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Meeting of the Ninth Session of the Scientific Advisory Committee of the World Climate Impact Assessment and Response Strategies Programme

**Boulder, Colorado, USA
26-29 October 1992**



United Nations Environment Programme

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1. Opening of the Session

The meeting was opened by Mr. Peter Usher, Coordinator of the Climate Unit of UNEP on behalf of the Executive Director of UNEP, Dr. Mostafa K. Tolba.

Mr. Usher welcomed SAC members, many of whom were newly appointed to the Committee. He also welcomed the new SAC Chairman, Mr. Jim Bruce who had replaced Professor Jim Dooge of Ireland who had retired from the position.

Mr. Usher told the SAC that their primary responsibility was to advise the Executive Director on the content and implementation of the WCIRP and that UNEP would in turn do its best to satisfy the recommendations made within the limits of available resources.

He outlined some of the documents to be presented at the ninth session of SAC which included a review paper on WCIRP performance over the previous ten years; an account of WCIRP activities in the year since the eighth session held in Budapest and a prospective document which suggested programme priorities in line with the Agenda 21 outcome of the United Nations Conference on Environment and Development (UNCED).

Mr. Usher said that it was important for the WCIRP to be responsive to the needs of the Intergovernmental Panel on Climate Change (IPCC) and the Intergovernmental Negotiating Committee for a Framework Convention on Climate Change (INC/FCCC) and in this regards he welcomed the participation of the chairman of IPCC, Professor Bert Bolin and a representative of INC/FCCC Mr. Leo Breslin and asked that they specify how the WCIRP can best support IPCC and INC.

In thanking the Director of the National Centre for Atmospheric Research for hosting the meeting in Boulder, Mr. Usher noted that an important part of previous SAC meetings was the opportunity for interaction between SAC members and institutions undertaking relevant work of interest to SAC. He said that the meeting looked forward with anticipation to learning more of the work of NCAR and its Environmental and Societal Impacts Group (ESIG). Mr. Usher then called on the chairman Mr. Jim Bruce to begin the work of the ninth session of SAC.

The chairman, Mr. Jim Bruce, requested the members present to introduce themselves and to briefly indicate their areas of specialization and interest. He said that the new World Climate Impact Assessment and Response Strategies Programme should go beyond simple name-change cosmetics. SAC must ensure that WCIRP addresses the full range of mandate as recommended by the Second World Climate Conference and agreed by the UNEP Governing Council and WMO Congress. He expressed his pleasure

in seeing many of his old colleagues being on the Committee and looked forward to a rewarding working experience with them.

Mr. Bruce said that the WCIRP must stimulate national research on climate impacts assessment and response strategies, and SAC must design ways and means of supporting this. The IPCC expects to get the results of such studies as a basis for their assessments in the future. He noted that while UNEP's mandate was to catalyse action by governments, it will never have enough money to do everything. SAC must design ways and means of ensuring that actions are taken at the national level.

He thanked Dr. Michael Glantz of the Environmental and Societal Impacts Group (ESIG) of NCAR for his assistance and extended his thanks to the Director of NCAR, Dr. Robert Serafin, for agreeing to hold the Ninth SAC meeting in the magnificent setting of the Mesa Laboratory. He said that he looked forward to listening to some of the scientists explain the work they are carrying out that is relevant to the WCIRP, notably the work of the Climate Modeling Group and ESIG.

Dr. Robert Serafin, the Director of NCAR, welcomed the members of SAC to NCAR and informed them of the recent development at NCAR towards the development of computer facilities to address the problem of climate prediction. He specifically drew attention to the development of a six-box coupled climate model that includes biogeochemistry, atmospheric chemistry, and oceans, and revealed that a Modelling Evaluation Climate Consortium (MECCA) had provided funding for the acquisition of a supercomputer dedicated to climate modeling. A brochure on this consortium was made available to SAC and wished them every success in their deliberations.

2. Participants

The full list of the participating SAC members and observers is contained in Annex 1 to this report.

3. Adoption of the Agenda

The following Agenda was adopted.

1. Opening of the Session;
2. Approval of Provisional Agenda;
3. Report on implementation of WCP by representative of WMO;
4. Report by the Coordinator of Climate Unit on implementation of WCIRP and consideration of results;

5. Preparations for the Intergovernmental Meeting and WCP;
6. Reports of representatives of IPCC and INC on activities of their bodies related to WCIRP;
7. Reports of representatives of specialized agencies on activities related to WCIRP;
8. Presentation by NCAR/ESIG on their climate activities;
9. General discussion of the future activities of WCIRP:
 - i) objectives and overall planning;
 - ii) special projects for impact studies;
 - iii) special projects on response strategies;
 - iv) institutional arrangements for cooperation and coordination;
 - v) stimulation and support of national WCIRP programmes;
 - vi) networking of national programmes of impact studies.
10. Public information;
11. Date and place of the tenth meeting;
12. Closure of the meeting.

It was agreed that discussion on issues raised by UNCED on climate and development issues would be considered under agenda item 9.

4. Implementation of the World Climate Programme (WCP)

A report was presented by Dr. Victor Boldirev of the World Meteorological Organization and Director of the World Climate Programme Department on the activities of the World Climate Programme.

He said that activities within the WCP component, other than WCIRP (World Climate Data and Monitoring Programme, World Climate Applications and Services Programme, and World Climate Research Programme) were outlined with special emphasis on aspects relevant to the

WCIRP. Support by UNEP of various projects within WCP was acknowledged with appreciation.

