

Annex 1

Members of Expert Group on Climate Change and Sea Level Rise

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Annex 2

Terms of Reference

- (a) to consider (i) the substantial volume of scientific evidence and assessment concerning recent changes in climate—particularly global warming—and projections of possible changes which may reasonably be expected; and (ii) possible underlying causes, with particular reference to man-made contributions from, *inter alia*, changing patterns and levels of energy use;
- (b) against this background, to evaluate the environmental, social and economic impacts of such climate changes particularly on small islands and low-lying regions, primarily in terms of sea-level rise and flooding but also of other phenomena which should be taken into account so far as possible stating relative probabilities and significances;
- (c) to review what effective, practical and feasible protective measures can be taken by the countries likely to be affected by sea level rise and flooding and other impacts of environmental changes, not only as regards protection against disaster but also as regards forward planning;
- (d) to consider what measures the international community needs to take collectively to complement the measures which countries take individually. Specific attention should be given to ways of assisting those countries most likely to face adverse effects; the best ways in which the international community can further study and review unresolved scientific and policy questions; possible international action to limit man-made climate change by acting on underlying causes.

Annex 3

Leading Institutions and Fora Involved in Climate Change and Sea Level Rise

I. COLLABORATIVE PROGRAMMES

The Inter-Governmental Panel on Climate Change (IPCC)¹

The Inter-Governmental Panel was first requested at the 10th Congress of the Tenth World Meteorological Congress in 1987 and followed up by the WMO Executive Council and the UNEP Governing Council. The IPCC was established to report to the governing bodies of WMO and UNEP with three specific tasks:

- (i) to assess the scientific information related to the various aspects of the climate change issue;
- (ii) to evaluate the environmental and socio-economic impacts of climate change;
- (iii) to formulate realistic response strategies for the management of the greenhouse issue.

The first session of the IPCC in November 1988 established three working groups:

- Working Group I under the Chairmanship of Dr. J. Houghton, Director General of the British Meteorological Office, is responsible for assessing all available scientific information on factors affecting climate change including greenhouse gases, responses to these factors of the atmosphere-ocean-land-ice system, assessment of current capabilities of modelling global and regional climate change and their predictability, past climate

1. Tewungwa, S.: *Note on the Inter-Governmental Panel on Climate Change Report of the First Session of the IPCC Bureau. Reports of IPCC Working Groups I, II and III.*

record and presently observed climate anomalies, projections of future climate and sea level and the timing of changes. Its reports will identify the range of projections and their regional variations, gaps and uncertainties.

- Working Group II under the Chairmanship of Professor Israel of the USSR is reviewing environmental and socio-economic impacts of climate change in an integrated manner. The Group is also expected to address the evaluation of impacts on a regional and national scale of climate warming and sea level rise, the latter especially in the coastal and island areas; on agriculture, forestry, health, energy and water resources; and in relation to floods, droughts and desertification.
- Working Group III under the Chairmanship of Dr Bernthal of the USA is concerned with the policy dimension and, in particular, future emissions of greenhouse gases, impacts of changing technology, sources and sinks, adaptation to climate change, strategies to control or reduce emissions and other human activities that may have an impact on climate (e.g. deforestation, changing land-use) and their social and economic implications, including legal matters.

To oversee the work of the IPCC there is an intergovernmental bureau chaired by Professor Bolin of Sweden, and a Secretariat located in the WMO.

The World Climate Programme (WCP)

This programme is operated by the World Meteorological Organisation (WMO) jointly with the United Nations Environment Programme (UNEP), the International Oceanic Commission (IOC) of UNESCO and the International Council of Scientific Unions (ICSU). Initiated in 1979, as a result of the First World Climate Conference, it provides an institutional framework for research and data collection, specifically to improve understanding of national and global climatic systems, and to assess its likely impacts. The programme promoted much of the technical material which served as a basis for the Villach (1985) and Bellagio (1987) Conferences¹. It has several specific components.

