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SUMMARY OF WORKSHOPS ON ARTICLE 4.8 AND 4.9 OF THE UNFCCC: ADVERSE EFFECTS OF CLIMATE CHANGE AND THE IMPACT OF IMPLEMENTATION OF RESPONSE MEASURES 9-11 AND 13-15 MARCH 2000

Two workshops on Article 4.8 and 4.9 of the UN Framework Convention on Climate Change (FCCC) were held from 9-11 and 13-15 March 2000 at the Internationales Kongresszentrum Bundehaus in Bonn, Germany. The FCCC Secretariat and the Chairs of the FCCC subsidiary bodies organized these workshops. Approximately 85 participants attended each workshop, including representatives of governments, intergovernmental organizations, non-governmental organizations (NGOs) and academic institutions.

The first workshop was held from 9-11 March to consider initial actions to meet the specific needs and concerns of developing country Parties and the specific needs and special situations of the least developed countries (LDCs) arising from the adverse effects of climate change. Participants heard presentations and engaged in discussions on the adverse effects of climate change on food security, water resources, economic activities, coastal zones and human health. They also considered initial actions related to funding, insurance and the transfer of technology to meet the needs and circumstances of developing countries. Other issues addressed included actions to: enhance capacity for monitoring, systematic observation and vulnerability assessment in developing countries; build capacity in environmental management and integrated assessment; and identify adaptation options and facilitate appropriate adaptation.

The second workshop was held from 13-15 March to consider the impact of the implementation of response measures to climate change. Participants heard presentations and engaged in discussions on methodological approaches and what actions are necessary under the FCCC relating to the impact of implementation of response measures on, *inter alia*, terms of trade, international capital flows and developmental efforts, in accordance with FCCC Article 4.8 and 4.9 and in the light of matters related to Kyoto Protocol Article 3.14 (adverse effects). Participants also considered the nature, content and sources of information required in relation to this issue, procedures and modalities for the provision of information, and what actions are needed, including those relating to funding, insurance and the transfer of technology. The specific needs and special situations of LDCs were considered.

The outcome of these workshops will be a report from the Chairs of the FCCC subsidiary bodies that will provide an input for discussions on these issues at the twelfth and thirteenth sessions of the subsidiary bodies (SB-12 and SB-13), to be held in June and September 2000 respectively. Negotiations at SB-12 and SB-13 will lead to a decision at the Sixth Conference of the Parties to the FCCC (COP-6), to be held in The Hague in from 13-24 November 2000.

A BRIEF HISTORY OF THE FCCC AND THE KYOTO PROTOCOL

The FCCC was adopted on 9 May 1992 and opened for signature at the UN Conference on Environment and Development in June 1992. The FCCC entered into force on 21 March 1994, 90 days after receipt of the 50th ratification. It has currently received 181 instruments of ratification.

COP-1: The first Conference of the Parties to the FCCC (COP-1) took place in Berlin from 28 March - 7 April 1995. In addition to addressing a number of important issues related to the future of the FCCC, delegates reached agreement on the adequacy of commitments and adopted the "Berlin Mandate." Delegates agreed to establish an open-ended *Ad Hoc* Group on the Berlin Mandate (AGBM) to begin a process toward appropriate action for the period beyond 2000, including the strengthening of commitments by Annex I Parties (Parties with developed economies or economies in transition) through the adoption of a protocol or other legal instrument. COP-1 also requested the Secretariat to make arrangements for sessions of the subsidiary bodies on scientific and technological advice (SBSTA) and

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implementation (SBI). SBSTA serves as the link between the information provided by competent international bodies, and the policy-oriented needs of the COP. SBI was created to develop recommendations to assist the COP in the review and assessment of the implementation of the Convention and in the preparation and implementation of its decisions.

AD HOC GROUP ON THE BERLIN MANDATE: The AGBM met eight times between August 1995 and COP-3 in December 1997. During the first three sessions, delegates focused on analyzing and assessing possible policies and measures to strengthen the commitments of Annex I Parties, how Annex I countries might distribute or share new commitments and whether commitments should take the form of an amendment or a protocol. AGBM-4, which coincided with COP-2 in Geneva in July 1996, completed its in-depth analysis of the likely elements of a protocol and States appeared ready to prepare a negotiating text. At AGBM-5, which met in December 1996, delegates recognized the need to decide whether or not to permit Annex I Parties to use mechanisms that would provide them with flexibility in meeting their quantified emissions limitation and reduction objectives (QELROs).

As the protocol was drafted during the sixth and seventh sessions of the AGBM, in March and August 1997, respectively, delegates "streamlined" a framework compilation text by merging or eliminating some overlapping provisions within the myriad of proposals. Much of the discussion centered on a proposal from the EU for a 15% cut in a "basket" of three greenhouse gases (GHG) by the year 2010 compared to 1990 emission levels. In October 1997, as AGBM-8 began, US President Bill Clinton included a call for "meaningful participation" by developing countries in the negotiating position he announced in Washington. In response, the G-77/China distanced itself from attempts to draw developing countries into agreeing to new commitments.

COP-3: The Third Conference of the Parties (COP-3) was held from 1-11 December 1997 in Kyoto, Japan. Over 10,000 participants, including representatives from governments, IGOs, NGOs and the media, attended the Conference, which included a high-level segment featuring statements from over 125 ministers. Following a week and a half of intense formal and informal negotiations, Parties to the FCCC adopted the Kyoto Protocol on 11 December 1997.

In the Protocol, Annex I Parties to the FCCC agreed to commitments with a view to reducing their overall emissions of six GHGs by at least 5% below 1990 levels between 2008 and 2012. The Protocol also established emissions trading, "joint implementation" (JI) between developed countries, and a "clean development mechanism" (CDM) to encourage joint emissions reduction projects between developed and developing countries. To date, 84 countries have signed and 22 have ratified the Protocol. The Protocol will enter into force 90 days after 55 States, including Annex I Parties representing at least 55% of the total carbon dioxide emissions for 1990, ratify it.

COP-4: The Fourth Conference of the Parties (COP-4) was held from 2-13 November 1998 in Buenos Aires, Argentina, with over 5,000 participants in attendance. During the two-week meeting, delegates deliberated decisions for the COP during SBI-9 and SBSTA-9. Issues related to the Protocol were considered in joint SBI/SBSTA sessions. A high-level segment, which heard statements from over 100 ministers and heads of delegation, was convened on Thursday, 12 November. Following hours of high-level closed-door negotiations and a final plenary session, delegates adopted the Buenos Aires Plan of Action (BAPA). Under BAPA, the Parties declared their determination to strengthen the implementation of the FCCC and prepare for the future entry into force of the Protocol. The BAPA contains the Parties' resolution to demonstrate substantial progress on: the financial mecha-

nism; the development and transfer of technology; the implementation of FCCC Articles 4.8 and 4.9, as well as Protocol Articles 2.3 and 3.14 (adverse effects); activities implemented jointly (AIJ); the mechanisms of the Protocol; and the preparations for the first Conference of the Parties serving as the meeting of the Parties to the Protocol (COP/MOP-1). On the issue of adverse effects, delegates to COP-4 agreed on a programme of work that included provision for an expert workshop, to be held in September 1999.

SBI-10 AND SBSTA-10: The subsidiary bodies to the FCCC held their tenth sessions in Bonn, Germany, from 31 May - 11 June 1999, and began the process of fulfilling the BAPA. SBI discussed, *inter alia*, administrative and financial matters and non-Annex I (developing country Party) communications. SBSTA considered topics such as Annex I communications, methodological issues, the development and transfer of technology, and adverse effects. SBI and SBSTA jointly considered the mechanisms of the Protocol, AIJ and compliance.

In its consideration of adverse effects, SBSTA adopted the terms of reference for the expert workshop agreed to at COP-4. The workshop was to identify: factors that would determine the adverse effects of climate change and the impacts of implementing response measures; and existing information gaps, needs and views on methodologies. The workshop was also tasked with considering the specific needs of the least developed countries, as well as issues raised in national submissions and communications.

WORKSHOP ON IMPLEMENTATION OF FCCC ARTICLE 4.8 AND 4.9 (ADVERSE EFFECTS): Under the guidance of SBSTA Chair Kok Kee Chow (Malaysia) and SBI Vice-Chair Mohammad Reza Salamat (Iran), the workshop on adverse effects was held from 21 - 24 September 1999 in Bonn. The workshop included expert presentations followed by panel discussions addressing the policy-related implications of the information presented. Regarding preliminary actions, some participants suggested that the policies and measures reported by Annex I Parties and the projected actions to implement the Protocol be examined to analyze potential impacts on the economies of the oil producing and other developing countries.