As far as the World Climate Data and Monitoring Programme (WCDAMP) was concerned, the following projects with linkages with WCIRP were mentioned:

- development of the CLICOM system which successfully continued providing countries with computer facilities suitable for climate data processing and thus contributing to the undertaking of studies of climate and its impact at the national level.
- completion of the updated and digitized version of the climate data referral system (INFOCLIMA) aimed at facilitating search of climate data sets suitable for climate studies, including climate impact studies.
- climate system monitoring and climate change detection projects which contribute to provisions of climate analysis products to countries and to the production of the global climate baseline data sets, including supporting information (metadata).

The World Climate Application and Services Programme (WCASP) projects are concerned with:

- (i) development of application and services techniques,
- (ii) assistance to countries in developing national climatological services,
- (iii) development of methodologies for climate and climate change effects assessment.

All these projects were of direct relevance to WCIRP activities and were expected to be implemented in close coordination and cooperation with WCIRP.

The following specific activities were outlined, inter alia:

- development of special, CLICOM-compatible, climate application software, including Climate Application Referral system (CARS) that contains information on proven methodologies to apply climate information and knowledge in food, energy and drought and desertification areas.

- preparation of guidance material on climate application, including updated version of the WMO "Guide on Climatological Practices".
- completion of a regional project in Europe on "Meteorological Information for Development of Renewable Energy".
- WCASP involvement in energy-related programmes and projects of other organizations, particularly IAEA and ECE.
- joint activities with World Tourist Organization in preparation of guidance material on climate applications for tourism and recreation.
- continuation of the Tropical Urban Climate Experiment (TRUCE) with holding in January 1993 the major WMO Technical Conference on Tropical Urban Climates (TECTUC).

As regards the World Climate Research Programme (WCRP), the seven projects included in the programme were described with reference, as appropriate, to aspects relevant to WCIRP. These seven projects are concerned with:

- atmospheric variability
- atmospheric radiation transfer
- cloud-climate feedback
- global water cycle and fresh water resources
- prediction of transient climate variations
- climate change
- stratospheric processes and their role in climate.

It was emphasized that the WCRP, aiming at achieving better understanding and prediction of climate provides an indispensable input to any climate impact studies and assessments.

5. Implementation of the World Climate Impact Assessment and Response Strategies Programme

Mr. Alusa, who is responsible for the coordination of the WCIRP project in the Climate Unit, reported on the activities of the WCIRP since the eighth session of SAC in Budapest.

He said that in accordance with the recommendation of the Scientific Advisory Committee (SAC) at its Eighth Session in Budapest in 1991, the WCIRP in 1992 addressed the following priority areas:

- (i) Greenhouse Gases/Climate Change;
- (ii) Coordination of Climate Impact Activities;
- (iii) Methods of Climate Impact Assessments;
- (iv) Monitoring;
- (v) Response Strategies;
- (vi) Information, Education and Training.

(i) Greenhouse Gases/Climate Change:

With regard to priority area (i), the main thrust of the programme was in support of the UNEP/WMO Intergovernmental Panel on Climate Change. Through the provision of a Senior Programme Officer to the Secretariat and contributions to the Trust Fund established for IPCC implementation, the IPCC was assisted in supporting the involvement of developing country participants in various meetings of task groups, Working Groups and the IPCC Plenary which was due to be held in Harare in November 1992. Resources were specifically provided to support the IPCC Workshop on Biotic Feedbacks then in progress at Woods Hole, Massachusetts, USA. UNEP had supported all the sessions of the Intergovernmental Negotiating Committee for a Framework Convention on Climate Change (INC/FCCC) through the secondment of a programme officer and secretary to the Secretariat, and was represented at all the sessions by a programme officer from the Climate Unit.

UNEP was involved in three types of country studies:

- 1) OECD and IPCC Working Group I (Science) was concerned with the development and testing of methodologies for compiling inventories; utilizing GEF funds an eleven country pilot phase is in development. A workshop to refine the assessment methodology held in December 1991 was followed by a transparency studies and training workshop in July 1992 prior to the carrying out of the country studies themselves which were to begin in January 1993.
- 2) UNEP climate impact assessment studies undertaken in Vietnam, Brazil and jointly in the South East Asian countries of Malaysia, Indonesia and Thailand have been completed and the reports published. Three levels of reporting were undertaken -- a comprehensive research report to each of the study countries, a shorter but detailed report distributed to all countries providing details of study methods, study results and indications of potential responses, and a widely distributed brochure which provided a brief description of the country programme undertaken and the major findings of the study for the general reader and non-scientist.
- 3) A third type of country study dealing with the costs of greenhouse gas emission abatement was being implemented for UNEP by the RISO UNEP Collaborating Centre on Energy. This study, initially conducted in two developed and three developing countries aimed at providing cost estimates of greenhouse gas control through improved energy production and use efficiency and the acquisition of cleaner technology to limit greenhouse gas emissions.

An inventory of all types of country climate studies had been prepared by UNEP using information obtained primarily from responses to a questionnaire sent to governments. The updated report was to be presented to the Eighth plenary session of the IPCC, in Harare, Zimbabwe, in November 1992.

Among the new country study initiatives was an Asian regional study on global environmental issues developed by the Asian Development Bank and co-financed by the Asian Development Bank (ADB) the Governments of Australia, Japan and Norway. Eight Asian countries were participating in the study with the aim of developing national strategies to respond to climate change and to propose a strategy for regional cooperation.

Using a common methodology, the studies were to comprise sources and sinks inventories, climate impact studies and abatement costing studies. A final report of the study would be published in August 1993. UNEP is one of the several international organizations represented on the Inter-

Agency Coordination Committee for the programme which met for the first time in July 1992 in conjunction with the commencement workshop for the project.

