



United Nations
Environment
Programme



UNEP(OCA)/MED WG.25/Inf.9
15 March 1991

Original: ENGLISH

MEDITERRANEAN ACTION PLAN

Joint Meeting of the Scientific and Technical
Committee and the Socio-Economic Committee

Athens, 6-10 May 1991

PROGRESS REPORT ON THE ACTIVITIES CONCERNING IMPLICATIONS OF CLIMATIC CHANGES IN THE MEDITERRANEAN REGION

TABLE OF CONTENTS

INTRODUCTION

1. PROJECTS AND ACTIVITIES CARRIED OUT BY NATIONAL BODIES
2. SECOND WORLD CLIMATE CONFERENCE, GENEVA, 24 OCTOBER-7 NOVEMBER 1990
3. INTERGOVERNMENTAL NEGOTIATING COMMITTEE FOR FRAMEWORK CONVENTION ON CLIMATE CHANGE
4. JOINT MEETING OF THE CO-ORDINATORS OF THE REGIONAL TASK TEAM ON IMPLICATIONS OF CLIMATIC CHANGES, SINGAPORE, 12-16 NOVEMBER 1990
5. ACTIVITIES CO-ORDINATED OR SUPPORTED BY THE CO-ORDINATING UNIT FOR THE MEDITERRANEAN ACTION PLAN

ANNEX I Conference Statement of the Second World Climate Conference, Geneva, 24 October-7 November 1990

ANNEX II Ministerial Declaration of the Second World Climate Conference, Geneva, 24 October-7 November 1990

INTRODUCTION

At the Joint Meeting of the Scientific and Technical Committee and the Socio-Economic Committee, Athens, 28 May-1 June 1990, the Secretariat reported on the activities since the Sixth Ordinary Meeting of the Contracting Parties to the Barcelona Convention (Athens, 3-6 October 1989) related to the implications of Climatic Changes in the Mediterranean.

The Joint Committee Meeting agreed that the Secretariat should prepare for the 1991 Joint Committee Meeting a document reviewing projects and activities relevant to climatic changes in the Mediterranean carried out by national and international bodies, together with a workplan for future activities.

In order to inform on the progress on the activities concerning implications of climatic changes in the Mediterranean region, this document will report on:

1. projects and activities carried out by national bodies;
2. Second World Climate Conference, Geneva, 24 October-7 November 1990;
3. Intergovernmental Negotiating Committee for Framework Convention on Climate Change;
4. Joint Meeting of the Co-ordinators of the regional Task Teams on Implications of Climatic Changes, Singapore, 12-16 November 1990;
5. Activities co-ordinated or supported by the Co-ordinating Unit for the Mediterranean Action Plan.

1. PROJECTS AND ACTIVITIES CARRIED OUT BY NATIONAL BODIES

In accordance with the request of the Contracting Parties a letter was sent to all National Coordinators for MED POL requesting information concerning studies and actions of Mediterranean countries concerning climatic changes. Answers which were received from France, Israel, Monaco, Tunisia and Yugoslavia will be presented below in summarized form.

1.1. France

France sent materials consisting of the:

- Memorandum for a Community point of view of the international action to limit CO₂ emissions of fossil origin (reproduced below in whole);
- Note on the policy of France to combat the greenhouse effect (reproduced below in shortened version with deletion of outdated parts and parts appearing in the Memorandum);
- Organization of French research activities on the problem "Greenhouse effect" with following attachments: Table I (State of French research on "Emissions of greenhouse gases of direct or indirect effect --> Climatic change and sea level, interactions with ecosystems), Annex I (list of organisms represented in ECLAT Committee), Annex II (Research financed by SRETIE in 1988, 1989, 1990 in the framework of ECLAT Programme - Evolution of climate and atmosphere) and Annex III (Research programme on energy management of the French Agency for Energy Management).
(For practical reasons, we reproduce herebelow only the text and not the Table and Annexes)

a) Memorandum for a Community point of view of the international action to limit CO₂ emissions of fossil origin

"Given the prime importance of the contribution of carbon gas which produces an additional greenhouse effect and the existence of reliable inventories of emissions for this gas, the question of the limitation of the emissions of CO₂ of fossil origin must be dealt with as a matter of priority, even if the Community must also develop at the same time common policies or positions concerning the other greenhouse gases and forest management.