In this context, it was suggested that the FCCC subsidiary bodies continue to examine information needed to minimize the adverse social, environmental and economic impacts of Annex I Parties' response measures on developing countries, including: tax restructuring to reflect the carbon content of fuels; measures to discourage the production of fossil fuels and nuclear energy; compensation; and assistance to developing countries, including increasing investment, to help them diversify their economies. Other participants said the uncertainties associated with the impact of implementing response measures are such that consideration of specific actions was premature. They noted that such actions under the Protocol would be considered at the COP serving as the Meeting of the Parties to the Protocol at its first session (COP/MOP-1). They also recalled that compensation was not provided for under the FCCC or the Protocol. Some participants stressed the need to identify and analyze initial actions to meet the specific needs and concerns of developing countries arising from the adverse effects of climate change and the impact of response measures.

COP-5: The Fifth Conference of the Parties (COP-5) met in Bonn, from 25 October - 5 November 1999. With over 3000 participants in attendance and 165 Parties represented, delegates continued their work toward meeting the two-year deadline set out in the BAPA for strengthening FCCC implementation and preparing for the future entry into force of the Kyoto Protocol. Ninety-three ministers and other heads of delegation addressed COP-5 during a high-level segment held from 2-3 November. During its last two days, COP-5 adopted 32 draft



decisions and conclusions on, *inter alia*, the review of the implementation of commitments and other FCCC provisions, and preparations for COP/MOP-1.

On adverse effects, the COP adopted decision 12/CP.5 on FCCC Article 4.8 and 4.9 and Protocol Article 3.14 (FCCC/CP/1999/6/Add.1). The decision recognized that the identification of initial actions necessary to address the adverse effects of climate change and/or the impact of the implementation of response measures needs to be based on sufficient information and analysis within a clearly defined process. The COP decided that the process of implementation of FCCC Articles 4.8 and 4.9, as established by decisions 3/CP.3 and 5/CP.4, should, *inter alia*, continue and gather information on initial actions needed to address the specific needs and concerns of developing countries and LDCs arising from climate change and/or the impact of the implementation of response measures, as well as identify what actions are necessary under the Convention relating to funding, insurance and transfer of technology to meet the specific needs and concerns of developing countries and LDCs. It further decided that SB-12 would continue consideration of the implementation of FCCC Article 4.8 and 4.9, including consideration of the extent of developing countries' efforts to diversify their national economies and of how the international community could best support such efforts. The COP decided to organize two workshops under the guidance of the Chairs of the subsidiary bodies: one on the consideration of initial actions needed to meet the specific needs and concerns of developing country Parties, and the specific needs and special situations of LDCs, arising from the adverse effects of climate change; and another on the methodological approaches and actions necessary to address the impact of the implementation of response measures on, *inter alia*, terms of trade, international capital flows and development efforts. The decision stated that the two workshops should be organized in two consecutive but equal time periods, before 31 March 2000.

REPORT OF THE WORKSHOP ON ADVERSE EFFECTS OF CLIMATE CHANGE

SBSTA Chair Harald Dovland (Norway) opened the meeting on 9 March and noted that this workshop was the result of a decision taken at the Fifth Conference of the Parties to the FCCC (COP-5). He stated that, under the COP-5 decision, this workshop would consider initial actions to meet the specific needs and concerns of developing country Parties and the specific needs and special situations of LDCs arising from the adverse effects of climate change. Issues to be addressed included: enhancing capacity in developing countries for monitoring, systematic observation and vulnerability assessment; building capacity in environmental management and integrated assessment; and identifying and facilitating adaptation options where near-term climate change impacts are understood and adaptation measures are feasible.

Chair Dovland said organizers had tried to ensure fair geographic distribution and a balance between developed and developing countries in setting their invitation list for this workshop. He noted that the workshop's outcome will be a report from the Chairs of the FCCC subsidiary bodies that lists the main points and issues raised by participants. The report will contain two sections. The first will relate to this workshop, while the second will cover the workshop on the impact of the implementation of response measures, scheduled for 13-15 March. This report will be presented at the Twelfth Meeting of the Subsidiary Bodies (SB-12) in June 2000.

Claire Parker, Coordinator of the Implementation Programme of the FCCC Secretariat, noted that this workshop would provide input into discussions on this issue at SB-12 and SB-13, which will lead to a

decision at COP-6. She said this process should give new impetus for an international response to the needs of countries vulnerable to climate change, including LDCs.

OVERVIEW OF THE ADVERSE EFFECTS OF CLIMATE CHANGE

Youba Sokona, Deputy Executive Secretary of Environmental Development Action in the Third World, and Thomas Downing of the Environmental Change Institute at the University of Oxford, provided an overview of action on implementation of Article 4.8 and 4.9.

Youba Sokona presented case study experience relating to droughts in the Sahel, as well as studies on coping with cyclones and sea-level rise, noting the wide range of coping strategies employed. These strategies included regional research and monitoring initiatives, improved agricultural production technologies and increased rural mobility. Coping strategies used in Bangladesh relating to cyclones and sea-level rise included early warning systems, safe refuges, public information and cultural acceptance of these measures. He said lessons learned from recent flooding in Mozambique should be used to advance adaptation strategies. He recommended early adaptation action at the international, national and local levels involving strategies in the areas of: information provision to encourage greater participation; capacity building; reconstruction to reduce uncertainty; risk reduction through implementation of "low regrets" and "no regrets" measures; and spreading the risk of adverse effects.

Tom Downing said priorities for adaptation should be based on the assessment of vulnerability and risk, and highlighted criteria for evaluating adaptation measures and strategies related to, *inter alia*, stakeholders and vulnerable groups, resilience and effectiveness of the proposed measures, strategic responses, timing and the likelihood of adverse impacts. He concluded by calling for the immediate adoption of adaptation policies to protect vulnerable populations and countries and for funds to put existing technologies into use. He stated that such action could be justified on broad social and economic grounds.

Chair Dovland then invited comments and questions from delegates on issues raised during this presentation. Several participants addressed the issue of low regrets and no regrets options, with a number noting that a clear definition of these terms and what options fit into these categories would be valuable. The SMALL ISLAND DEVELOPING STATES BRANCH OF THE UN DEPARTMENT FOR ECONOMIC AND SOCIAL AFFAIRS (UNSIDES) agreed with the presenters' view that we know enough in certain areas to take immediate action. He also noted difficulties in quantifying environmental vulnerability. Several delegates underscored the need to enhance developing country capacity for conducting vulnerability assessments. The US noted that vulnerability will change over time, meaning ongoing assessments by all Parties are desirable. He said adaptation issues should be integrated into national development strategies. ZIMBABWE noted the need to identify different levels of initial actions appropriate for countries with different levels of development. She stated that capacity building is a cross-cutting issue.

In the afternoon session, Martin Parry of the Jackson Environment Institute at the University of East Anglia, UK, presented recent research on impacts of climate change across several sectors, drawing lessons for adaptation. He summarized the likely global impacts of climate change under three scenarios: business-as-usual; emissions reduction aimed at stabilizing CO₂ levels at 750 parts per million; and emissions reduction aimed at stabilizing CO₂ levels at 550 parts per million, which would require much deeper cuts that required under the Kyoto Protocol. He noted that Africa and South Asia would be adversely affected under all three scenarios. He stated that the two scenarios involving CO₂ reductions have the potential to delay



massive forest degeneration and reduce the increase in flooding. However, he noted that even these mitigation scenarios would have minimal impact on water supply, food production and the spread of malaria, meaning that adaptation would be a significant feature under all three scenarios. In terms of mitigation measures, he underscored the importance of the 2010-2030 period, and identified water management and species loss as key areas in this regard.

SESSIONS ON ADVERSE EFFECTS ON CLIMATE CHANGE

Following the opening speeches and overview of the adverse effects of climate change, a number of individual sessions were held during 9 and 10 March to review adverse effects in several specific areas: food security; water resources; economic activities; coastal zones; human health; the needs and situations of the LDCs; and, actions relating to funding, insurance and the transfer of technology to meet the needs and circumstances of developing countries.

ADVERSE EFFECTS OF CLIMATE CHANGE ON FOOD SECURITY: On 9 March, Tom Downing made a presentation on food security. Focusing on drought vulnerability and food security, drew attention to existing vulnerability assessment and adaptation efforts, and said climate diagnostics need to be integrated into responses at the local level.

