

Rapporteur's Summary

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Rapporteur's Report on Session VI: How Realistically do IAMs Estimate Climate Change Impacts on Developing Countries?

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Professor Michael Schlesinger began the session by presenting "Country Specific Market Impacts of Climate Change". He came to several specific conclusions: firstly that climate impacts are not uniform; secondly that large uncertainties are underlined by using multiple models for agriculture impacts; thirdly that beyond the OECD nations, uncertainty increases dramatically, especially for agriculture; and finally that research on impacts is badly needed, and that such research should be focused on the tropics and sub tropics.

Tom Downing then gave a nominated discussion on this paper, dividing his comments into three parts.

- (1) What to remember from the paper: how some impacts from climate change may be positive, for market based commodities, where warming is a benefit.
- (2) What we should not forget: three important influences are not included in the paper.
 - a. There is a spatial pattern of changes and activity. A cooler richer world has lower impacts than a warmer poor world (IS92d as opposed to IS92a).
 - b. Sectoral estimates of climate impacts are highly uncertain- even the sign is uncertain. There might be regional benefits: for example, agricultural production in Russia could rise due to longer growing season and warmer temperatures.
 - c. Non-market and equity effects are not incorporated in the paper. Non-market and equity tend to be larger than market effects.
- (3) What should we forget: Impacts modeling using physical based simulation tools is preferred to the Ricardian approach.

Tom Downing's discussion was followed by various comments from participants:

Richard Odingo: Industrialized countries stand to gain, developing countries stand to lose. Why are industrialized countries pushing developing countries to help, when industrialized countries are historically responsible for the problem?

Steve Schneider: We are still early in the evolution of models. For example, the effects of variability may be much larger than the impacts of mean change. Global change also threatens biodiversity.

Michael Grubb: One issue is the dependence of European climate on the gulf stream. How stable is the gulf stream to these kind of changes? Also, examining credible scenarios suggests that a $2xCO_2$ or doubling of concentration is inevitable. Therefore, we need to look at 2x and 3x scenarios, since nothing less than doubling seems feasible. What is the outcome at a 3x scenario?

Michael Schlessinger: We have run a 4x scenario. We can do the analysis by shortcut with a simple ocean model, but we can't handle the gulf stream with the short cut methods. One needs large models to do this. However, we can't run the big models over more than a very few questions.

A participant from the audience then noted differential impacts between tropical and temperate zones. They further asked how the probability of greater globalizaton is apt to

affect the relative distribution of impacts: would the impacts transmit from developing to developed regions?

Michael Schlesinger: Our results are for only a part of the problem. We would need to embed the results in a larger framework to deal with these issues.

Chris Hope then presented a paper entitled "Developing Country impacts in integrated models of climate change"

He suggested there were three reasons for relative neglect of developing country impacts. First, computational limits sharply curtail the amount of data which can be handled in optimization models. Second, there is an OECD focus for most modeling groups working on climate issues. Third, there is a lack of reliable data for developing countries.

In the discussion following Dr. Hope's presentation, Rik Leemans questioned the validity of the difference between the developing and developed countries. He suggested that damages expressed, relative to GNP, are misleading because of different dependence on the climate between developed and developing economies. Chris Hope responded that it is unlikely that the OECD will be a net winner. Stuart Cohen then asked if the issue of acidification as a damage from sulfates had been considered. Chris Hope replied that he did not look at these impacts because he has a similar model for acid rain, which suggests that control would be desirable as countries get richer. Sulfate emissions were not made a control variable because of the possibility of a perverse decision to decrease control of SO₂ in order to lower temperature increase.

From the audience, concern was raised about the issue of applicability of the model to developing countries. Sixty percent of Africa is rural, with crop and animal husbandry dependent on rainfall. Concern was also raised about models considering Africa and the Mideast as one integrated region. Further concern was expressed about the potential impact of rural population who don't participate in formal markets. Chris Hope responded that there are always hard questions about the level of representation in a model. It is essential to ask what the models is trying to look for. As for the informal sector, in looking ahead fifty years, it is reasonable to assume that such sectors will have largely converted to monetary incomes and participation in the formal economy.