This memorandum is a contribution by France to Community thinking on the limitation of CO₂ emissions, in view especially of the future meetings of the Council of Ministers and the Second World Conference on climate.

It does not discuss the institutional aspects associated with the conclusion of a framework convention and its protocols on climate changes.

In order to prevent effectively the greenhouse effect it is imperative to ensure that the following conditions be met:

- *industrialized countries must change their habits of fossil energy consumption: the higher the per capita emissions, the more radical the change;*
- *developing countries must organize the economic development they need according to modalities which limit the growth of the emissions of greenhouse gases; this would also require a better control of their demographic evolution.*

Progress in this direction could be accomplished through the following means:

- *setting an objective of emissions for each country;*
- *defining a concerted economic approach;*
- *implementing additional technological and financial support to the developing countries.*

1. *Setting on objective of emissions for each country*

The stabilization of the radiative effect of carbon gas corresponds to the stabilization of its concentration in the atmosphere; the scientists of IPCC believe that this objective cannot be approached except through the reduction to at least half the present levels of world emissions. This reduction by 50% corresponds to 0.35 ton of carbon (contained in the CO₂) per capita, if we assume that the population increase ineluctably leads to a world population of 8 billion, a number which could be reached as early as the year 2030 according to current estimates.

The current world average of fossil carbon emissions is estimated by the AIE as 1.1 t per capita, per annum. To reduce this figure would require a considerable long term effort. It would require in particular the dissemination of existing technologies as well as the development of new technologies.

The continuous accumulation of greenhouse gases in the atmosphere implies that action should be undertaken as soon as possible in order to lower it. The first significant step to reduce emissions should be taken right away . In order that all nations share in this effort three principles must be respected:

- *equity among the people living on this planet;*
- *consideration of the specific needs of the developing countries;*
- *effectiveness of activities undertaken which implies that one should begin with the least costly.*

In practical terms, these principles have as a corollary that the progressive reduction of CO₂ emissions must be linked with a convergence in time of emissions per capita and per country. This convergence must from now on be the basis on which the distribution of efforts to be required of each country must rest.

The industrialized countries, i.e. essentially the OECD countries and the countries of Central and Eastern Europe are collectively responsible for the greatest part of current emissions and of their accumulation levels. Nevertheless, considerable disparities exist among these countries having to do especially with energy policies followed in the past (for instance Japan, Italy, France, Switzerland have much lower per capita emission levels than other countries with a comparable development). The cost of measures that should be taken obviously depends on the current level of emissions and thus the available margins of manoeuvre are not identical. We believe that significant progress can only be accomplished through a reduction of these differences. A "CO₂ protocol" should include the necessary commitments in this regard.

In the same line of thinking, it might be useful to distinguish 3 categories of countries and assign to them differentiated objectives:

- *those countries that have the highest per capita emissions, higher for instance than the double of the world average, would undertake the commitment to bring emissions to an agreed upon level (lower if possible to 2 tons of carbon per capita per annum) within a timeframe to be negotiated: this in our view could be between 15 and 25 years. Intermediate steps could also be negotiated. We believe that the recent declarations of some member states go in this direction;*

- *those countries that have per capita emissions between, for instance, 2/3 of the world average and double this average, would undertake the commitment not to exceed the ceiling of 2 tons per capita per annum; all of them should in the medium term stabilize their emissions at levels to be negotiated. In any event, the possibility for an increase of their emissions would be limited in relative terms, for example to half of the increase of their GNP;*
- *those countries that have emission levels lower than 2/3 of the world average, which means the great majority of the developing countries would undertake the commitment to improve their energy efficiency: additional financial and technical cooperation would help them take the necessary internal measures.*

We propose that the EEC member states examine whether it would be useful to be considered and dealt with collectively. The economic and monetary union, the single energy market and fiscal harmonization mean that in the short term the means of action will be in the hands of the Community and that the consequences could be reflected in the conventions and protocols to be concluded in the future. The Community's ability to undertake a collective and global commitment to limit CO₂ emission would be a concrete manifestation in this direction.