ADVERSE EFFECTS OF CLIMATE CHANGE ON ECONOMIC ACTIVITIES: On 9 March, Jan F. Feenstra, Manager of the Netherlands Climate Change Studies Assistance Programme of the Institute for Environmental Studies, made a presentation on the adverse effects of climate change on economic activities. He noted that climate change impact assessment requires both climate change scenarios and socio-economic scenarios.

Regarding adaptation, he stated that three kinds of adaptation are important in the context of adverse effects of climate change: autonomous adaptation, where plants, animals and humans will modify their behavior in response to climate change; planned adaptation, which results from policy decisions; and maladaptation, where actions that do not take climate change into account increase vulnerability to climate change.

He outlined a number of problems related to conducting impact and adaptation studies in developing countries, including:

- lack of funding for impact and adaptation studies, as most available funding goes toward inventory and mitigation studies;
- inadequate funds for technical assistance required to establish research programmes and familiarize scientists with the relevant models and the requisite multidisciplinary approach;
- the absence of data and funds to collect data;
- poor channels of communication between scientists, policy makers and stakeholders, as well as lack of involvement among government departments, other than the Ministry for the Environment;
- problems in motivating policy makers to take action on an issue where results are uncertain, particularly in light of the relatively short political cycle; and,
- the lack of specific adaptation projects resulting from impact assessments, often due to lack of funds.

Solutions to these problems could include: emphasizing and funding impact and adaptation studies; providing extra funds for in-country technical assistance; ensuring that studies focus on the most important economic sectors; improving communication between scientists, policy makers and stakeholders; identifying win-win adaptation options that will have both short and long-term effects; and initiating specific adaptation studies.

In the ensuing discussion, ANTIGUA AND BARBUDA highlighted the role of the media in building support for climate change adaptation measures at the grassroots level, noting that policy makers will often respond to public pressure. ZIMBABWE noted that communications and dialogue between policy makers and scientists needed to be two-directional. UGANDA endorsed the need for awareness raising.

Replying to a question from FINLAND relating to the fact that some methodological guidelines for adaptation assessments are now over a decade old, Feenstra said methodologies should continue to be developed, but that this should not be used as a reason to delay adaptation assessments. Responding to a question from the PHILIPPINES concerning the role of the private sector in adaptation studies, Feenstra noted that the private sector can play a part, but much work is needed to raise its understanding and awareness of climate change.

On 9 March, Brett Orlando, Climate Change Programme Officer at the IUCN (World Conservation Union) presented recommendations for action in the areas of: information gathering; capacity building; policy/implementation; and finance, technology transfer, and insurance. Specific actions recommended included: development of an analytical framework for risk assessment by the Intergovernmental Panel on Climate Change (IPCC), development of tools and guidelines at the national level in developing countries by the GEF and its partners; joint action to harness synergies with other conventions; and the mobilization of financial and technical development assistance by the World Bank, UNEP and UNDP to support implementation of the priority actions.

ADVERSE EFFECTS OF CLIMATE CHANGE ON WATER RESOURCES: On 10 March, Bubu Jallow, Principal Meteorologist, Department of Water Resources for the Gambia, outlined the impacts of climate change on: the hydrological system; extreme events; freshwater systems; inputs into water bodies; water supply and demand; and water resources infrastructure and management. He noted that, while precipitation is expected to increase at the global level, it will be unequally distributed, with increases in high latitude regions and decreases at lower latitudes, and with both impacts and adaptive capacity varying across nations. He then outlined actions for adaptation, including:

- increasing storage capacity for water;
- restoring and rehabilitating wetlands to reduce flooding;
- strengthening institutional capacity to undertake assessment and adaptation;
- updating and developing meteorological and hydrological networks and preserving existing databases;
- legislating to regulate the abstraction of surface and river water for irrigation;
- introducing crops and varieties suited to water stress, and improving management and efficiency of irrigation;
- cooperating at the regional and river basin level; and,
- improving modeling, planning tools and early warning systems.

During the ensuing discussion, INDIA questioned the applicability of legislative measures to control abstraction from rivers in cases where water volumes fluctuate widely. SWITZERLAND noted that precipitation in central Europe in winter has increased by 40%, with more intense rainfall rather than more days of precipitation, which has resulted in flooding. The UK called for the identification of the additional elements of water stress arising from climate change. ZIMBABWE noted the need for regional down-scaling of models to aid in assessing vulnerability and adaptation options. FINLAND said high resolution climate models are not yet well developed. The US



commented that the discussion on the impacts of climate change on water resource needs to include implications for power production. Responding to a question from NIGERIA, Jallow underscored that, while climate change is not the only factor negatively affecting water resources, it will exacerbate existing problems.

ADVERSE EFFECTS OF CLIMATE CHANGE ON HUMAN HEALTH: On 10 March, Roberto Bertollini, Director, Rome Division of the World Health Organization's European Center for Environment and Health, presented an overview of the possible adverse effects of climate change on human health. He noted that possible adverse effects could result from changes to the frequency and intensity of extreme weather events, as well as from disturbances to ecological systems, which could bring about, *inter alia*: changes in the geographic range of vector-borne diseases; droughts; floods; and population displacement resulting from sea-level rise.

Regarding vulnerability assessments, he suggested that: monitoring and assessments need to take an integrated approach; national assessments of climate-induced human health impacts should constitute an important part of FCCC national communications; information-exchange networks should be developed and strengthened; and relevant research should be promoted, with particular emphasis on empirical studies. He emphasized the importance of adequate capacity for conducting vulnerability assessments that require multisectoral collaboration, data availability and comparability, trained personnel, and necessary equipment. On the issue of adaptation, he noted that low-cost adaptation options include: interagency cooperation; reduction of social vulnerability; public education; early warning and epidemic forecasting; support for infectious disease control; and integrated environmental management.

In the subsequent discussion, several delegates drew attention to recent reports of a spread of diseases such as malaria and cholera to new areas, and suggested that this may relate to climate change. Bertollini noted that traditional public health measures can be effective in responding to these diseases, and that public health infrastructure and systems need to be in a position to address such problems effectively. He noted that climate change may exacerbate or spread certain health risks, and that this would require investment in the health system.

In response to a number of delegates' comments on raising awareness of the adverse effects of climate change on health, Bertollini agreed on the need for awareness raising, while noting that it is difficult to encourage policy makers to take measures in response to scenarios for the year 2050. The NETHERLANDS supported awareness-raising both among the public and policy makers. The EUROPEAN COMMISSION underscored the potential role of the private sector in terms of adaptation. Mohammed Sanusi Barkindo (Nigeria), co-chair of the workshop session, stated that "health is wealth," and noted the correlation between health spending and health indicators.

ADVERSE EFFECTS OF CLIMATE CHANGE ON COASTAL ZONES: On 10 March, Mahendra Kumar, International Negotiations Officer for the South Pacific Regional Environment Programme (SPREP), emphasized that the impacts of climate change in coastal zones range from issues specific to coasts to more broadly manifested impacts related to water supply, food production, and human health. He said responses and adaptation need to be multi-sectoral, process oriented, linked to integrated coastal zone management and incorporated into long-term national development planning. Specific responses identified in the national communications of Small Island Developing States (SIDS) involved, *inter alia*, coastal zone planning, modeling of storm surges, engineering solutions, bans on sand extraction, replanting of littoral vegetation, and coping strategies, including education and relocation. He called for technology transfer

in the form of flows of knowledge, experience and adaptation equipment, and for capacity building to raise awareness, especially in relation to coastal processes. He noted the importance of equity and social considerations and said that, while more adaptation measures can be implemented as further knowledge becomes available, immediate action should be taken.

In the subsequent discussion, ANTIGUA AND BARBUDA noted that insurance companies are beginning to withdraw coverage and increase rates for some coastal areas, which could impede economic growth, particularly in the tourism industry. He said premiums can be linked to adaptation on the part of the property owner, and called for dialogue between governments and insurance companies. MAURITIUS called for identification of common issues relating to vulnerability and adaptation contained in SIDS' national communications that could be used in developing adaptation strategies. Responding to JAMAICA regarding the appropriate level at which to approach adaptation, Kumar said regional cooperation is useful, as specific measures that can be modified at a low cost could be identified and replicated elsewhere.

