



**UNITED  
NATIONS**



**Framework Convention  
on Climate Change**

Distr.  
GENERAL

FCCC/SBSTA/2008/8  
10 September 2008

Original: ENGLISH

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**SUBSIDIARY BODY FOR SCIENTIFIC AND TECHNOLOGICAL ADVICE**  
**Twenty-ninth session**  
**Poznan, 1–10 December 2008**

**Item 9 of the provisional agenda**  
**Fourth Assessment Report of the Intergovernmental Panel on Climate Change**

## **Report on the workshop on the Fourth Assessment Report of the Intergovernmental Panel on Climate Change**

**Note by the secretariat**

### *Summary*

This document contains a report of the workshop held in Bonn, Germany, during the twenty-eighth session of the Subsidiary Body for Scientific and Technological Advice on the Fourth Assessment Report of the Intergovernmental Panel on Climate Change (IPCC). The workshop consisted of presentations given by experts from each of the Working Groups of the IPCC, addressing the science of climate change, mitigation, adaptation, and climate change and water. An informal discussion among Parties and experts from the IPCC on the contents of the Fourth Assessment Report was held on the same day.

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## I. Introduction

### A. Mandate

1. At its twenty-seventh session, the Subsidiary Body for Scientific and Technological Advice (SBSTA) requested the secretariat to organize, under the guidance of the Chair of the SBSTA and with the participation of experts from the Intergovernmental Panel on Climate Change (IPCC), a workshop on the Fourth Assessment Report (AR4) of the IPCC.<sup>1</sup> The aim of the workshop was to facilitate the exchange among Parties of relevant information on the contents of the AR4.
2. At the same session, the SBSTA requested the secretariat to prepare a report on the workshop for the information of Parties.

### B. Possible action by the Subsidiary Body for Scientific and Technological Advice

3. The SBSTA may wish to use the information in this report as part of its consideration of the IPCC AR4 at its twenty-ninth session.

## II. Proceedings

4. The workshop on the IPCC AR4 was organized as an in-session event during the twenty-eighth session of the SBSTA. It was held on 6 June 2008 and was attended by approximately 200 participants. Ms. Helen Plume, Chair of the SBSTA, chaired the workshop.
5. Opening the workshop, Ms. Plume welcomed participants and introduced the six experts who represented all three Working Groups of the IPCC: Mr. Thomas Stocker (Working Group I), Mr. Peter Stott (Working Group I), Ms. Jean Palutikof (Working Group II), Mr. Shardul Agrawala (Working Group II), Mr. Michel den Elzen (Working Group III) and Mr. Bert Metz (Working Group III).
6. Seven presentations<sup>2</sup> in total were given, addressing the science of climate change, mitigation, adaptation, and climate change and water. The presentations were followed by a question-and-answer session.
7. To facilitate further the exchange of views and dialogue among Parties and experts from the IPCC, an informal discussion was held on the same day. The panel of experts for this discussion was formed by Mr. den Elzen, Mr. Ogunlade Davidson (Co-Chair, Working Group III), Mr. Agrawala, Ms. Palutikof and Mr. Stott. The discussion was moderated by Mr. Jean-Pascale van Ypersele on behalf of the Chair of the SBSTA.

## III. Summary of presentations

8. Two presentations were made by experts from the IPCC in relation to the findings of Working Group I. An additional presentation was made to introduce the IPCC technical paper *Climate Change and Water*.<sup>3</sup>

### A. Latest findings on the science of climate change

9. The first presentation, based on the latest findings of Working Group I contained in its contribution to the AR4, *Climate Change 2007: The Physical Science Basis*,<sup>4</sup> focused on four main

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<sup>1</sup> FCCC/SBSTA/2007/16, paragraph 50.

<sup>2</sup> All presentations are available at <<http://unfccc.int/meetings/sb28/items/4417.php>>.

<sup>3</sup> Bates BC, Kundzewicz ZW, Wu S and Palutikof JP (eds). 2008. *Climate Change and Water*. Geneva: IPCC Secretariat.