- (i) **World Climate Data Programme** which assists countries in setting up data systems and acquiring processing capability in a way that could help economic policy-making.
- (ii) **World Climate Applications Programme** provides for transfer of technology to using climate information to plan agricultural activities, energy, transportation, human settlements, etc. An important example of the Programme's work was a joint WMO-

1. UNDP/ICSU/WMO (1987) International Conference on the Assessment of the Role of CO₂ and of other Greenhouse Gases (GHGs) in Climate Variations and Associated Impacts. Villach, Austria.

UNEP-WHO project on Climate and Human Health, including a major symposium in Leningrad in 1986.

- (iii) **World Climate Research Programme**—coordinated by WMO, ICSU and the IOC—is designed to understand the nature of the earth's climate system in order to (a) increase the predictive capacity of weather forecasts on a seasonal or monthly basis and (b) assess the impact of man's influence on global climate change. It includes such major projects as Tropical Oceans and Global Atmosphere (TOGA), a study of the El Nino phenomenon, and the World Ocean Circulation Experiment (WOCE).
- (iv) **World Climate Impact Studies Programme** has undertaken projects and set up expert groups to study the socio-economic impact of climate fluctuations and change, for example:
 - (a) A UNEP project on the socio-economic impact of climate change has focused on Malaysia, Thailand and Indonesia. This was an integrated systemic project which considered the impact on food production, rubber production and coastal ecosystems of climate change.
 - (b) A three-year co-operative programme between UNEP and the Netherlands Government has studied the impact of sea level rise on society. The first phase established an inventory of areas most vulnerable to sea level rise and a set of criteria for determining high risk areas. The second phase is undertaking in-depth case studies in the Maldives, Bangladesh, *inter alia*.

The International Geosphere Biosphere Programme (IGBP)¹

This programme, of the International Council of Scientific Unions (ICSU) was established in 1986 to 'describe and understand the interactive physical, chemical and biological processes that regulate the total Earth system . . . the changes that are occurring in this system, and the manner in which they are influenced by human actions'. This programme builds upon and integrates other scientific work by ICSU, especially through its Scientific Committee on Problems of the Environment (SCOPE).

The first meeting of the Special Committee of IGBP took place in July 1987 and identified special themes that will guide the IGBP's future work:

- documenting and predicting climate change,
- observing and improving understanding of dominant forcing functions,
- improving understanding of interactive phenomena in the total Earth system,

1. Global Change Report No. 4, 1988. *IGBP Plan of Action*.

- assessing effects of global change that have major implications for renewable and non-renewable resources.

As regards SCOPE, it has pursued work on bio-geochemical cycles in relation to the global climate cycles (SCOPE 13, 16 and 23) and more specifically in relation to climate change impacts (SCOPE 29).

There was a major review meeting of IGBP in Stockholm in the autumn of 1988. This meeting considered the need for a wide range of studies including an examination of the interactions in both polar zones, between ocean and atmosphere and between soil and air (also reviewed at an international meeting on Soils and the Greenhouse Effect, held at Wageningen, Netherlands, in August 1989).

The Advisory Group on Greenhouse Gases (AGGG)

This was established jointly by WMO, UNEP and ICSU to ensure adequate follow-up to the recommendations of the 1985 (Villach) International Conference on the Assessment of the Role of Carbon Dioxide and other Greenhouse Gases in Climate Variations and Associated Impacts. The AGGG, which is chaired by Professor K Hare of Canada, compiles biennial reviews of international and regional studies related to greenhouse gases as well as periodic assessments of the rates of increase in the concentration of greenhouse gases and their effects.

II MULTILATERAL INSTITUTIONS

UNEP is centrally involved in climate change issues through its participation in the IPCC, the World Climate Programme and the AGGG.

It has also been directly involved as the lead agency in the implementation of the Vienna Convention and then the Montreal Protocol on Substances that Deplete the Ozone Layer. While the Montreal Protocol is concerned with the effects of CFC's on the ozone layer it is noted in the preamble that parties to the Protocol are 'conscious of the potential climatic effects of emissions of these substances'.