An IPCC Workshop on Country Studies was held at the Lawrence Berkeley Laboratory, California, USA, from 14-16 September 1992. The major activity of the workshop was expert group discussions on:

- Assessing vulnerability to climate change;
- Inventorying sources of greenhouse gas emissions;
- Inventorying sinks and reservoirs of greenhouse gases;
- Identifying and analyzing technological options;
- Analyzing project feasibility and costs; and
- Integrating socio-cultural factors.

After integration of the results of the workshop a report containing the results of workshop discussions and suggestions for further initiatives was published as an IPCC document.

(ii) Coordination of Climate Impact Activities:

Plans were in hand to establish an international network of country climate impact studies and to encourage the development of country and regional network programmes. The major problem earlier was staff. The situation had improved slightly with the recent (October) recruitment of a programme officer. An additional new programme officer post to be dedicated to networking activities had been advertised and the process of shortlisting the applicants had started. It was expected that the post will be filled in 1993.

Due to this staff shortage, networking activities were limited to the NCAR Newsletter which UNEP has partially supported in the past.

(iii) Methods of Climate Impact Assessment:

The Roving Seminar Programme on methods of Climate Impact Studies had provided a cost effective method of imparting knowledge to a large group of scientists and had to date been rated as very successful by participants. Specifically, the last workshop held in Zimbabwe used a new training approach where computer models of water resources and agriculture impacts were demonstrated, and participants were involved in scenarios

and impacts assessment using the models on computers brought into the seminar room. Future seminars would replicate this new approach. It will be necessary, however, to ensure that participants are at least computer literate.

Plans were underway to conduct another Roving Seminar in a developing region early next year. Climate impact assessment methodologies had been developed and tested through the Vietnam and Brazil projects and the joint Indonesia, Malaysia and Thailand project, whose results were published early 1992.

(iv) Monitoring

Under the overall umbrella of the Global Environmental Monitoring System, the Climate Unit had supported the Background Air Pollution Monitoring (BAPMoN) project executed by WMO. It had also continued to support the Glacier Monitoring project of the World Glacier Monitoring Service (WGMS) and the Climate System Monitoring with WMO. The latest Glacier Monitoring Bulletin had just been published and distributed and the Climate System Monitoring reports continue to be issued on a regular basis.

WMO, UNEP, ICSU and IOC have signed a Memorandum of Understanding and established a Joint Scientific and Technical Committee to plan and oversee the implementation of the Global Climate Observing System (GCOS). UNEP has offered to contribute US\$200,000 for 1992 through the secondment of a staff member and plans were in hand to recruit a suitable expert for secondment to GCOS Planning Office.

UNEP's involvement in the actual GCOS activities were expected to be through the Global Terrestrial Observing System (GTOS) to be established soon and to be overseen by the Scientific Advisory Committee on Terrestrial Ecosystem Monitoring and Assessment (SACTEMA). SAC recommended that Secretariat and the Chairman explore the possibility of suggesting to the JSTC that some representation on it by a person with impacts and response strategies and/or terrestrial ecosystems monitoring background. In the meantime, UNEP representative should look after the impacts and response strategies aspects on the JSTC. It was agreed that perhaps the Chairman of SAC could attend JSTC as an observer.

(v) Response Strategies:

Previous WCIRP studies have, invariably, had a component on response options. Hence, the South East Asia and Vietnam projects had addressed the impacts of climate variability and change on socio-economic systems and offered options on possible response strategies. The country studies referred to earlier, namely the GEF funded project on Sources and Sinks of

Greenhouse Gases, and the RISO/UNEP project on Greenhouse Gas Emission Abatement Studies essentially address the issue of response strategies.

Many developing countries do not have inventories of greenhouse gases and their likely sinks. And globally, agreed methodologies on estimating sources and sinks of greenhouse gases or assessing the costs of their emission reduction do not exist. These projects seek to evolve such methodologies and test them in various situations in selected developed and developing countries. Response strategies to address the issue of climate change will be best assessed when these methodologies are agreed and the cost/benefit analysis of specific response options can be carried out.

The Oceans and Coastal Areas Programme Activity Centre (OCA/PAC), through its regional seas programme, had established a number of task teams on climate change which address the question of climate change and its impact on coastal areas including the resultant impacts of sea level rise. Possible adaptive and mitigative response options are addressed by each task team for all the regional seas.

So far no programme exists on the development of efficient environment friendly technologies as a response strategy but in response to Agenda 21 it is expected appropriate units in UNEP will address this aspect of response strategies.

(vi) Information, Education and Training:

Public information on climate change has taken centre stage in the Information Unit on Climate Change (IUCC). Over 100 Fact Sheets have been prepared on an assortment of scientific, legal, economic, social and political issues related to climate change. Their existence is being publicized through a wide distribution of the IUCC brochures and through seminars that the Unit has carried out in India, Pakistan and Paris and through on-line information systems. A Memorandum of Understanding has been signed between UNEP and WMO which seeks collaboration in the activities of IUCC. Similar memoranda of understanding are expected to be signed in due course between the IUCC and INC/FCCC Secretariat (the Climate Convention Secretariat), ENERCON of Pakistan and the Tata Energy Research Institute (TERI) in India.

Three videos have been produced and shown to various audiences, namely:

- 1) What is the greenhouse effect? This will be used to support IUCC seminars and was produced in collaboration with TVE;
- 2) A three minute film entitled "*Bios*" aimed at raising awareness was premiered at UNCED in Rio de Janeiro;

- 3) A forty minute video of newsclips on climate change was co-produced with INC and is intended for news broadcasters. Dozens of television stations have already ordered this film.