<sup>4</sup> Solomon S et al (eds). 2007. *Climate Change 2007: The Physical Science Basis*. Cambridge and New York: Cambridge University Press.

issues: Antarctic ice cores; Atlantic thermohaline circulation; Arctic sea ice; and ice sheet instabilities. The presentation highlighted the results of studies that demonstrate that the growth rate of greenhouse gas (GHG) emissions in recent years has been 100 times as high as it has been at any time during the last 20,000 years.

10. According to the latest findings, it is very likely that the Atlantic meridional overturning circulation (MOC), which carries warm upper waters to northern latitudes while carrying cold deep waters to the south, will be reduced as temperature levels rise; however, the MOC is unlikely to suffer an abrupt reduction or collapse.

11. The Arctic sea ice sheet has been decreasing rapidly and the extent of sea ice was at a record low in the summer of 2007. Projections over the next century show that the extent or area of the ice in the Arctic is likely to decrease at four times the rate of that shown in the observed trends of the past century. It was noted that the temperature increase threshold in the Greenland mass balance is between 1.9 °C and 4.6 °C and that sustained global warming above these temperatures would eliminate the ice sheet.

12. The presenter mentioned that the new observations allow for more reliable quantification of natural ranges; the extent of reductions of Arctic sea ice need to be further studied to reduce uncertainties in sea level rise projections; and more accurate ocean circulation components in comprehensive models are required for producing reliable projections over decades.

#### **B. The Intergovernmental Panel on Climate Change technical paper on climate change and water**

13. There were two presentations regarding the technical paper referred to in paragraph 8 above. The first provided information on the background, content and scope of the paper, and the second dealt with its findings and the resulting projections. The focus of the technical paper is on the impacts of climate change on hydrological processes and on freshwater resources. The paper also covers mitigation and adaptation measures and the impacts of these measures.

14. It was explained that observational records and climate projections provide abundant evidence that freshwater resources are vulnerable and could be seriously affected by climate change, with wide-ranging consequences for human societies and ecosystems. Various studies suggest that changes in radiative forcing have influenced precipitation trends and that human interference may have contributed to the increase in extreme precipitation events. Decreases in glaciers and ice caps, along with thermal expansion, have contributed greatly to the recent sea level rise.

15. Projected changes in a number of variables were also addressed, for example: there will be further contraction of snow cover; the loss of mass in glaciers and ice caps may be irreversible in some regions; the permafrost area is likely to decrease by up to 35 per cent by the middle of the twenty-first century; it is likely that there will be more intense tropical cyclones; and there will be changes in seasonal run-off in snow-fed regions.

16. The contributions of Working Group II to the technical paper relating to adaptation and water resources were highlighted. Extreme events, such as extreme precipitation and droughts, and their impacts on water resources were addressed. Projections focusing on the droughts that are likely to happen in Europe over the next six decades were presented. Examples of the possible impacts on various sectors, such as agriculture or health, of extreme precipitation changes due to climate change were also presented.

17. A brief introduction to the contributions of Working Group III to the technical paper was given, illustrated by two tables: one showing the influence of sector-specific mitigation options on water quality, quantity and level; and the other pointing out the influence of water management on sectoral GHG emissions from energy, agriculture and waste.

### **C. Findings on adaptation planning and practices of relevance to the Nairobi work programme on impacts, vulnerability and adaptation to climate change**

18. The Nairobi work programme on impacts, vulnerability and adaptation to climate change served as the basis for a presentation on the work of Working Group II. The presentation highlighted the elements of the Nairobi work programme that are closely linked to the report of Working Group II in the AR4, in particular on adaptation practices, constraints and adaptation capacity.
19. It was noted that adaptation to climate change is already being carried out in both developed and developing countries. However, progress made in adaptation actions so far has been slow and limited despite more information on climate change and its risks and impacts becoming available.
20. It was also noted that adaptive capacity varies across and within regions. Some sectors and communities in both developed and developing countries are particularly vulnerable.
21. Adaptation practices are diverse and can be deployed on various scales. They can include legislation, infrastructure projects or inducing changes in behaviour. However, although many adaptation options are available at low cost, there is a lack of comprehensive estimates of the costs.