SPECIFIC NEEDS AND SPECIAL SITUATIONS OF THE LEAST DEVELOPED COUNTRIES: On 10 March, Mamadou Honadia, Coordinator, National Council for Environmental Management, Burkina Faso, outlined the specific needs and special situations of the LDCs. He described the shared characteristics of LDCs in terms of the poor state of their economies and their health, education and industrial sectors, and observed that 33 of the 54 LDCs are African countries, while 15 are Asian or SIDS.

He stated that measures should be taken and assistance received from developed countries in the areas of technology transfer, financing, and actions related to socio-economic risk. Regarding technology transfer, he said measures and assistance could be applied in the areas of agriculture, water resources, integrated management of coastal zones, the energy sector, and the rehabilitation of arid and semi-arid zones affected by drought and desertification. Regarding financing, he urged support for a number of measures and actions, including, *inter alia*: adaptation measures in the agriculture sector; a plan of action to combat epidemics; early warning systems for disasters; local development plans to combat desertification; sustainable management of forests through reforestation programmes; studies and integrated projects for coastal zone management; resettlement of industrial facilities and other infrastructure affected by climate change; public awareness campaigns; and both North-South and South-South capacity building undertaken through workshops, training and joint activities.

He also supported financing for vulnerability and adaptation assessments and studies related to adverse effects of climate change. In relation to socio-economic risks, he proposed the creation and financing of early warning systems at a sub-regional scale, the establishment of rapid intervention mechanisms, and the restoration of areas affected by climate change. He concluded by calling for LDCs to be given priority in terms of Article 4.8 and 4.9 and for a decision at COP-6 on an urgent plan to implement Article 4.9. He cautioned that we should not wait for completion of all national communications before taking action.

In the discussion that followed, UNSIDS supported the proposal to give urgent attention to implementing actions for LDCs. NIGERIA and ZIMBABWE expressed concern about an approach that might divide the needs of LDCs and other developing countries, and supported considering the needs of all developing countries together. In response, Honadia noted that LDCs fit within the framework of Article 4.8, but that their special needs are also recognized under Article 4.9.



ACTIONS RELATED TO FUNDING, INSURANCE AND TECHNOLOGY TRANSFER TO MEET THE NEEDS OF DEVELOPING COUNTRIES:

On 10 and 11 March, participants heard four presentations and engaged in discussion on actions related to funding, insurance and the transfer of technology to meet the specific needs and circumstances of developing countries arising from the adverse effect of climate change.

Presentations: Michael Cooper, CGU Insurance Group, emphasized that insurance is a commercial enterprise. He noted the large losses incurred recently by insurance companies due to storms, cyclones and hurricanes, and said investments in preparedness, mitigation and prevention are economically efficient. He noted that large and growing cities in coastal areas are considered as emerging risks by the insurance industry. He said the industry can offer advice on risk management and loss prevention in developing countries, drawing on its own research. He also stressed the role of insurers and reinsurers in raising public awareness; insisting on sensible development of land and on more resistant designs and standards; encouraging economic development that takes account of climate change; and providing insurance for acceptable risks.

Hiro Kazuno, Ministry of Foreign Affairs of Japan, presented examples of Australia, Japan and the US supporting adaptation measures. He discussed a number of projects, including those involving monitoring, training and early warning systems. Based on evidence from these examples, he concluded that: the adverse effects of climate change are threatening people's livelihoods in vulnerable areas; developed countries have been providing assistance to vulnerable countries, as envisaged under Article 4.8 and 4.9; greater coordination of adaptation assistance among developed countries would make such assistance more effective; and assistance for adaptation activities could be strengthened if more information was sought by and provided to developed countries regarding vulnerable countries' needs and concerns.

Espen Rønneberg, Inter-Regional Advisor for Small Island Developing States, Water, Natural Resources and SIDS Branch of the UN Division for Sustainable Development of DESA (UNSDS), made a presentation on the needs of SIDS, particularly in relation to adaptation options. He suggested that the international community could assist SIDS with adaptation in the following three areas:

- actions aimed at making development more sustainable in light of climate change by building an adaptation component into development projects;
- actions specifically oriented to adapt to the effects of climate change, including coastal zone protection, agricultural innovations and public education and awareness programmes; and,
- actions aimed at capacity building.

He noted that the issue of insurance needed to be addressed to ensure the long-term viability of the sustainable development process for SIDS. He also stated that UNSDS should become a central hub for information, assistance, cooperation and project facilitation.

Regarding national communications, he emphasized that these contain valuable information on vulnerability and adaptation, which, once analyzed, should form the basis for priority-setting, future activities and project development. He also stated that information on experiences and lessons learned from relevant past and ongoing programmes and projects would be useful.

Youba Sokona said funding for adaptation in developing countries should be integrated within existing development programmes. He emphasized the need to explicitly incorporate funding for adaptation in ongoing programmes, including those existing under environmental

conventions, as well as in development aid programmes and National Environmental Action Plans. Noting the lack of basic infrastructure in developing countries, he stated that adaptation needs to be taken into account when infrastructure is planned. He called for a high-level policy dialogue on climate change that engages officials from all relevant government ministries and departments. Such a dialogue would aim at facilitating a more efficient use of resources by identifying areas where synergies exist.

Discussion: In the ensuing discussion on these presentations, the WHO drew attention to national disaster funds that are collected through a surcharge on individual insurance policies and collected in the case of disaster. The UK asked whether such a model for insurance collection could work at the regional level, and Cooper responded that a regional approach could work where small-scale models would not. GREENPEACE asked whether mechanisms exist to collect funds in LDCs, where there are few individual insurance policies. Michael Cooper suggested that other options, including taxation, could be explored.

IUCN noted that the insurance industry has a large stake in whether the international community can succeed in addressing the adverse effects of climate change, and asked whether insurance companies might consider investing resources as a pre-emptive strategy to help prevent such adverse effects. In response, Cooper stressed that industry investments would have to demonstrate some profit-making potential. He also noted that insurance companies currently invest in research in order to better understand issues of risk and risk reduction.

A number of delegates raised the issue of how adaptation measures can be integrated into national strategies for sustainable development. Youba Sokona stated that there are different methods and various levels for applying integration. Bo Kjellen (Sweden), co-chair of this session, noted that integration can help avoid creating another layer of bureaucracy specific to climate change.

On integrating adaptation criteria at the programme/project level, SPREP welcomed the expansion and modification of existing programmes to take into account new, emerging and actual needs. The PHILIPPINES cautioned against reclassifying projects without prior climate change vulnerability assessment and agreed processes. NIGERIA said reclassification would create problems for assessment. FRANCE supported revisiting existing projects and programmes, and asked whether a further step could be taken in the progress, suggesting regional or sectoral workshops on revisiting. Youba Sokona called for active discussion and dialogue on adaptation issues outside the climate change community.

PANEL DISCUSSION

On 11 March, participants convened for a panel discussion to identify and reflect on the key issues and initial actions raised at this workshop. The panel consisted of delegates representing Bangladesh, Jamaica, the Netherlands, New Zealand, Uganda, and the European Commission.

Panel presentations: BANGLADESH noted the adverse effects from climate change affecting his country, including flooding, impacts on agricultural production, malnutrition, and the risk of higher incidences of some diseases. He noted that his country's greenhouse gas emissions are negligible in global terms. He raised the need for capacity building for vulnerability and adaptation assessments. He called for more funding for adaptation assessments and for implementation. He highlighted the needs of LDCs and the importance of technology transfer, and identified education, training and monitoring as key areas requiring attention.



JAMAICA supported the establishment of regional climate centers that could have a mandate to: strengthen monitoring and analysis of climate change and sea-level rise; identify areas of vulnerability; help develop integrated management and planning frameworks for response measures; enhance institutional strengthening and human resource development; and identify and evaluate policy options that could be integrated into the national agenda. He noted that participants had identified education and awareness raising as important areas for taking action. He suggested that education and awareness raising activities could be aimed at three different groups: policy makers, students/tutors, and the public. He said this workshop had also highlighted the need to establish and improve effective early warning systems.

The NETHERLANDS noted some participants' view that it is important for all developing countries, including LDCs, to be producing their national communications, as the vulnerability assessment and adaptation sections will be of value to all developing countries in identifying adaptation options. He drew attention to participants' calls for further linkages and cooperation with other conventions, including the desertification and biodiversity conventions. He said the period following a disaster should be used as a window of opportunity to promote the integration of climate change policies into reconstruction projects and to raise awareness.

