

Concluding Session

Closing Address

Professor Bert Bolin

Chairman of the IPCC

This has been an interesting workshop. I am not going to summarise the summaries for the different sessions that have just been given. I have simply made a few observations and will focus on the possibilities of drawing conclusions in spite of the many uncertainties that we still have to cope with. It is also important to emphasise that the issue of climate change must be seen in the context of the broader issue of sustainable development of all countries on earth.

There is, however, one reason for focusing rather explicitly on the issue of global warming. Scientists are now able to formulate quantitative models for this issue in spite of all the uncertainties. We can place some overall bounds on what might be 'permissible' in the future. This has really not been possible before. This should also be of relevance in the discussions of sustainable development.

We should, however, realize that politicians often need answers to simple question that do not require the development of complex global models. There is a need also in such cases for analysis of basic scientific aspects of such issues and their socio-economic implications simultaneously. In other words integrated *analyses* are required. It should be emphasised, however, that models are not trustworthy unless they in some manner have been validated against reality, which in turn requires observations. An example may illustrate this point.

Methane is a greenhouse gas. It is of interest to countries to know how much is being emitted naturally in order to judge to what extent soils might serve as a net source or sink for greenhouse gases. An early estimate of emissions from bogs and wetland in Sweden has recently been revised on the basis of a thorough study of more than 300 sites all over the country. The outcome implied that the earlier estimate was about five times too large. Still we do not know if the particular year, when the study was conducted, was about normal or not. The key question of course becomes: What do we really know about the role of the soils in the world as sources of sinks for methane as well as carbon dioxide? The uncertainty of our basic knowledge becomes the key issue to be resolved. Until this has been achieved the economical and political issues largely remain uninteresting.

In the course of the workshop several individuals have asked the question of whether the achievements so far really are useful for the ongoing negotiating process that precedes the third Conference of the Parties to the Climate Convention in December 1997. Personally I think the answer is: as yet not very much. They may have contributed in giving another view of what science can provide that in the long term may well turn out to have been useful. The concept of 'Safe corridors' is interesting in this context, but the uncertainties of the results have not yet been accounted for adequately. A more complete sensitivity analysis should be most interesting.

Some interesting studies of the impact of climate change on natural as well as managed terrestrial ecosystems have been presented and are of course important steps forward. Many details shown are, however, not reliable, since there is still considerable uncertainty with regard to the expected changes of climate.

The simple formulation of the way to compute damages as a function of a changing global mean temperature leaves still much to be desired. Such simple relationships can hardly be used, since damages are associated with the regional and local changes of climate that may be very different from the global mean.

The Climate Convention considers the need to stabilise greenhouse gas concentrations in the atmosphere, but does not give any specific target to be aimed for. This will most likely be a very central theme for analyses over the years to come. At present politicians do not even translate correctly a given stabilization target into terms of global and regional temperature changes. The proposal from the European Union is inconsistent in this regard. Further, it is of course important to not consider only what changes might be expected at different times in the future, but also to recognise that we may at any one time very well be committed to considerably more than is being observed. The climate system responds slowly, and further the warming effect of greenhouse gases is at present partly counteracted by the emissions of sulphur aerosols, which, however, would disappear in pace with the reductions of emissions. This is not accounted for at present. How could this be done more adequately?

Another issue of central concern to the negotiators is that of burden sharing. The present negotiations are conducted on the basis of a very specific decision at the first Conference of the Parties in 1995, that developing countries ('Non-annex-I Countries') would not be obliged to take measures aimed at reducing greenhouse gas emissions during five, or perhaps even ten years after 2000. The implications of this is analysed in a forthcoming IPCC Technical Paper (No.4) to appear in September this year. This issue deserves much further attention and integrated assessment would be most desirable.

One thing emerges quite clearly from available analyses. Rather stringent measures, in order to keep a human-induced climate change within bounds, may well have to be taken during the first decades of next century. We will probably not be able to use all gas and oil that presumably can be found even much less so the coal resources. This also implies that new energy sources need to be developed, above all renewable ones. Development has been slow during recent decades because new energy sources are unable to compete with the cheap fossil fuels. How to achieve an optimal development could be a central theme for integrated analyses.

Developed countries have a key role to play because most of the research and development needed is carried out in the rich countries. There is, however, an obvious need for technological transfer from rich to poor countries, which is another emerging political issue. This concerns both the gradual build up of renewable energy supply systems in developing countries, as well as taking advantage of the very substantial opportunities that exist for more efficient use of energy. The IPCC Technical Paper No.1 provides an extensive inventory of policies and measures for such a development, but presents no analysis of how this best be done under the varying circumstances that are found in the different countries of the world.

The simultaneous use of tools from research groups in different fields to carry out integrated analyses, should make it possible to make progress towards addressing the global climate change issue more comprehensively than today. This is the final and general conclusion I wish to draw from the presentations given at this workshop.