Since currently the community average stands at 2.3 tons of carbon per capita per annum, the EEC as a whole would fall into the first category of countries and would have to reduce its emissions in the medium term under conditions that the studies to be drafted by the Commission soon would define.

Naturally, each member state would play its part in the common effort. France, which since 1980 has reduced emissions by nearly 30%, is ready for its part to set a national objective of stabilization of emissions produced at a level lower than 2 tons of carbon per capita per annum by the year 2000, provided that the main industrialized countries commit themselves to a similar process and adopt a similar economic approach to that proposed in para. 2.

2. Defining a concerted economic approach

As is proposed in the final IPCC report, countries should in a first phase examine the subsidies and fiscal incentives from which the energy sector and the sectors producing greenhouse gases benefit. France for its part believes that this examination should lead to a quick abolishment of subsidies to fossil energy offer.

The industrialized countries should establish within their respective national fiscal framework an additional tax on fossil energy at the same rate and progressively increasing to cover the external costs of the greenhouse effect: to begin with this tax should be applied at least in all EEC member states, then in all OECD countries and then extended to all countries in the world under conditions that would avoid both distortions in competition and shutting down of industrial complexes.

In addition, all industrialized countries should focus upon the specific case of transports (which is the only sector where in all countries emissions are currently increasing rapidly and which is a sector that represents 40% of CO₂ emissions, the other exhaust gases - other than CO₂ - also contributing to the greenhouse effect). Transport activities result in multiple and varied external costs depending on the mode of transport: infrastructure costs, costs of congestion, local pollution, lack of safety etc, in addition to the greenhouse effect. Each country should undertake to reflect upon the users of transport the totality of these various external costs.

In this perspective, the Community harmonization levels of excise taxes on fuel proposed by the Commission do not take into account the need to organize the fight against the greenhouse effect. Consequently, the rates proposed for these excise taxes should be increased (see in particular the Memorandum of Italy of 2 October 1989).

But prices alone will not by themselves build a true market of energy efficiency. The impact of the new price structure should be accompanied by the implementation at the same time of the following actions:

- *launching of measures, either as incentives or of a regulation character, in the fields of industry, transport, in the housing sector and in the services; projects like that in the Community programme SAVE should be developed in this direction;*
- *dissemination of knowledge to the persons and bodies involved;*
- *launching of an international coordinated effort for technological development in the field of energy management.*

Moreover, such an economic approach could contribute toward the acquisition of means to bring about the indispensable intensification of research and development efforts.

3. *Implementing additional technological and financial support to the developing countries*

In order to assist developing countries to adapt their development to the needs of the fight against the greenhouse effect (especially to help them preserve their forests and to develop mass transport) the industrialized countries should undertake to make a financial contribution proportionate to their emission level.

These additional resources would, in total or in part, be handed over to the instrument being set up within the framework of the World Bank."

b) Note on the policy of France to combat the greenhouse effect

"Since the beginning of 1989 several international meetings to define prevention policies of climate changes linked with the greenhouse effect and policies to adjust to such changes have taken place. Beginning with The Hague March 1989 summit meeting, France has played a very active role, especially within IPCC which was set up in December 1988 by the United Nations Programme for the Environment (UNEP) and the World Meteorological Organization (WMO) in order to produce a report on climate changes.

The greenhouse effect prevention and/or adaptation measures will incur a cost which cannot be compared with the cost of "classic" antipollution measures (to combat acid rain, or to abolish the use of CFCs) and no matter what the result they will completely alter the pattern of the major choices of society, especially in the fields of energy and transport.