As part of its contribution to the World Climate Impact Studies Programme, UNEP had developed various regional projects on climate and sea level rise:

- UNEP's *Oceans and Coastal Area Programme Activity Centre (OCA/PAC)* is examining the implications of climate change on a variety of marine ecosystems. In the Mediterranean basin for example, the project is examining the physical impact of sea level rise on current land use and the ecological impact on natural and agricultural production systems of likely temperature rises — resulting in the Split Conference of October 1988 (UNEP report reference UNEP(OCA)/WG.2/25).
- The *Caribbean Environment Programme* of UNEP has, with other agencies, looked at the possible implications of sea level

rise and climate change in relation to the Caribbean, and published a substantial report on that subject.

- It has also sponsored work directly in relation to climatology such as ISLSCP (International Satellite Land Surface Climatology Project).

WMO, the World Meteorological Organisation, is the UN agency responsible for the co-ordination of scientific measurements and studies of the global atmosphere and the climate it produces. Since 1979 it has been the lead agency for co-ordination of the World Climate Programme.

One important contribution worth highlighting is the Climate System Monitoring (CSM) Project of the World Climate Data Programme (WCDP)—designed to provide meteorological services with synthesised information on the state of the climate system. The development and speed of the CLICOM (a simple computerised climate data management system) and DARE (a historical data rescue project) are all of great importance for developing countries.

WMO has some closely related programmes such as:

- The *Global Atmosphere Watch*, for measuring changes in the chemical composition of the global atmosphere, includes the Global Ozone Observing System and the Background and Pollution Monitoring Network which includes greenhouse gases and chemical composition of precipitation.
- The *Tropical Cyclone Programme* with its five regional bodies covering the main areas affected by cyclones (typhoons, hurricanes) for the purpose of exchanging information to enable better prediction and warning.
- *Agrometeorological* activities to improve the use of meteorological and climatological information to reduce crop losses and improve food security, through, for example, Drought Monitoring Centres (Nairobi, Harare).

A major focus for WMO's work, and that of the international community generally on climate, will be the *Second World Climate Conference*, to be held in Geneva, November 1990, to assess the developments in global understanding of climate a decade after the first Conference, and take the next steps towards a global framework convention on climate change.

The World Bank is important in influencing projects and policies as the main multilateral lending institution. It has established an Environment Department and is taking environmental considerations more seriously in its work.

The United Nations Development Programme (UNDP) is significantly increasing its technical co-operation support for climate change studies and measurements, for adoption of national projects and policies to respond to this issue.

UNDP, with WMO, the Economic Commission for Africa and UNEP, is planning to set up, in Niger, an African Centre for Meteorological Applications for Development. This would aim to strengthen long range weather predictions and climate analysis for Africa.

UNESCO is involved in climate through the *International Oceanographic Commission (IOC)*. The IOC is a collaborating partner in the World Climate Programme and has several specific areas of relevant interest:

- co-ordination of the Global Sea Level Monitoring System (GLOSS) which monitors and analyses sea level data, backed up by technical assistance efforts where necessary for countries needing such assistance,
- work on marine science and ocean services for development, together with a major assistance programme to enhance the marine science capabilities of developing countries.

The EEC has carried out work as part of its Climatology and Natural Hazards Research programme. The Commission has also carried out a far-reaching appraisal of the issue in general: 'Greenhouse Issue and The Community' (X1/674/88) and 'Commission Work Programme Concerning the Evaluation of Policy Options to deal with the "Greenhouse issue"' (X1/803/88).

UN regional programmes have carried out work that bears upon the climate issue:

- *The Economic Commission for Europe* has looked in detail at energy reserves and supplies, alternative energy scenarios and energy conservation and has specifically addressed the 'greenhouse' gas issue through its work on the Interrelationships between Environmental and Energy Policies (ECE/Energy/13) and 'Implications of Carbon-dioxide induced climate change for electricity production' (EC/GE.4/R.75/Add 1 and 2).
- *ESCAP* has considered marine environmental management and coastal ecosystems at a regional workshop in Bangladesh, February 1984.

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