In conjunction with IPCC, the IUCC is planning seminars in Botswana, Lesotho, Zambia and Zimbabwe during November after the IPCC plenary to be held in Harare.

With limited support from and UNEP participation, TVE have produced a video on the drought in Southern Africa and highlighted the need for drought preparedness and other policy initiatives to deal with future droughts. Press conferences have also been held in conjunction with the launching of the reports of the various projects carried out by UNEP.

With a view to developing awareness of the impact of the El Nino-Southern Oscillation (ENSO) on socioeconomic systems, a popular book on the "El Nino Phenomenon" was issued in 1992 as GEMS/Environmental Library Series No. 8.

(vii) Other Activities

The Working Group on Socio-Economic Impacts of ENSO held its third workshop in Bangkok, Thailand, 4 - 7 November 1991 on the theme "*ENSO and Climate Change*". Its main purpose was to discuss some aspects of the speculations about ENSO-Climate Change interaction. The main conclusions of the workshop are covered in a workshop report and included the following:

- 1) ENSO events were likely to occur, and would possibly be intense with a change in their frequency but would more likely not change in duration.
- 2) It was unclear as to whether or not tropical teleconnections would change but with climate change, systematic changes in extra-tropical teleconnections could occur.
- 3) Judicious use of ENSO information could provide societies with coverage against their adverse consequences but demographic and climatic changes could change existing relationship (and current wisdom) about society-ENSO-environment interactions in an adverse way.
- 4) Deforestation, changing land use and inappropriate development generally would render societies more vulnerable to the impacts of ENSO events especially (a) coping mechanisms and (b) severity and location of harmful impacts of ENSO-related climate anomalies.

- 5) Changes in the characteristics of ENSO-related processes were expected, as the climate changes, but in ways not yet fully understood.
- 6) There was need for better interaction between ENSO, natural and social science research communities for improved understanding of changes in interaction between ENSO and demographic processes.
- 7) Socio-economic research result in the area of ENSO impacts should be coordinated, pooled and analysed with a view to producing outputs useful to decision-makers in governance, development planning, hazard reduction and resource management.

6. Intergovernmental Meeting on World Climate Program 14-16 April 1993

Mr. Bruce briefed the meeting on the planned Intergovernmental meeting on WCP. He said that the WMO Congress and the UNEP Governing Council decided that they should look at what was agreed at UNCED in Rio de Janeiro, the Intergovernmental Negotiating Committee for a Framework Convention on Climate Change and consider how that will be reflected in WCP. He said he had been designated the Chairman of the Organizing Committee held its first meeting in Geneva the preceeding week. The Conference was being organized by WMO, UNEP, UNESCO and the IOC, ICSU, all partners in organizing the Second World Climate Conference.

Mr. Bruce said that each component of WCP was to contribute a document on its activities -- past and planned -- on the basis of which appropriate resource needs would be identified and presented to the meeting. A secretariat had been established under Dr. A. Askew, with two scientists seconded from USA and Canada.

After listening to the presentation by Mr. Bruce and after additional input by Mr. Usher, there ensued a discussion on how SAC members saw the forthcoming meeting and how it might be useful in furthering the objectives of WCIRP.

SAC, recognizing that there was very little time to organize a major intergovernmental meeting and the need to avoid a negative response, especially from developing countries, recommended that:

- 1) The meeting should be seen as a response to Rio and aimed at, assisting countries to address commitments in the Framework Convention on Climate Change (FCCC) and intentions of key sections of Agenda 21.

- 2) The requirements of FCCC and the IPCC for scientific and technical input to reduce uncertainties should be clearly identified and addressed in "Future Directions" to attract interest of non-technical government officials.
- 3) All efforts should be made to ensure cross-sectoral and policy-oriented representation and involvement in the meeting.
- 4) To this end, IPCC and INC should be consulted at their next meetings, and participants encouraged to participate in the Intergovernmental Meeting.
- 5) IPCC and INC involvement should be directed towards
 - (a) securing IPCC and INC views on the most effective procedures and programs for the meeting;
 - (b) consideration of appropriate timing of INC and IPCC meetings to be close to 14-16 April 1993 to ensure cross fertilization of ideas.
- 6) To ensure active involvement of developing countries, the linkages between desertification and land degradation on the one hand with climate on the other, must be emphasized.
- 7) The objectives of the meeting should be focussed on: (a) new thrusts for WCP, (b) development of national climate programs, and (c) resources to support both.
- 8) The role of WCP in both support of both climate change responses and in national economic development must be recognized in the meeting.
- 9) The expanded response strategies aspects of the WCIRP component should be more strongly recognized, for example in the title of Part 5 of the Future Directions document.
- 10) The cross-sectoral scope of national climate programs should be made clear. These programs should reflect the scope of the WCP, now including studies of response strategies, as well as the data, applications, research, monitoring, and impact assessment components. However, the scope does not extend to policies on abatement programs.
- 11) In view of the likely interval before the Framework Convention is ratified and the Conference of Parties convened, the Intergovernmental Meeting provides an opportunity for countries to determine and support needed technical activities.

- 12) UNEP should ensure that within available resources, as many of the SAC members as possible are assisted to attend the meeting to facilitate the catalysation of impact studies at national and regional levels.

7. Activities of FAO relevant to the WCIRP

Dr. R. Brinkman presented the activities of FAO relevant to WCIRP. He said that from 1960, FAO jointly with WMO engaged in studies on climate-agriculture interactions for areas with large agricultural developments and from 1968, with WMO and Unesco in the Interagency Group on Agricultural Biometeorology.