In this connection, the work of IPCC has highlighted the difficulty to obtain a consensus among the various states of the world on the greenhouse effect. However, the policies to respond to climate changes can only be international; moreover they should be both radical and reflect the will of the countries in order to be effective. This is why the

international activities of France aim at bringing about collaboration among the countries and securing the support of an increasing number of countries in order to counter the reservations of certain countries, especially the U.S.A. In particular, France wishes that the European Community adopt a unified and active position.

In this framework, France has recently made clear its position at international force, both in the United Nations and in the EEC, to limit CO₂ emissions of fossil origin.

Thus, Brice Lalonde, in a letter recently addressed to Mr Tolba, Executive Director of UNEP and to Mr Obasi, Secretary general of WMO, outlined the position of France on this question. France has also proposed to its Community partners a memorandum on a Community position for international action to limit CO₂ emissions of fossil origin.

France, which since 1980 has reduced emissions by about 30%, is ready for its part to set a national objective of stabilization of emissions produced at a level lower than 2 tons of carbon per capita per annum by the year 2000, provided that the main industrialized countries commit themselves to a similar process and adopt an economic approach similar to that proposed above. The good performance of France is linked mainly with past efforts in energy management in the industrial and housing sectors, whereas emissions in the transport sector have continued to increase and reach today a relative share of approximately 30%. Current trend is increase in emissions; the objective that France is setting consists in stemming this trend so that the level of emissions would come down to that of the year 1968. This ambitious objective implies considerable effort, especially in the transport sector.

This proposal by France comes from the work of the interministerial group established by Brice Lalonde upon a request by the Prime Minister to formulate at the technical level a French policy to combat the greenhouse effect. The interministerial group must submit its report to the government in October 1990. This group's mission is to inventory the emissions (or absorptions) of greenhouse gases for which France is responsible, to explore concrete preventive actions to reduce such emissions, as well as to define the approaches which would make possible the implementation of preventive actions. The group determined a cost of reference for its work as a basis on which to select the actions that should be undertaken and studied the interest that the approach through taxes, especially in the energy sector, would present.

It is important to note that the large scale pollution problems are closely linked with local and specific pollution problems. Efforts already expanded to reduce the latter have positive repercussions on world scale risks which in part are due to pollutant emissions typical of urban agglomerations and industrial zones.

Obviously, very considerable research has been carried out in order better to conceptualize and understand the new challenges that atmospheric pollution poses. In this framework one should mention among other activities the launching in late 1988 by the Ministers of the environment and of research of a large-scale research programme bearing the title ECLAT (study of climates and the atmosphere); its objective is to define the impact of the various possible scenaria of climate changes on the ecosystems and the French economy and to study different prevention policies of such changes as well as reactions to changes. ECLAT is part of such international programmes as Geosphere-biosphere (PIGB), launched in 1986, the purpose of which is to collect the necessary data and improve the descriptive and predictive models of change of climatic parameters as a function of the evolution of the chemical composition of the atmosphere and oceans."

c) Organization of French research activities on the problem "greenhouse effect"

"In this report, we present the research means currently deployed in France and the developments that should be attained in each of the three main axes of the general problem "increase of the greenhouse effect due to anthropogenic activities", i.e.:

- *the physical, chemical and biological mechanisms of the greenhouse effect and climate change;*
- *the impact on the environment of climatic changes and their socio-economic consequences;*
- *the prevention strategies that are being envisaged (slowing down climate changes and/or diminishing their consequences): technological and socio-economic aspects.*

1. *Research on the mechanisms of the greenhouse effect and of climate changes*

They are primarily - but not exclusively - carried out within the framework of the 5 national scientific programmes coordinated by the Executive Committee and the Scientific Committee of PIGB - France which integrate the French contributions in the International Programme Geosphere-Biosphere under the regis of the International Council of Scientific Unions (ICSU) and in the World Research Programme on Climate under the joint sponsorship of the World Meteorological Organizations (WMO) and ICSU. Many of these research projects are also supported by the "Environment and Climatology" Division of the Commission of the European Communities/DG XII within the framework of the European research and development programmes EPOCH, STEP and MAST.