NEW ZEALAND emphasized participants' reference to the information gap, noting that the lack of information and data exists at many levels. He said both Annex I and non-Annex I Parties need to consider carefully what is required to address these gaps, although he noted that the precise form of the information is less important at this stage than starting the process itself, as "the best should not be the enemy of the good." Emphasizing the concept of integration as another key issue, he said some participants had noted that all relevant government agencies should be involved in what is a cross-sectoral issue. He said governments need to identify the best means of facilitating communications, mediation and institution building, and noted that the idea of creating national teams that operate within government and have external outreach was worth exploring. He stated that climate change is an iterative process, and that the appropriate policies and solutions will differ depending on circumstances, meaning a pragmatic approach is necessary.

UGANDA highlighted three key issues: capacity building; poverty reduction; and the need to develop an action programme for adaptation. He emphasized the need for institutional capacity building, and stressed the importance of establishing links to programmes and agencies in areas considered national priorities, such as poverty reduction, education and health. He also stressed the need for poverty alleviation and climate change impact assessment in key sectors.

The EUROPEAN COMMISSION highlighted the needs of populations in LDCs and those in poverty in low and middle income countries, as these people will suffer most from the adverse impacts of climate change. He advocated mainstreaming the climate change agenda into development programmes and projects. He further pointed to the urgency of setting priorities in light of scarce resources, in particular scarce human resources.

Discussion: In the ensuing discussion, many delegates observed that a number of specific ideas and proposals for initial actions had been identified during this workshop. Several delegates endorsed the proposal for regional climate centers. UNSIDS supported using existing institutions to establish regional climate centers. NIGERIA expressed reservations about creating centers that could be mono-sectoral in scope, and said regional centers that addressed a number of related areas would be preferable. SPREP said that empowering existing regional centers to take on these activities would ensure that

the initiative was multi-sectoral. In response to the comments on regional centers, JAMAICA stressed that the aim was not to create new institutions but to establish this initiative within existing institutions.

ZIMBABWE said initial actions would cover impact assessments, vulnerability assessment, evaluation of adaptation options and adaptation project implementation. She noted that external and internal interventions would be necessary in terms of these initial actions. External interventions would relate to capacity building, funding, and technology transfer, with a focus on project implementation and insurance. Internal interventions would relate to developing political will, awareness raising, and integration of climate change in development planning.

MAURITIUS highlighted the important assistance that developed countries can provide developing countries in terms of capacity building for both human resources and equipment. He said capacity building in terms of human resources should focus on training those involved in climate change negotiations, relevant science and research, and operational aspects at the national level. INDIA noted that, although the transfer of technology was an important tool in efforts to address climate change, the lessons and solutions to be found in traditional knowledge systems should not be overlooked. CANADA urged identification of priorities for action as well as continuation of information-gathering, noting that "action and learning are two sides of the same coin and we have to keep moving on both."

On insurance, JAMAICA said governments will have to play a lead role and should have insurance coverage in order to attract inward investment. He stated that, if developed countries had implemented their FCCC targets, adaptation would not be such an urgent issue now.

CLOSING PLENARY

On 11 March, Chair Dovland noted that the workshop had covered comprehensively the issues it had been mandated to consider, including funding, insurance and the transfer of technology.

Reflecting on the key issues raised during the workshop, he drew attention to delegates' comments on the need for capacity building, and said the regional approach identified by participants would be reflected in his report. On the issue of information gaps, he stated that the Secretariat should identify what information is available to it from national communications and other sources on vulnerability and adaptation assessments. This could be supplemented by further information, which may or may not be provided through national communications. He noted that the water, health and food sectors had been identified as being particularly important in terms of adaptation.

He observed that cross-cutting issues included the integration of adaptation issues into development plans. He also noted the need for better coordination between ministries and agencies. Another key issue identified by participants was the need for adequate funding. He also noted the discussion on the needs of LDCs, as well as the importance of awareness raising. He then drew attention to participants' views on insurance, and said this was an issue that should be explored further.

UNSIDS said it would be useful to develop a list of concrete initiatives being conducted by insurance companies relating to climate change mitigation. WHO said insurance companies should be invited to any future workshop on this issue to help develop specific measures in this area. QATAR noted the need for more information on adverse effects to clear up some of the existing uncertainties. MAURITIUS stressed the urgency of acting on Article 4.9. BRAZIL observed that, although information gaps need to be filled, vulnerability and adapta-



tion assessment are not mandatory in non-Annex I communications, meaning that national communications will not necessarily be the appropriate means to fill this gap.

In response, Chair Dovland said that this is one of several channels that exist to fill the information gaps. He said the report from this workshop would reflect the ideas raised by participants and contribute to discussions at SB-12. He said he believed that this workshop had been a productive exercise and, after thanking participants, declared the meeting closed at 2:30pm.

REPORT OF THE WORKSHOP ON THE IMPACT OF IMPLEMENTATION OF RESPONSE MEASURES

SBSTA Chair Harald Dovland (Norway) opened the meeting on 13 March and noted that this workshop was the result of a decision at the Fifth Conference of the Parties to the FCCC (COP-5). He said the workshop would consider methodological approaches and necessary actions under the FCCC relating to the impact of implementation of response measures on, *inter alia*, terms of trade, international capital flows and developmental efforts, in accordance with FCCC Article 4.8 and 4.9 and in the light of matters related to Protocol Article 3.14 (adverse effects). He noted that issues to be addressed at this workshop would include the nature, content and sources of information needed in relation to the impact of response measures, procedures and modalities for the provision of information, and what actions are needed, including those relating to funding, insurance and the transfer of technology. He stated that the outcome of this workshop will be a report from the Chairs of the subsidiary bodies that lists the main points and issues raised by participants. The report will provide an input into discussions at the twelfth and thirteenth meetings of the subsidiary bodies (SB-12 and SB-13), which will lead to a decision at COP-6.

OVERVIEW OF THE IMPACT OF IMPLEMENTATION OF RESPONSE MEASURES

Thomas Rutherford, Associate Professor, Department of Economics of the University of Colorado, provided an overview of the economic impact of the implementation of response measures from a modeler's perspective. He underscored the usefulness of collaborative efforts within the modeling community. He presented the Energy Modeling Forum 18 (EMF 18) programme on international trade dimensions of climate policies, which brings together ten modeling programmes and focuses on: terms of trade effects and the transfer of impacts across countries; leakage rates and their determinants; impacts on developing countries; oil price responses; and decomposition methodologies. He also introduced the Global Trade Analysis Programme (GTAP), a database that collates international economic production and trade statistics to facilitate modeling and policy analysis. He then presented indicative outcomes from his work within the EMF and GTAP framework, focusing on implications of the implementation of the Kyoto Protocol.

He outlined international trade effects, including a reduction of international oil and coal prices and a migration of energy intensive production to non-Annex B (developing) country Parties. He said the economic impacts of response measures would be negative on OECD countries and could be extremely negative on oil producing developing countries, while other developing countries could experience either positive and/or negative effects. He said China and India would benefit from response measures, and Clean Development Mechanism (CDM) and Annex B (developed country Party) trade may provide limited welfare gains to developing countries.

Chair Dovland then invited comments and questions from the floor. Some delegates noted the complexity of these models, while several suggested additional assumptions or noted specific inadequa-

ties. SWEDEN underscored the importance of factoring in renewable energy sources in modeling. CANADA questioned whether existing models fully capture the evolution of new, less carbon-intensive technologies. The UK and UNSIDS pointed to the inaccuracy of models based on the assumption of a uniform carbon tax, as many countries plan to implement multiple policies and measures to reduce emissions. Rutherford agreed that additional assumptions could be useful, but noted limitations inherent in economic equilibrium models. SOUTH AFRICA supported the need to develop modeling activities and improve data collection in developing countries. In response to a question from BOLIVIA, Rutherford said Annex B countries may place restrictions on imports of energy-intensive products from non-Annex B countries.

SESSIONS ON THE IMPACT OF IMPLEMENTATION OF RESPONSE MEASURES

Following the opening of the workshop and overview of the impact of implementation of response measures, sessions were held during 13 and 14 March to review the impact of response measures on: terms of trade and international capital flows; developmental effects; and the specific needs and special situation of LDCs. In addition, a session was convened to consider what actions are necessary as a result of these impacts, including actions relating to funding, insurance and the transfer of technology. The following section outlines the presentations and discussions that took place during these sessions.