Since the Stockholm Conference, 1972 and the 1974 World Food Conference, the Agro-Ecological Zones project was set up to estimate the food production potential of developing countries. Since then, this information has been used for a study on population supporting capacities of lands of the developing world. The methodology had been, and was being refined for use at country and subnational level, to assist in planning of optimal land use, taking into account climate and its variability, land suitability for different uses, and environmental conservation.

Since 1990, an interdepartmental working group had been coordinating FAO's activities on environment and sustainable development, incorporating the existing working group on climate change. The 26th FAO Conference in 1991 decided to increase the budget allocation for cross-sectoral activities, including those on climate change and related issues, such as biodiversity.

An FAO position paper on climate change was submitted to the UN General Assembly in 1988, and a revised version to the Second World Climate Conference. A two-page summary, entitled "Climate Change: World Agriculture and the Rural Environment", widely distributed at UNCED, gives a synoptic view of facts, model projections and uncertainties, consequences for agriculture and FAO's strategies and actions. Briefly listed, these include:

- 1) Development of monitoring and early warning systems for extreme events affecting food and agriculture, such as droughts or pest and disease outbreaks
- 2) Disaster preparedness plans and food security assistance schemes
- 3) Stimulation of research to increase reliability of seasonal weather forecasts to reduce risk in rainfed farming

- 4) Promotion of improved georeferenced databases on natural resources and current land uses that influence sources and sinks of greenhouse gases
- 5) Improved management of existing forests, afforestation and reforestation programmes
- 6) Conservation schemes for plant and animal genetic resources, including traditional land races now under threat
- 7) Stimulation of research and application methods to improve nutrition, health and genetic characteristics of livestock, increasing its productivity and reducing greenhouse gas emissions per unit product
- 8) Promoting development of resilient agricultural systems and adapted management practices, including crop diversification and breeding of stress-tolerant crops
- 9) Conservation and rehabilitation of degraded lands, more judicious use of nitrogen fertilizers, and improvement of rural water use efficiency
- 10) Stimulation of further research on the effects of increased CO₂ - alone and combined with increased UV-B radiation and ozone - on plant growth and on soil conditions, especially in tropical environments
- 11) Stimulation of improved modelling of climatic change at regional and national levels, and subsequent reassessment of national human population supporting capacities.

FAO had organized or participated in several international fora and conferences with climate change and sustainable development as core issues, such as IPCC meetings, the Second World Climate Conference, the FAO-Netherlands Conference on Environment and Sustainable Development, UNCED and its Preparatory Committee sessions, for which it prepared a number of draft documents.

Several current studies deal with climate change, its impact on agriculture and appropriate human responses. Most are undertaken together with partners such as ECU, IIASA, ETH Zurich, the Public Health Institute and the Geological Survey of the Netherlands.

These studies include:

- 1) Guidelines and methods for assessment of climate change impact on irrigated agriculture

- 2) Methodology development for regional impact studies on crop agriculture
- 3) Mapping and characterization of the world's low-lying coastal areas in terms of variables influencing their expected response to a gradual sealevel rise
- 4) Identification of sensitive inshore areas and wetlands; monitoring of fisheries ecosystems
- 5) Biofuels as sustainable substitutes for fossil fuels.

Other relevant studies include:

- 1) The 1990 Global Forest Resources Assessment
- 2) Future development of tropical forest resources
- 3) The FAO-IAEA study on biogeochemical cycles
- 4) AMDASS, the agrometeorological data system.

Besides these activities, which may seem largely directed to serve researchers and government planners, much of FAO's work was directed to improving farmers' capacities to reduce risk or make optimal use of climate variability. This was done, for example, through developing and improving techniques to increase soil moisture storage, or improving management advice to farmers on the basis of current weather monitoring (contingency planning and response farming). Improving household-level food security is another element in the range of activities to help rural populations achieve greater resilience and food security under short-term and medium-term climate variations.

On the issue of methane release from ruminants and from rice paddies, FAO is identifying management alternatives to maintain productivity and decrease emission per unit product.

Soil and water resources can be degraded by plant nutrient depletion at very low input levels, as in major parts of sub-Saharan Africa, as well as by pollution through excessive plant nutrient applications, as in parts of northwestern Europe. Integrated Plant Nutrition Systems are being developed, making optimal use of all internal plant nutrient sources, with necessary external supplementation. These systems optimize plant nutrient efficiency while minimizing losses and greenhouse gas emissions and preventing degradation of soils and waters.

FAO believes that the two major positive effects of increasing CO₂ concentrations, on biomass production and yields as well as on water-use

efficiency, should be studied and taken into account together with the negative effects on yields of, for example, higher nighttime temperatures, increased UV-B radiation or tropospheric ozone. An expert consultation on the effects of increased CO₂ concentrations and some of these other issues is planned for late 1993.

Discussions on the FAO/ECU Project on climate change, Global Agro-Ecological Potential and Regional Agricultural Productive Capacity:

Mr. Peter Usher provided the background leading to the presentation of the above project to SAC. He said that the project having being considered by the Eighth SAC and referred to the Secretariat for normal processing had been referred to the Project Screening Committee, but had been rejected by the Committee.

The project was referred back to the Climate Unit for complete reformulation and rethink and subsequent resubmission to the PSC. It was considered prudent to refer the proposal to SAC for some guidance. Hence Professor Parry had been invited to present the revised proposal.