These comments were followed by two discussion papers. First, Professor Liu Shusheng talked about, "Impact Analysis of Climate Change and Human Activities on Ecosystems in China". Professor Ken Strzepek then presented a paper on "The effect of spatial temporal and sectoral aggregation on water related impacts".

Audience discussion:

A member of the audience began the discussion by noting that negative endogenous GDP impacts may be offset by using resources more intensively. This could result in a negative spiral. Chris Hope responded that GDP is not the ultimate measure of welfare. It is essential to look at net gains of moving from one set of policies to another set of policies. Fred Langeweg asked to what extent is the use of straight forward cost benefit a realistic approach: will the economy evolve and how do you account for the evolution in relative adaptation? Tom Downing responded that you need to consider what factors in an economy might adapt. The exercise showed Africa would suffer more under adaptation, because it has less flexibility in response to change in climate. Chris Hope added that you also need to consider how long it takes to adapt, and whether the economy adapt that fast. It is unlikely you will get to equilibrium fast enough to have only minor impacts.

Professor Yuzuru Matsuoka then presented a paper discussing his work using the Asian Integrated Model [AIM] on Physical Impact Assessments. Results were presented for water resources, crop production, forests, and malaria risk.

Following Professor Matsuoka's presentation, discussion papers were given by Professor Sun Jiulin, of the Commission for Integrated Survey of Natural Resources, who discussed many different aspects of the impact of climate change on the Chinese environment; and by Ferenc Toth, who presented a paper entitled The Tolerable Windows Approach to Integrated Impact Assessment.

Audience discussion:

John Weyant emphasized the need to keep working to improve impact studies.

Richard Odingo stated that Integrated Assessment Modeling is, in his opinion, too raw to be used by the decision makers. He said the models were not ready for Kyoto, and IAMs have yet to understand what the decision makers need.

Richard Moss replied to Professor Odingo's concerns with a question: 'what makes you unhappy about regionalizing IA models'? Odingo responded that the economics associated with models is still not certain enough.

A member of the audience then suggested two points: that there are too many caveats for IAMs to be of use to decision makers; and while developed countries know their own situation, the developing countries are still not clear about theirs, so that it is hard to know what to say to the politicians.

Steve Schneider responded that he agreed that time-evolving regional damages can't be estimated now. But some things are known. He went on to raise two issues. First, what is the right response to things known imperfectly. And second, how should we present the uncertain caveated information that we have today. A deeper issue is that the timetable to improve regional impacts information is of the same order as the time frame in which damages will occur.

A member of the audience then expressed unease about large models, and suggested such models were relied on too heavily in the policy process. He had three sources for this unease. The first was the largely global scale of much current analysis, requiring much more model development at national or sub-national scales. The second was an excessive focus on single instruments and measures, without allowing for mixed strategies. The third was that decisions are based on multiple criteria, but models focus on only one criteria- the best economic solution. Other criteria which need to be examined include technological feasibility, equity, political viability, environmental compatibility (sustainable development), and cultural acceptability.

Professor Amano suggested that many developing regions are not appropriately represented. He continued that short and long term objectives need to be considered, with COP3 being too early for full inclusion of IAM results. The third assessment report is the long term objective for IA models. He concluded by noting the AIM has made a good start towards getting results for the Asian region, by getting all countries involved.

Michael Schlessinger commented that: our results are not integrated assessment but just impacts models. One analyst does impacts for all the countries but is limited by data. Another option would be for all countries do their own. A third option is to use the collaborative approach, where there are groups working together on problems. This could be developed under something like START.

Chris Hope expressed understanding of the frustration involved with limitations in the field, and continued by noting the need to guard against two errors: the temptation of modelers to overstate their case and make claims for results that can't be supported; and the belief that some more work will reduce errors significantly. This implies we will need to learn to use enormously uncertain numbers in the decision making strategies.

Hadi Dowlatabadi commented: ecological models have taught me a lot. There is inertia in response to change. The role of the status quo is not included in models. Finally, decisions makers can't use broad uncertainty, and need robust strategies to avoid danger.

Chairmen Richard Moss concluded the session by putting the development of regional models into an IPCC perspective. The first assessment report examined impacts only in isolation. The second assessment report made some progress but not as much as desired. It is expected that the third assessment report will make more progress in the regional assessment of impacts. It is important to move forward on the institutional issue of developing structures to solve the problems of making regional assessments of impacts.