IMPACT OF RESPONSE MEASURES ON TERMS OF TRADE AND INTERNATIONAL CAPITAL FLOW

Oil markets and oil production revenues: Knut H. Alfsen, Director of the Center for International Climate and Environmental Research (CICERO), made a presentation on the Kyoto Protocol and its impact on global oil markets and production revenues up to 2020. He noted that his assessment used the CLIMOX model, which covers 13 sectors in 12 regions. He said this model has a number of advantages, as it includes fugitive methane emissions, explicitly addresses the issue of oil supply, including non-conventional oil, and accounts for likely regional variations in policy. Using this model, he presented three scenarios based on: business-as-usual; prolonging the Protocol to 2020; and regulating the greenhouse gas emissions of all countries.

He said the CLIMOX model suggests that the establishment of a climate regime will result in a decline in revenue from oil, gas and coal production when compared to the business-as-usual scenario. However, distribution of these losses among regions is expected to vary according to the fuel in question. He noted that some oil producing countries are heavily dependent on revenue from oil, while gas and coal producers are generally less reliant on these products for their incomes. In addition, he concluded that the distribution of revenue losses will be affected by the nature and coverage of the Protocol and the type of policy instrument used to reach emission targets.

In the subsequent discussion, SAUDI ARABIA said there seemed to be agreement that the Protocol will have an impact on fossil fuel exporters, although there might be divergence over the extent of this impact. The US and UK stated that the losses noted in this study did not mean actual losses in overall revenue from the baseline year, as revenues would actually increase considerably under all three scenarios. Rather, it was the rate of revenue increase that differed under each scenario. AUSTRALIA suggested that losses in potential oil revenue could result in growth prospects in other areas that could compensate for any hypothetical loss predicted under these models. OPEC noted that many oil exporting countries are also gas exporting countries, meaning the impact on these economies would be even greater.



A number of delegates raised issues relating to the assumptions and elements included in the CLIMOX model and scenarios used. In response to GREENPEACE on whether renewable energy factors were included in this model, Knut Alfsen said it was not explicitly included, but that energy efficiency considerations were accounted for. In addition, he noted that climate policy is just one of many factors affecting oil revenue.

Impacts of Annex B policies on Non-Annex B Parties: John Reilly, Associate Director for Research of the Joint Programme on the Science and Policy of Global Change at the Massachusetts Institute of Technology, outlined five ways that Annex B response measures may impact on non-Annex B countries:

- terms of trade effects, especially effects due to changes in the prices of oil, gas and coal;
- impacts on the volume of trade, as lower economic growth in Annex B countries translates into less demand for non-Annex B products;
- migration of energy-intensive production from Annex B to non-Annex B countries;
- economic effects of payments related to the CDM; and
- migration of capital and labor.

He recommended: improving estimates of the relationship between the carbon price and the impact on non-Annex B countries based on advice from a panel of experts; improving modeling by using observed Annex B carbon prices as a basis for estimating the impact on non-Annex B countries; and converting various Annex B policies into a “carbon price equivalent.”

In the ensuing discussion, SAUDI ARABIA and NIGERIA cautioned that energy intensive industry may not necessarily relocate to oil exporting countries. NIGERIA stated that consumer and ethical values may create trade barriers between high and low energy intensive countries. The UK questioned the assumption that implementing climate change policies in Annex B Parties necessarily leads to reduced economic growth.

Analytical frameworks/models and sustainable development: Tariq Banuri, Senior Research Director, Tellus Institute, discussed climate change models and policies from a broader sustainable development perspective. He said a lesson from using earlier frameworks/models is that they need to be participatory at both the international and national level, and include an effective and inclusive policy process. He said it may be necessary to rework current models or develop complementary models. Noting the global income inequity, he also addressed the issue of economic rents and the need for their more equitable distribution.

In the ensuing discussion, AUSTRALIA expressed doubt that a reconstruction effort of current climate change models was necessary. SAUDI ARABIA noted the vulnerability of developing countries that are heavily dependent on the export of fossil fuels. He said the FCCC recognizes that no country should bear a disproportionate share of the burden of the impacts of climate change. In response to a question from BOLIVIA on the CDM, Banuri said it could provide incentives for investment in developing countries, but that much work remained to ensure that it contributed to sustainable development.

IMPACT OF RESPONSE MEASURES ON DEVELOPMENTAL EFFORTS: On 14 March, Vanida Govender, Corporate Environmental Manager at ESKOM, a South African government-owned power utility, made a presentation on how response measures to climate change in Annex I countries could affect the international coal market and coal exporting developing countries. She emphasized that small impacts on the price of fossil fuels would have a major impact on exporters, with implications for welfare and development prospects

for people in poverty. She outlined a sequential approach to minimizing the negative impact of response measures based on both short-term and long-term policy measures. She said action in the short term should involve: modeling of response measure impacts, with peer review of the models by Party representatives; technical review of response measures described in national Annex I communications; and research and development to explore a range of compensation measures. Action in the long term should involve: mitigation measures in Annex I countries to eliminate negative impacts in non-Annex I countries; technology transfer linked to restructuring of fossil fuel dependent economies; technology transfer linked to the CDM and an adaptation fund; and measures to ensure that efficient technologies are installed when energy intensive industry relocates.

During the ensuing discussion, the UK highlighted the potential of the FCCC to stimulate the development of renewable energy sources to provide further electrification in developing countries. Vanida Govender underscored the need for a strong economy to support investment in electrification through emerging technologies. SAUDI ARABIA called for immediate action to create structures for dealing with impacts of response measures, with compensation occurring after the extent of impact has been proved. JAPAN noted that compensation is not mentioned in the FCCC and the Kyoto Protocol. The UAE stated that compensation exists as a general principle of international law. Vanida Govender emphasized the need for research as a basis for policy development on compensation.

SPECIFIC NEEDS AND SPECIAL SITUATIONS OF THE LEAST DEVELOPED COUNTRIES: On 14 March, Tariq Banuri, Senior Research Director, Tellus Institute, discussed climate change policy within the framework of sustainable development. Noting that 40% of the world’s population lives in poverty, he said the challenge is to achieve development in the context of reducing global carbon emissions.

He outlined the concept of “sustainable livelihoods,” which considers development objectives in terms of identifying vulnerabilities and establishing sufficient capacities in developing countries. He said the capacity for sustainable development is determined by the availability of various types of capital, including financial, technological, ecological, social, institutional, cultural and climate capital. He noted that climate is a form of capital that is shrinking on a global level. However, developing institutional capital can help create the necessary technological and financial capital to achieve sustainable development.

He said climate-related actions to promote sustainable development should include: a focus on the “sustainable livelihoods” approach; a transition to renewable forms of energy; capacity building for project certification, monitoring and preparation, and self-protection, research and policy making; a gradualist rather than “sudden change” approach; and the development of national adaptation funds.

Philip Gwage, Assistant Commissioner, Applied Meteorology and Data Processing, Ministry of Land, Water and Environment of Uganda, considered the impacts of response measures on LDCs. He said LDCs were particularly vulnerable to climate change and its response measures, given their economic fragility and high levels of poverty. He said response measures may result in: declining exports from LDCs to developed countries; increasing prices of essential goods in LDCs, especially if oil prices are high; an increasing debt burden; and decreasing development assistance, which may not be offset by foreign direct investment, as investment conditions are often less attractive in LDCs than in other developing countries. He called for: studies specifically relating to the impact of climate change and response measures on LDCs; and elimination of market imperfections relating to oil and other commodities.



In the ensuing discussion, several countries noted the adverse impact of high energy prices on LDCs. The NETHERLANDS said he understood that the impact of response measures on non-annex I energy importers would be positive or neutral overall. JAPAN observed that oil prices have been rising regardless of FCCC-related measures. He noted the adverse impact of oil price rises on LDCs, and asked who is gaining from these increases. Bo Kjellen (Sweden), who chaired this session, noted that commodity prices have a history of price fluctuations. SAUDI ARABIA noted market distortions, and said tax made up 80% of the final price of oil in some OECD countries. He said all developing countries will be affected by climate change or response measures.

UNSIDES supported allowing only renewable energy within the CDM. IRAN said renewable energy sources have only a limited capacity to compensate for conventional sources. In response, Banuri said there must be a shift in the long term to renewable sources. Replying to a question from BURKINA FASO on compensation, Banuri said he did not believe that large financial transfers provided long-term benefits. He stressed the need for investment in capacity rather than compensation. FRANCE called for more work on the transportation sector, as it is critical in terms of energy use.

CONSIDERATION OF ACTIONS NECESSARY: On 14 March, delegates considered what actions are necessary, including those relating to funding, insurance and the transfer of technology, with regards to the impact of implementation of response measures. Participants heard four presentations and engaged in discussion on this issue.