### **D. Emission reduction trade-offs for meeting concentration targets**

22. The presentation on emission reduction trade-offs for meeting concentration targets was based on three scenarios taken from the AR4 on concentrations of GHGs (at 450, 550 and 650 ppm of carbon dioxide (CO<sub>2</sub>) eq) and the necessary reductions by Parties.
23. The reduction ranges in the scenarios were derived from 25 studies, which differed in their assumptions. The assumptions in each scenario varied in: the baselines; the GHGs included in the calculations (which could include only CO<sub>2</sub> or all GHGs); the inclusion of countries that have commitments under the Kyoto Protocol to meet emission reduction targets; and the global emission limits necessary to reach stabilization of the concentration of GHGs in the atmosphere.
24. It was noted that the choice of the baseline is a very important assumption in developing the scenarios. Different baselines were tested, some of which included countries that are now showing a rapid growth in their GHG emissions. It was also noted that the projections indicate that greater reductions will be necessary when the current rapid growth of emissions in non-Annex I Parties is taken into account in the baseline.
25. The presentation emphasized that reducing emissions from deforestation could contribute substantially to the necessary emission reductions for Annex I and non-Annex I Parties.

### **E. Implications of the stabilization of greenhouse gas concentrations**

26. The final presentation illustrated various scenarios concerning the stabilization of GHGs in the atmosphere.
27. The impacts of climate change on different sectors, as identified in the AR4, were described. If there is a 50 per cent reduction in global emissions by 2050, there is likely to be a global increase in temperature of just below 2 °C. By 2100, this temperature increase is likely to result in impacts such as: changes in crop productivity; increased risk of extinction of 20–30 per cent of species across all ecosystems; an additional 1–2 billion people experiencing water stress; up to 3 million more people each year at risk of coastal flooding; sea level rise; and an increased burden on health systems worldwide. The impacts will be even harsher by 2100 if no mitigation actions are taken globally, since temperature would then be likely to increase by over 4 °C. It was observed that mitigation efforts over the short term (20–30 years) will be crucial to achieving lower stabilization levels of GHGs.

28. Various alternatives in energy mix that could help in achieving the desired GHG emission reductions were presented. The presenter stated that a global decrease in CO<sub>2</sub> emissions could be achieved through: increased use of nuclear energy, renewables, carbon dioxide capture and storage (CCS), and biofuels; increases in energy efficiency; decreased use of coal, oil and natural gas; and the use of combinations of coal, oil and natural gas with CCS.

## **IV. Summary of observations and discussions**

### **A. Issues raised during the discussions**

29. Some participants commented on the lessons that may be drawn from the AR4 and the corresponding implications for the work of Parties under the Bali Action Plan.<sup>5</sup> It was emphasized that: climate change and its impacts are already happening but mitigation options and technologies are available; 'business as usual' would result in harsher impacts; more research and development is needed; and reducing emissions from deforestation is necessary. Global action and efforts on mitigation and adaptation need to be urgently addressed; it was stated that a carbon price can be a major driver of mitigation. The experts of the IPCC observed that both Annex I and non-Annex I Parties need to contribute to mitigation in order to minimize the impacts of climate change. It was noted that there is synergy between adaptation and mitigation and that there are considerable opportunities for adaptation in the agricultural sector.

30. Participants suggested that the material produced by the IPCC needs to be brought to the attention of the Chairs of the Ad Hoc Working Group on Long-term Cooperative Action under the Convention and the Ad Hoc Working Group on Further Commitments for Annex I Parties under the Kyoto Protocol, and the science communicated to the policymakers. It was noted that top-down modelling is not easily understood by policymakers and that better understanding of the basic science of climate change among policymakers should be promoted.

#### 1. Global average temperature increase

31. Participants debated the feasibility of setting a 2 °C limit in temperature increase. Some participants stated that a limit of 2 °C is a reasonable and feasible goal, while others said that even this would be too high an increase in global temperatures.