The organization, objectives and means of these 5 national programmes (PNEDC: Programme National d'Etude de la Dynamique du Climat, PFO: Programme Feux Océaniques, PSMOY: Programme Atmosphère Moyenne, PACB: Programme Phase Atmosphérique des Cycles Biogéochimiques and PIETLC: Programme Interactions des Ecosystèmes Terrestres et Littoraux avec le Climat) are described in the brochure "Climat evolution and global environment" published by the Ministry of Research and Technology (MRT) which, jointly with the SRETIE, directs PIGB - France.

Here we will but:

- *point out the ministerial departments and research bodies which contribute to the research projects, i.e. MRT/TOEE, MEN/DRED, SEE/SRETIE, MD/DRET, TAAF, DGE, CNES, DMN/EERM, CNRS/INSU and PIREN, IFREMER, ORSTOM, INRA, CEA and BRGM. On certain aspects that concern them more specifically DER of EDF, IFP and ATOCHEM also contribute indirectly through research contracts concluded with the participating laboratories;*
- *highlight from these research programmes those projects that aim more specifically (or more directly) at defining and predicting the perturbations of the climatic system and of the environments atmosphere, oceans, continents and biosphere associated with anthropogenic emissions of the various greenhouse gases of a direct effect (CO₂, CH₄, CFCs and substitutes, N₂O) or of an indirect effect (CO, NO_x, NMHC_s etc). This exercise allows us to uncover certain gaps in this area (even taking into consideration related French programmes) and to propose means to fill them on the basis of French potential as compared with the state of research abroad.*

The complement of research needed could be integrated in the framework of ECLAT: Evolution of Climate and the Atmosphere. This interorganizational and multidisciplinary research programme is directed by SRETIE and comprises 4 parts:

- *basic scientific data and contribution to PIGB;*
- *impact of climate changes on the environments;*
- *economic and social aspects;*
- *prevention and technology research.*

Research corresponding to these four themes is (co-)financed by SRETIE.

2. Impact study

Even though certain research projects on the impact of emissions on natural ecosystems have already begun impact studies are at the present time not very developed in France.

This is why, the ECLAT Committee asked SRETIE to prepare in collaboration with the bodies concerned (Ministry of Agriculture and Forests, INRA, CNRS/PIREN, etc) a programme on the specific risks for France, such as those associated with the destabilization of forests.

The priority research axes are the following:

- 1. comparative evolution of organic C of agriculture, forest and natural soils;*
- 2. comparative evaluation of N₂O and NO_x emissions in cultivated and non-cultivated soils;*
- 3. exploration of genetic forestry resources;*
- 4. wood-energy sector: emissions from combustion of wood and derivatives;*
- 5. integrated study of the socio economic vulnerability of a region in connection with ecologic vulnerability.*

The impact of an intensified reforestation policy should also be evaluated.

Moreover, a research programme on tropical forests was launched by the SRETIE, 2 projects relating to the greenhouse effect problem were financed in 1990.

3. Research on prevention

There is no programme of coordinated research at national level on this question which however is most important for the decision makers. To date only specific studies have been carried out by different bodies and laboratories dealing primarily with the complex relationships among society, economy, energy and emissions.

To improve the situation:

- *AFME jointly with the Prospective Group "Long Term energy" of the Commissariat au Plan has prepared an evaluation programme of alternative technologies by sector of activity and/or production/consumption, especially in the field of energy and raw materials (PIRSEM).*

- *Mr Beaud and CIRED have prepared a research programme for the short, medium and long term on the economic and social implications of prevention and for adjustment policies.*

The proposal on the strategy of development of this research in the long term was adopted by the ECLAT Committee which supports the idea to set up a GIS (Groupement d'Intérêt Scientifique) in which would participate, in addition to SRETIE all bodies concerned. Indeed, it is the best way (not to say the only way) to ensure both the mobilization of teams and the coordination of research activities.