Professor Parry discussed the objective and expected outputs of the project in some detail and maintained that the project was basically a good one and one that would add to our body of data bases on studying the effects of climate change on agro-ecological potential and agricultural productive capacity; develop a methodology for estimating the effects of climate change on agro-ecological potential, land degradation and agricultural productive capacity. These would constitute a powerful policy tool for national, regional and global analysts. He pointed out that the concept of population supporting capacity had been removed from the proposal.

The SAC considered the presentation of Professor Parry, Mr. Usher's background information and the proposal itself in detail. It noted that the project was a good project with considerable scientific merit as it addressed some of the issues raised by UNCED and builds on previous work done by IIASA/UNEP that culminated in the publication of two important volumes on climate variability and agriculture. It was also noted that the project was backed by eminent scientists with a track record in producing results. It was noted, however, that UNEP budget was limited and there were competing demands on these limited resources. Additionally, there were new areas that demand attention in the new WCIRP mandate, namely response strategies which must be addressed in order to provide the IPCC with the requisite results for future assessments.

The question of capacity building had not been given the prominent position it merits in such a project. There were questions as to whether UNEP is necessarily the correct institution to support some of the components of the core project.

After extensive discussion of the proposal, SAC recommended that:

- 1) UNEP should support those portions of the project that relate to:
 - the improvement of methodologies for assessing the potential impact of climate variations and long-term climate change on agro-ecological potential and agricultural productive capacity
 - capacity building which should be better developed and given appropriate prominence in the project proposal

It was expected that commensurate reduction in UNEP's contribution would be reflected as a consequence of the adjusted roles of the respective organizations.

- 2) The Secretariat should examine the proposal with FAO and ECU and explore other sources of finance to support the project. The Chairman of SAC was to prepare a letter to FAO suggesting that other portions of the project might best be supported from sources other than UNEP and invite FAO to consider making future budgetary provisions to support these portions of the project.

8. Activities of the Intergovernmental Oceanographic Commission (IOC) related to WCIRP

The SAC had before it a document on the IOC activities related to the WCIRP. It was noted that through the Tropical Ocean and Global Atmosphere (TOGA) programme The El Nino- Southern Oscillation (ENSO) was being studied to elucidate the nature of ENSO and its impacts on the precipitation and temperature regime of nations, which in turn have serious implications on a wide range of economically important activities including agriculture, water supply, and on fishing industry. Studies of the relationship between regional and local precipitation and temperature patterns and the ENSO cycle were needed to apply the available forecasts to specific regions. Additionally, as ENSO is not the only climate factor which determines variability in climate on a regional and global scale, regional climate forcing factors need to be better understood to improve the accuracy of climate forecasts. The IOC would continue to support research related to the basic understanding of the science related to ENSO phenomenon and applied research to improve ENSO forecasting through the WCRP; support through its WMO-IOC Intergovernmental TOGA Board, an initiative to investigate the establishment of a core facility for climate prediction research and the setting up of a network of regional and national application centers for ENSO predictions; urge its Member States to make

provisions for continuing support of TOGA ocean observing systems, which will contribute to a major component of Global Climate Observing System (GCOS) and the climate module of the Global Ocean Observing System (GOOS).

9. Activities of Intergovernmental Negotiating Committee for a Framework Convention on Climate Change (INC/FCCC)

The Committee heard a presentation by the representative of the INC Secretariat. It noted that the United Nations Framework Convention on Climate Change had been agreed and adopted by the Intergovernmental Negotiating Committee (INC) at the second part of its fifth session held in New York from 30 April to 9 May 1992. The Convention was subsequently opened for signature on 4 June 1992 at the United Nations Conference on Environment and Development in Rio de Janeiro, Brazil, where it was signed by 154 States and by one regional economic integration organization. Since then, two additional States (Iran and Mali) signed the Convention, bringing the total number of signatures to 157. The Convention will come into force ninety days after the day of deposit of the fiftieth instrument of ratification, acceptance, approval, or accession. So far, four States (Mauritius, Seychelles, Marshall Islands and USA) had deposited their instruments of ratification. The Conference of the Parties to the Convention was required to meet not later than one year after the date of entry into force of the Convention. It was anticipated that this was unlikely to be much before the latter part of 1994.

The Committee also noted that Article 8 of the Convention established a Secretariat to support the Conference of the Parties and other subsidiary bodies of the Convention. The functions of the Secretariat would be carried out on an interim basis by the present INC Secretariat. The current session of the General Assembly was also expected to make arrangements for INC to prepare for the first session of the Conference of the Parties and for implementation of the Convention. The sixth session of the INC was already scheduled to be held in Geneva from 7 to 10 December 1992.

The Committee noted the commitments of States party to the Convention under Article 4 as well as the other provisions of the Convention. It agreed that UNEP, primarily through its World Climate Impact Assessment and Response Strategies Programme (WCIRP) of the World Climate Programme (WCP), but also through its Global Environment Monitoring System (GEMS), could contribute, and indeed was already contributing to, implementation of the Convention, particularly in the following main areas:

- 1) Assisting with the preparation of national inventories of anthropogenic emissions by sources and removals by sinks of relevant greenhouse gases through support to the

development of methodologies and guidelines at the national level (Articles 4 and 12);

- 2) Supporting climate change impact assessments with a view to developing and implementing appropriate preventive, mitigation, or adaptive response measures (Articles 4 and 12);
- 3) Promoting the transfer of suitable technology to, and between developing countries (Article 4);
- 4) Contributing to education, training, and public awareness activities and supporting capacity building programmes (Articles 4 and 6); and
- 5) Strengthening research and systematic observation through GEMS and through participation in the Global Climate Observing System (GCOS) (Article 5).