32. The panel of IPCC experts explained that this increase of 2 °C is a global average that encompasses a range of temperatures that will vary among the different regions of the world. They indicated that warming is likely to be greater at higher latitudes, and while there are regions whose average increases are likely to be over 2 °C, this is a global average value discussed as a safe level.

33. In the discussions on this issue it was noted that current knowledge and science indicates that temperature increases are already approaching the 2 °C level threshold. The experts emphasized the urgent need for adaptation and mitigation, and stated that, depending on the available technology and adaptation actions, it may be possible to withstand the impacts associated with a global temperature increase of 2 °C.

34. The experts explained that the feedbacks resulting from the increase in climate change produce non-linear effects. Acidification of the oceans was cited as a considerable problem in this regard; greater evaporation will result in more floods and droughts.

#### 2. Modelling and scenarios

35. The efforts made by the IPCC to incorporate adaptation into the mitigation scenarios were explained; one of the experts noted that autonomous (non-planned) adaptation is already ongoing.

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<sup>5</sup> Decision 1/CP.13.

36. Along with the scenarios developed by the IPCC, the projections and models provided an opportunity for a rich exchange of views. In response to a query regarding whether there are plans to refine the modelling at the regional level, the experts described the various difficulties that regional modelling faces and the need to develop and improve the models. Experts noted that reliable data on tropical areas required for modelling have been scarce, resulting in few regional models of the tropics. It was also noted that it is still not possible to downscale a global model. All experts agreed that there is a need for data to enable regional modelling, including daily data on temperature and moisture, and data and information collected in oceans and over land.

### 3. Uncertainties

37. Monitoring and observation should be continuous and the time series consistent in order to reduce the uncertainties in the models and allow for better regional models to be developed. Among the uncertainties mentioned in the discussion, the difficulty in assessing the effect of aerosols due to their cooling effects was highlighted.

38. The uncertainties in the models, according to the experts, are to a large degree due to gaps in precise and accurate data; there is a lack of reliable information on precipitation and in annual and seasonal run-off. This resulted in particular difficulties during the preparation of the technical paper referred to in paragraph 8 above, as it was not possible to present data for all regions of the world. It was also noted that the information available is more reliable for the summer than it is for the winter. Some participants expressed the view that for the next assessment report of the IPCC, it would be important to focus on reducing uncertainty in the models and scenarios.

### 4. Actions for mitigation of and adaptation to climate change

39. Participants pointed out that a wide range of options for mitigation and adaptation to climate change should be put in place in all countries. Experts from Working Group II noted that 'no regrets' adaptation options are possible and that there are already some success stories on adaptation. Although progress has been made, adaptation to climate change is still at an early stage.

40. The Working Group II experts noted that the adaptive capacity of a country depends largely on its level of development. It was also noted that the use of better technology and different sources of energy, such as renewables, is considered a good path to development.

41. The IPCC experts also warned that care should be taken in explaining and dealing with geo-engineering – geo-engineering options are very complex and it is still unclear what the results, outcomes and possible side effects on the global and regional ecosystems could be.

42. Land use, land-use change and forestry, and reducing emissions from deforestation in developing countries were also considered during the informal discussion.

### **B. Closing remarks**

43. Opinions expressed by the participants included the desire for the IPCC to make their findings more accessible and to update the information, particularly on models and mitigation potentials. It was mentioned by some participants that holding similar workshops in the future would help to do this.

44. Participants also noted that countries need to map out their own individual capacities and needs. Science should be considered along with other factors such as technology and economic development when setting the targets for combating climate change.

45. The workshop concluded with the following general comments from the moderator of the general discussion session:

- (a) Science needs to continue to support the UNFCCC process;
- (b) There is a need to develop and improve regional models;
- (c) More and better data are required for the assessment of science through studies and for research;
- (d) It is necessary to look into the details underlying scenarios, including the uncertainty and comparability of the model data and the assumptions made;
- (e) Policymakers would like to see less complex messages from the scientific community;
- (f) It would be useful to have an update at a future session on how the AR5 is progressing.

46. Participants expressed their satisfaction with the workshop, remarking that not only did it provide useful and new information from the IPCC, but it also allowed for an exchange of views between Parties.

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