Impact of climate change measures on OPEC: Faten Alawadhi, Downstream Oil Industry Analyst, Energy Studies Department, OPEC, discussed the impact of response measures on OPEC. She noted that studies on the impacts of Protocol implementation show reductions in revenues for oil exporting developing countries of 10-45%, although impacts on natural gas revenues are less clear. She supported parallel discussions aimed at: reaching a consensus on the extent of losses through more assessment and modeling work; and exploring how Annex B commitments to minimize the impact of their mitigation policies can be fulfilled. She suggested actions by Annex B Parties, including, *inter alia*: removing distortions in Annex B energy markets and restructuring existing energy taxes to reflect carbon content of fuels; assisting in economic diversification; and providing funding and transferring technology to support projects related to CO₂ storage, reduction of gas flaring and venting, and energy efficiency. She called for all GHGs to be included in Annex B Parties' abatement policies.

Impact of response measures on the coal industry: Ron Knapp, Chief Executive of the World Coal Institute, outlined key aspects of the international coal market, noting the rise in consumption in developing countries. He emphasized that both coal producer and consumer countries will be adversely affected by response measures, but that effects will be unevenly distributed. He said the objective of the Kyoto Protocol is to reduce GHGs, not carbon intensity, and called for: effective market solutions, including the use of voluntary measures and the Kyoto mechanisms; technological development in response to market circumstances; and the promotion of clean coal technology.

Macro and micro issues in relation to impacts and actions: Jonathan Pershing, Head of the Energy and Environment Division, International Energy Agency, reviewed macro and micro analyses of the impacts of response measures, with particular emphasis on the energy sector. He concluded that, in spite of some shortcomings, such models can offer insights on specific policy options. He presented a framework for analyzing individual policies and their impacts, and

applied it to an EU voluntary agreement on CO₂ reductions in the transport sector. He concluded that, in this example, the adverse effects were negligible and there were ancillary policy benefits. In looking at these models and approaches, he said it is difficult to evaluate the impacts and separate climate policy consequences from other factors. He also suggested that near-term impacts are likely to be relatively minor, but that this may not apply in the longer term.

Methodological approaches and necessary action: Thomas Rutherford, Associate Professor, Department of Economics of the University of Colorado, highlighted how disaggregation of data affects results and presented a model showing impacts of response measures by Annex I countries on Saudi Arabia. He noted that, when oil exporting countries are considered individually, the adverse impacts appear greater than when the countries are clustered within regions. He said impacts of response measures are heterogeneous across non-Annex I countries, and more developing country specific data is needed. On response measures, he observed that replacing the existing mix of taxes with a targeted carbon tax could decrease costs both to Annex I countries and oil exporters. He also recommended action focusing on diversification and a move to greater production of non-energy goods in countries dependent on oil exports.

Discussion: In the ensuing discussion, JAPAN suggested that oil producers take measures now to diversify their economic structures. Faten Alawadhi noted that a number of barriers to diversification existed, while Pershing said the investment climate is not always conducive for diversification. The US called for modeling of potential cartels and agreed reduction cut-backs by oil producers. IRAN supported concrete action to, *inter alia*: enhance research and development related to energy efficiency, the use of natural gas, and advanced fossil fuel technologies; diversify the economies of fossil fuel producing developing countries through facilitating access to markets and preferential treatment; transfer technology across a number of sectors; and support training programmes and capacity building. ZIMBABWE said some action should be taken despite current uncertainties, including further research and development on: reduction of emissions without reducing consumption; clean coal; diversification; and win-win actions. SWEDEN supported considering the suggestions by Iran and Zimbabwe and involving developing countries in research and development efforts. The US said careful analysis of impacts in developing countries of climate change policies in Annex I countries since the FCCC entered into force constitutes appropriate action prior to consideration of future policies and measures. SAUDI ARABIA called for action as well as research. QATAR noted that oil is a commodity that will be depleted and said revenues should be strategically invested to ensure future welfare. AUSTRALIA stressed the limitations of current models and need for inclusion of further elements, such as sinks and all GHGs.

PANEL DISCUSSION

On 15 March, participants convened for a panel discussion to identify and reflect on the key issues and initial actions raised at this workshop. The panel consisted of delegates representing Bolivia, Canada, Japan, Nigeria, Saudi Arabia and the UK.

Panel presentations: BOLIVIA underscored the need for progressing sustainable development within the FCCC framework. He called for capacity building for developing country governments in the context of the new, deregulated economy, especially in the oil and gas sectors. He noted the information and research and development gap in developing countries, and suggested building indigenous research capacity as well as training researchers from developing countries in developed countries and initiating joint research efforts.



CANADA stated that models provide necessary but not sufficient information for policy making and constitute one of a number of tools available to policy makers. He said the uncertainty inherent in models and incompleteness of datasets presents a key challenge. He identified opportunities for action despite the uncertainties, calling for: the application of a wide range of response measures, including the use of the Kyoto mechanisms, enhancing sinks and considering all six GHGs, to achieve cost effectiveness; and research on the impacts of policies already implemented as well as improvement of data collection, particularly in developing countries. He said not enough time had been spent considering positive ancillary impacts of response measures on developing countries.

JAPAN stressed the importance of adhering to the terms of references, noting that the scope of the workshop was impacts under the FCCC. He emphasized the limitations of modeling, particularly in the light of fluctuations in oil prices. He highlighted the need to study impacts already experienced since the FCCC's entry into force, rather than projecting into an uncertain future. He indicated his willingness to consider Iran's list of proposals for action, but said Japan cannot accept the idea of compensation. He underscored that oil producers should take measures now to diversify their economies, in light of increasing revenues due to high oil prices. He affirmed Japan's commitment to assisting LDCs.

NIGERIA suggested that, as many non-Annex I Parties have yet to submit national communications, information abstracted from relevant government ministries could be provided as an interim measure, as this would facilitate immediate action relating to the impacts of response measures. He called for action to:

- introduce a paradigm shift in the scoping and process of modeling that will, *inter alia*, include other GHGs, and disaggregate the impact of response measures on regions and, if possible, countries;
- develop and promote technologies that could accommodate consumption of fossil fuels without increasing GHG emissions;
- expand the global carbon sink;
- establish institutions and procedures, with active participation by all Parties, to address issues relating to an adaptation or compensation fund, linkages with other conventions, and the flexibility mechanisms;
- build institutional and human resource capacity; and
- ensure investment into developing countries to promote less carbon intensive energy, renewable energy, and technology transfer.

SAUDI ARABIA said that, in spite of the uncertainties, all models agree that there will be negative impacts from response measures on developing countries. He called on Annex I Parties to: remove subsidies and restructure tax systems to reflect the amount of GHGs in each fossil fuel; remove existing barriers to more oil use in the power generation sector; discourage nuclear energy use; encourage and assist in wider use of CO₂ sequestration technologies; establish a fund/funds to compensate impacted developing countries; and assist impacted developing countries dependent on fossil fuel exports to diversify their economies. He said more analysis on impacts is needed, but this should not prevent the compensation issue from being on the negotiating table. He said no one is asking for compensation today, only after impacts are proved. He stressed that, under the FCCC, developing countries cannot accept a disproportionate burden of the impacts of climate change or response measures.

The UK said discussion at this workshop had identified a number of inadequacies in the models used, including their assumption of a uniform carbon tax and failure to account for non-CO₂ GHGs. However, he noted unanimity among all models that, with regard to fossil fuels, demand, production and revenue is projected to rise. He said this workshop had raised the issue of LDCs and that the poorest communities are the most vulnerable. He noted potential benefits of response measures, such as through relocation of industry, and highlighted the need to consider consumers as well as producers. He noted that participants had considered what developing countries could do to further their policy objectives, and said one action was to put aside rent from the recent high prices and revenues from oil sales for insurance provision or diversification.

Discussion: In the ensuing discussion, the PHILIPPINES said the burden of proof in terms of documentation of impacts is shifting from Annex I to non-Annex I countries. The UAE pointed to the information gap in terms of impacts of response measures and said Annex I countries are obliged to take the lead in bridging the gap. IRAN commented that the workshop had focused too much on the recent oil price rise, noting that this is not a permanent phenomenon. Mohammed Reza Salamat (Iran), who chaired this session, agreed that the current rise cannot be a major factor when detecting impacts of response measures, while the UK underscored the difficulty of trying to assess the impacts against severe market fluctuations.

