or effective methods of carbon sequestration); and (4) increases in public participation in decision making (e.g., encouraging the public and affected parties to be involved in decision making about low probability events with serious or irreversible impacts). In this respect, use of the precautionary principle would provide more compelling reasons for nations to reduce their share of emissions to safe levels.

Support for the precautionary principle is based on the view that it ought to be used in policy and decision making when there are gaps in knowledge and uncertainties about risks and their probabilities, when there are uncertainties as to the costs and benefits of actions which impose risks, and when risks have serious public policy and ethical consequences which require decision makers to rely on multiple lines of evidence from diverse disciplines and constituencies. The precautionary principle, then, is meant to ensure that the public good is represented in all decisions made under scientific uncertainty. When there is substantial scientific uncertainty about the risks and benefits of a proposed activity, policy decisions should be made in a way that errs on the side of caution with respect to the environment and the health of the public.

Summary

The problem of how to deal with scientific uncertainty in addressing the problem of global climate change is complicated and, from a public policy

standpoint, needs to be dealt with. Nevertheless, most scientists and public policy makers, including the IPCC, typically adopt conventional scientific norms of using high levels of confidence or high probabilities of occurrence when making conclusions. In this commentary, I have tried to briefly outline some potential problems of IPCC's use of such norms in AR4 and, further, have suggested that a greater use of the precautionary principle might overcome the problems.

References

1. (IPCC) International Panel on Climate Change. 2007. Summary for Policy Makers. IPCC Secretariat: c/o WMO, Geneva, Switzerland. (www.ipcc.ch)

2. Brown, D, N. Tuana, and 23 other authors. 2006. *White Paper on the Ethical Dimensions of Climate Change*. Rock Ethics Institute, Penn State University, PA. 40 pgs.

3. (IPCC) International Panel on Climate Change. 2007. Procedures: Preparation of IPCC Reports. IPCC Secretariat: c/o WMO, Geneva, Switzerland. (www.ipcc.ch)

4. Alley, R.B. 2007. Changes in Ice: The 2007 IPCC Assessment. Testimony of Dr. Richard B. Alley, Pennsylvania State University before the Committee on Science, United States House of Representatives, 8 February 2007, Washington, DC.

5. Pilke, R., Jr. 2007. Clarifying IPCC AR4 Statements on Sea Level Rise. (sciencepolicy.colorado.edu/prometheus/archives/climate_change/001096clarifying_ipcc_ar4_.html)

6. Kriebel, D., Tickner, J., Epstein, P., Lemons, J., Levins, R., Loechier, E. L., Quinn, M., Rudel, R., Schettler, T., and Stoto, M. 2001. The Precautionary Principle in Environmental Science. Environmental Health Perspectives 109: 871-876.