The Committee also expressed the hope that full information regarding progress towards implementation of the Convention both prior to and after ratification would be made widely available, and in particular that SAC itself should be kept fully informed.

The SAC took note of these developments and observed that in the interim and since the Convention, is unlikely to come into force before the end of 1994, there was an urgent need for country studies in preparation for the first meeting of the Conference of the Parties. The contribution of UNEP to the INC Secretariat was acknowledged with thanks and it was hoped that this support would continue after the General Assembly has made appropriate decision on the matter.

10. Activities of the Intergovernmental Panel on Climate Change (IPCC) related to WCIRP

Prof. Bert Bolin, chairman of the IPCC, gave a brief summary of the IPCC activities as he sees them evolve and pointed out that the next IPCC plenary was due to be held in Harare, Zimbabwe, in November 1992, and he therefore could only discuss what he was proposing to the IPCC, but not what might be agreed. He noted that the Framework Convention on Climate Change has been signed by over 157 countries and ratified by 6 countries. The INC is now preparing the groundwork for the Conference of the Parties, and the IPCC must do an assessment which should neither be too early nor carried out too quickly, as it is unlikely that the Conference of the Parties will meet before the end of 1994. He expected that an assessment by the fall of 1995 would be realistic, but that an Interim Report to the Conference of the Parties would need to be prepared prior to

its first meeting. He emphasized that the following areas were urgent points for investigation:

- 1) Inventories of sources and sinks, and proper understanding of the carbon cycle was of paramount importance for future IPCC assessments; methodologies need to be developed urgently, but appreciate that it is unlikely that agreed methodologies were unlikely to be available in less than half a decade; biogeochemical cycle of carbon must be analyzed to facilitate assessment;
- 2) We are likely to be able in the not-too-distant future to produce global maps of sulfur distribution as a basis for studying sulfate forcing in climate dynamics.

He outlined the following proposals which were due for discussion in Harare:

- 1) Working Group I on science, he proposed should remain as it has been before; however, Working Group II and III on impacts and response strategies, should be merged, but there will be a need to have subgroups, perhaps three, as follows:
 - (i) terrestrial ecosystems;
 - (ii) coastal and marine systems;
 - (iii) industry and transportation.

He noted that, whereas the Working Group I has a coordinating center in the UK, there will be a need for similar centers to coordinate the activities of the combined Working Group II and III and their sub-groups. He also noted that it will be necessary to have a representative from the developing countries in each one of these secretariats.

The following issues remain outstanding and need to be addressed:

- The economics of climate change must be addressed especially in order to develop future scenarios as a basis for climate.
- Development of methodologies will continue to be a problem, and it will be difficult to reach agreements on these methodologies, as they must be developed and tested in real life before they are adopted.

He emphasized that the IPCC's mandate is not to carry out scientific work, but to assess the status of our current knowledge.

SAC considered the report and noted that there is a gap in the body of knowledge on climate impact assessment methodologies and channels for catalyzing work on these methodologies must start in earnest. In this respect, SAC should ensure that the scientific work in this regard relates to IPCC needs. UNEP should focus on IPCC priorities and address them in WCIRP activities.

SAC further agreed that some of its members should be designated to liaise with the IPCC and some of its working groups. The Chairman of SAC was designated to liaise with Working Groups II and III on impacts and response strategies, and appropriate aspects of Working Group I on behalf of SAC. A request for his participation in IPCC as an observer was to be made by the Secretariat.

11. Presentation by UCAR/NCAR/ESIG on their activities related to WCIRP

Dr. Michael Glantz of the Environmental and Societal Impacts Group at NCAR presented a summary of the activities of the Group. He said that the Group's objective is to improve the knowledge base about societal implications of atmospheric processes so that decision makers might better understand, anticipate and respond to atmospheric science related issues. Consequently ESIG's research activities are focused on the interactions between climate and society, and considers climate variability/change to be a key element of global change. The actual activities include:

- Interaction between society and atmospheric processes,
- Collaborative research between ESIG and other research and user groups,
- Publications, visitors program, workshops, lectures and newsletter.

The SAC was informed of the studies actually undertaken since 1986 and areas for future research. A selected list of publications produced as a result of previous research was also given.

A presentation by Dr. Anthes, the President of the University Corporation for Atmospheric Research, highlighted the work going on at NCAR on regional climate modeling using one way nesting . He said this approach allowed a more realistic incorporation of orography and mesoscale forcing and so far has produced results that more closely approximate observations. Further work was in progress on what effects changes on ecosystems has on climate models and includes behavior of biogeochemical systems.

The SAC took note of the work going on at NCAR on climate modelling and the work of ESIG and commended NCAR for being in the forefront on critical areas of particular interest to WCIRP. SAC paid particular tribute to ESIG's networking activities and agreed that national institutions should be assisted in starting national impact studies networking as recommended in their eighth Session in Budapest.

12. Future activities of the WCIRP

The Chairman invited Dr. Malone to give a presentation as he sees WCIRP moving ahead in the context of Rio and the Framework Convention on Climate Change. Dr. Malone in his presentation, pointed out that Rio was an opportunity window to examine the linkage between climate and sustainable development. He emphasized the significance of regional approach to climate change impact studies, especially in the context of START initiatives. The item was introduced by the Coordinator of the Climate Unit, Peter Usher. He presented a document proposing future directions which were, he said, based on Recommendations of the Second World Climate Conference, Agenda 21, the Framework Convention on Climate Change, decisions of UNEP's Governing Council particularly GC.16/41 of 31 May 1991 and on the advice of the eighth session of SAC which identified priorities for programme development and set criteria for project selection.