On modeling, PORTUGAL noted that models are an indicative tool, but cannot prove anything. Noting the importance of biomass for many LDCs, AUSTRALIA said models need to take into account all GHGs and sinks. The PHILIPPINES and ANTIGUA AND BARBUDA called for additional refinement of economic analysis, including other analytical tools besides modeling.

IRAN welcomed the transfer of technologies to advance diversification, as long as the technologies are sophisticated and modern. Salamat noted links between the current workshop and the upcoming workshop on policies and measures. The NETHERLANDS noted the need for national communications from more non-Annex I countries, and disagreed with the concept of a fund for compensation. ANTIGUA AND BARBUDA called for expanded dialogue with the WTO and UNCTAD.

JAMAICA noted that the oil exporting developing countries had presented a strong case relating to loss of income. He said it would be disappointing if Article 4.8 and 4.9 was not implemented. CANADA said it would be useful to focus on maximizing the benefits of response measures, particularly in relation to the world's two billion poor. GREENPEACE noted that it should not be assumed that relocation of carbon intensive industries would benefit developing countries, as these countries themselves will take on commitments in the near future. She supported removal of subsidies on fossil fuels to help renewables, and asked panelists from Annex B Parties when their countries would remove fossil fuel subsidies. In response, the UK and CANADA noted their liberalization of energy markets and renewable energy measures. SAUDI ARABIA said subsidy removal should also apply to nuclear energy.

CLOSING PLENARY

On 15 March, Chair Dovland outlined key issues raised during the workshop to be included in the Chairs' report. He noted participants' comments that models are important and relevant tools for their work, as well as statements on the need for a comprehensive modeling approach that would include, *inter alia*, sinks, all GHGs and mechanisms. He noted the call for modelers to take into account specific policies and measures, not simply carbon taxes, and the need to include developing countries in modeling networks and activities.



On actions needed, he noted statements on the importance of improving data availability from developed and developing countries from national communications and various other sources. He said capacity building and technology transfer issues had been raised. He took note of calls by some participants for an action-oriented approach to look further into the issue of diversification, and noted proposals for examination of restructuring with regard to tax policies and subsidies. He also noted participants' comments on the need for further consideration and action relating to funding to address proven impacts of response measures. He said reference to sustainable development had been made, as had the importance of considering LDCs and the position of the poorest.

Mohammad Reza Salamat (Iran), who co-chaired the closing plenary, noted participants' comments on difference in the situations of various developing countries, and on identifying those developing countries dependent on fossil fuels, either as producers or consumers. Bo Kjellen (Sweden), who had chaired earlier workshop sessions, underscored several participants' comments on the need for close cooperation between the climate convention and other conventions, particularly the desertification convention.

SAUDI ARABIA said the Chairs' report should note discussion on compensation and on a comprehensive approach in addressing actions. CANADA and the UK said modeling should address net rather than gross impacts. JAPAN said the report should reflect the fact that some issues were raised but may not have been discussed in-depth or agreed on. UNSIDS suggested that the FCCC Secretariat investigate and advise on any concerns or issues relating to impacts raised in non-Annex I communications received so far.

Chair Dovland noted that this workshop had built on and advanced discussion since the previous workshop in September 1999. He thanked participants and the Secretariat for their hard work and valuable contributions, and declared the meeting closed at 1:30pm.

THINGS TO LOOK FOR BEFORE COP-6

FCCC WORKSHOPS: A workshop on "Issues related to Articles 5, 7 & 8 of the Kyoto Protocol" (national systems, adjustments and guidelines) will be held from 14-16 March 2000 in Bonn. A workshop on "Technology transfer for the Latin America & the Caribbean region" will be held from 29-31 March 2000 in El Salvador. A workshop on "Best practices in policies and measures" will be held from 11-13 April 2000 in Copenhagen. A workshop on "Non-Annex I communications for the Latin America & the Caribbean region" will be held from 1-5 May 2000 in Mexico City. For more information, contact: the FCCC Secretariat; tel: +49-228-815-1000; fax: +49-228-815-1999; e-mail: secretariat@unfccc.de; Internet: <http://www.unfccc.de/sessions/workshops.html>

CTI/INDUSTRY JOINT SEMINAR ON TECHNOLOGY DIFFUSION IN LATIN AMERICA AND THE CARIBBEAN: This seminar will be held from 27-28 March 2000 in San Salvador, El Salvador. It will focus on the role of the private sector in the diffusion of climate friendly technology. For more information contact: Megan Gardiner, CTI Secretariat at the International Energy Agency; tel: +331-4057-6684; e-mail: megan.gardiner@iea.org

SEATTLE SUMMIT ON PROTECTING THE WORLD'S CLIMATE: This meeting will be held from 3-5 April 2000 in Seattle, USA. The summit is being organized by the Climate Institute in partnership with Climate Solutions. It aims to bring together key individuals, including leaders in the information and telecommunications revolutions of the last two decades. For more information, contact: the Climate Institute; tel: +1-202-547-0104; fax: +1-202-547-0111; Internet: <http://www.climate.org/seattlesummit>

PACIFIC ISLANDS CONFERENCE ON CLIMATE CHANGE, CLIMATE VARIABILITY AND SEA LEVEL CHANGE:

This meeting will be held from 3-7 April 2000 in Rarotonga, Cook Islands. The meeting is being organized by the South Pacific Regional Environment Programme (SPREP), in partnership with the National Tidal Facility, UNDP and GEF through the Pacific Islands Climate Change Assistance Programme. For more information, contact: SPREP; fax: +685-202-31; e-mail: kaluwin@sprep.org.ws; Internet: <http://www.sprep.org.ws>

CLIMATE POLICY WORKSHOP: FROM KYOTO TO THE HAGUE - EUROPEAN PERSPECTIVES ON MAKING THE

KYOTO PROTOCOL WORK: This workshop will take place from 18-19 April 2000 in Amsterdam, and is being organized by the European Forum on Integrated Environmental Assessment. The workshop will review scientific information relevant for the EU and its Member States in preparing for FCCC COP-6 and will aim to enhance the policy relevance of climate-related research in Europe. For more information, contact: Albert Faber, RIVM; tel: +31-30-274-3683/3728; fax: +31-30-274-4435; e-mail: albert.faber@rivm.nl; Internet: http://www.vu.nl/english/o_o/instituten/IVM/research/efiea/announce.htm

CONFERENCE ON INNOVATIVE POLICY SOLUTIONS

TO GLOBAL CLIMATE CHANGE: This Conference will be held from 25-26 April 2000 in Washington DC. It is being co-hosted by the Pew Center on Global Climate Change and the Royal Institute of International Affairs. The meeting will consider innovative policies currently being implemented by industrialized country governments and the private sector to address climate change. For more information, contact: Michelle Pilliod; tel: +1-202-544-7900; fax: +1-202-544-7922; e-mail: pilliodmp@aol.com; Internet: http://www.pewclimate.org/forms/innov_conf.html

12TH SESSION OF THE FCCC SUBSIDIARY BODIES: SB-12 will be held from 12-16 June 2000 in Bonn. It will be preceded by one week of informal meetings, including workshops. For more information, contact: the FCCC Secretariat; tel: +49-228-815-1000; fax: +49-228-815-1999; e-mail: secretariat@unfccc.de; Internet: <http://www.unfccc.de/sessions/sessions.html>

INTERNATIONAL CONFERENCE ON CLIMATE

CHANGE COMMUNICATION: This conference will be held from 22-24 June 2000 in Kitchener-Waterloo, Ontario, Canada. It will be hosted by Environment Canada and the University of Waterloo and is intended to support effective communication as a means of strengthening the climate change science-policy process. Participants will examine the role of communication in perceptions and knowledge of climate change, assess the effectiveness of different tools in raising awareness of climate change, and identify obstacles to effective communication. For more information contact: Jean Andrey, Department of Geography, University of Waterloo; tel: +1-519-888-4567 ext. 3629; e-mail: jandrey@fes.uwaterloo.ca or contact Daniel Scott, Adaptation and Impacts Research Group, Environment Canada, tel: +1-519-888-4567 ext. 5497; e-mail: dj2scott@fes.uwaterloo.ca; Internet: <http://geognt.uwaterloo.ca/c3confer/>

FCCC 13TH SESSION OF THE SUBSIDIARY BODIES: SB-13 will be held from 11-15 September 2000. It will be preceded by one week of informal meetings, including workshops. For more information, contact: the FCCC Secretariat.

FCCC SIXTH CONFERENCE OF THE PARTIES: COP-6 will be held from 13-24 November 2000 in The Hague, the Netherlands. For more information, contact: the FCCC Secretariat.