He outlined programme policy and then identified the priority areas that it was felt the WCIRP should address as a consequence of Agenda 21 proposals. These included the development and application of improved methods of climate impact assessment; encouragement and support to climate-related country studies including national sources and sinks inventories, national and regional climate impact and response strategy assessment and national greenhouse gas abatement costing studies.

Mr. Usher suggested that greater emphasis needed to be placed on response strategies and recommended that a workgroup of governmental and international experts might be convened under the auspices of the Scientific Advisory Committee to elaborate and recommend a suitable response strategies programme for the WCIRP. Other issues to be addressed as priority would be preparing for and mitigating drought events and the more effective use of education, training and public awareness.

The Committee believed that Agenda 21 provided appropriate guidance for the choice of activities to be included in the future WCIRP. Particularly important in this regard was the charge to governments, with the cooperation of relevant United Nations bodies and others, concerning the establishment and operation of national climate programmes; the undertaking of country studies; the improvement of research and observation programmes; and the building of national scientific capacity, particularly of developing countries.

Accordingly, SAC asked the Secretariat to adopt the following guidelines in developing an effective programme on climate impacts and response strategies addressing international, regional, and national needs. The World Climate Impact Assessment and Response Strategies Programme would:

- Cooperate closely with the IPCC and the INC and be responsive to their need for climate impact and response strategy information required for assessment and for international decision making in reducing the threat of climate change.
- Give increased attention to preparedness measures for climate change and sea-level rise and identifying actions for responding to extreme climate events or prolonged deviations from average climate such as droughts. In association with other programmes the WCIRP should assist in the provision of advice to governments on climatic matters of concern, drawing on WCP and other international research initiatives, such as ongoing work on ENSO impacts and the improvement of drought early warning systems.
- Encourage countries to increase their climate-related monitoring activities including contributing to Climate System Monitoring (CSM), Global Oceans Observing System (GOOS), Global Climate Observing System (GCOS) and by monitoring of Terrestrial Ecosystem and of other parameters essential for climate impact assessment.
- Encouraging countries to establish and maintain national mechanisms involving a variety of scientific disciplines, socio-economic experts and political planners to undertake, review and update assessments, and monitor the implementation of the climate convention and Agenda 21. The WCIRP can assist countries in designing and operating national climate impact assessment and response strategies programmes as part of national climate programmes and can provide a focal point for communication among countries, for example, through an appropriate climate impact network newsletter and possibly data base of impact assessment and response strategies.
- Encourage countries to develop national studies or cooperate in regional programmes related to climate variability or change including IGBP START initiatives. Studies should ideally consist of national inventories of the sources and sinks of greenhouse gases; national climate impact and response option assessments; and national greenhouse gas abatement costing studies. We encourage UNEP to seek further funding for country studies.

- Assist developing countries to build within national climate programmes, provision for education, training and public information, with the aim of promoting endogenous capacity building.
- Provide a focus for country study information collection and exchange in association with the IPCC Report on country studies, including information on what studies have been completed, are underway or are contemplated and what resources they need or may wish to provide to assist other countries in country studies.

Within the general programme direction as detailed above, the Committee considered the following specific projects and requested the Secretariat to undertake them as part of the WCIRP programme. The SAC was aware that the implementation of this programme and project activities recommended would be subject to availability of finances and that it may not be possible for these projects to be undertaken due to lack of funds. It was further cognizant of the possibility that some of the projects would, even if resources were available, require a time frame beyond the next session of SAC to carry.

The Secretariat was requested, nonetheless, to explore the possibility of undertaking as many of the projects and as soon as possible and report to the next session of SAC. The specific project proposals are as follows:

- UNEP should continue support to the NCAR newsletters but with efforts being directed towards increased circulation. UNEP/NCAR to work out modalities for increased circulation and more input from both SAC members and WCIRP Secretariat on the WCIRP activities and to provide for expansion of the newsletter to make it available to more people in different languages.
- Continue support to atmospheric monitoring activities, including the Climate System Monitoring, BAPMoN, and GCOS and glacier monitoring. Within the networking programme undertake or support for distributing impacts and adaptation studies inventory.
- Initiate periodic overview reports on completed, ongoing, and planned country studies.
- Support methodology development and capacity building aspects of the FAO-ECU-IIASA project.
- Develop in collaboration with IDNDR, a programme proposal on societal responses to climate extremes such as drought, cyclones, and floods.

- Devise projects that aim at studying means for developing national institutional arrangements including regional arrangements for addressing the needs for climatic studies, including the multidisciplinary studies on impacts of climatic variability and change on society.
- Develop a coordinated programme proposal with WCASP on climate impacts on growing urban areas and vice versa.
- Develop a programme for studies on socio-economic impacts of variations in regional and climatic phenomena, e.g., monsoons, ITCZ (Africa).

SAC requested that WHO be invited to its future sessions to cover the health aspects of climate variability and change. Pursuant to paragraph 8 of the terms of reference of the SAC, it was agreed that the Secretariat would bring to the next meeting of SAC a set of programme proposals for the next two years, taking into account the anticipated budgetary provisions and the project proposals identified above.

13. Date and Place of the Tenth Meeting

SAC agreed to hold its tenth session in the first week of October 1993 in either Cairo or Amsterdam. The precise date and place of meeting to be advised later after consultation with potential hosts.

14. Closure of the Meeting

The Chairman thanked the members for the excellent cooperation they had given him which resulted in a very successful meeting. The Committee expressed their appreciation to Dr. M. Glantz for the administrative support and NCAR management for making the excellent facilities at the Mesa Laboratory available for the meeting.

The meeting was closed at 1300 hours on 29 October 1992

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