For the medium term, Mr Hourcade, at the last meeting of the ECLAT Committee presented the research axes which could be developed, i.e.:

1. *analysis of the consequences of scientific controversies;*
2. *prospective evaluation of the cost of the various policies;*
3. *analysis of action possibilities by sector of activity;*
4. *evaluation, at international level, of the instruments of public policies;*
5. *analysis of controversies leading to decisions."*

1.2. Israel

The Minister of Environment has appointed in 1989 a committee on climatic changes, headed by Prof. Ariel Cohen (from the Dept Atmospheric Sciences, the Hebrew University, Jerusalem). This committee serves as the national focal point on the subject of climatic changes.

One of the main activities of this committee is to organize, in cooperation with the Israel Academy of Sciences, an international workshop on regional implications of future climatic changes. The workshop will take place at the Weizman Institute from 28 April to 3 May 1991.

Main topics of the workshop are:

- regional aspects of past climate in the Eastern Mediterranean Basin and elsewhere: climatic records, sea level records, rain fluctuations;
- expected regional changes based on numerical models; in the Eastern Mediterranean, Sahel region, Canada;
- hydrological impacts of climate change and managerial aspects of water resources;
- implications on agriculture and vegetation in the Eastern Mediterranean;
- past and expected changes in the natural ecology of the Eastern Mediterranean induced by climate change.

1.3. Monaco

No research on climatic change was undertaken by Monaco. Report on the 75 years study of meteorological observations in Monaco was sent.

1.4. Tunisia

No studies were done by Tunisia but some research is to be done on Ichkeul Lake and an action programme is going to be established with National Institute of Meteorology, Ministry of Agriculture and Ministry of Housing and Equipment.

1.5. Yugoslavia

Summaries of following six completed studies were sent:

- Secular changes of the air temperature and precipitation in Yugoslavia;
- variations of Zagreb climate;
- the significance of recent climatic fluctuations at Zagreb;
- some characteristics of climate change at Zagreb during last thirty years;
- some results of the research of changes in annual and seasonal precipitation amounts in Belgrade in the period 1887-1986;
- survey of the air temperature changes in Belgrade, for the period 1888-1982.

Institutes dealing in research of climate changes and its influence are:

- Geophysical Institute, Faculty of National Sciences, University of Zagreb, Zagreb, and
- Federal Hydrometeorological Institute, Belgrade.

During 1990 Federal Hydrometeorological Institute has completed a draft version of Yugoslav Climate Programme with the view of sending it to Yugoslav Government for consideration and adoption. The Programme contains a series of projects related to the research of climate in Yugoslavia and possible climate changes as follows:

- research of climate in Yugoslavia and possible changes as a reflection of global climate changes;
- development and application of climate model in eta-coordinated system;
- development of assessment method for the effects of climate and climate changes on socio-economic development of the country and environmental elements.

Hydrometeorological Service of Yugoslavia will participate in the carrying out of these projects as well as scientific and research institutes in the field of meteorology and government institutions responsible for planning development of the country and environmental protection.

2. SECOND WORLD CLIMATE CONFERENCE, GENEVA, 24 OCTOBER-7 NOVEMBER 1990

The Second World Climate Conference was convened in Geneva, 24 October-7 November 1990, under the sponsorship of WMO, UNEP, UNESCO, IOC, FAO and ICSU. The conference was held in two sessions, scientific and technical sessions (24 October-3 November) and ministerial sessions (6-7 November).

Scientific and technical sessions involved 747 participants from 116 countries and addressed the following subjects:

- Greenhouse gases and climate change;
- use of climate information in assisting sustainable social and economic development;
- priorities for enhanced research and observational systems;
- public information;
- specific issues (water; agriculture and food; oceans, fisheries and coastal zones; energy; land use and urban planning; health and human dimensions; environment and development; forests); and
- organizational and policy issues for international activities (the future structure of the WCP; special needs of the developing countries; co-operation in international research; co-ordinated international activities and policy development).

The Conference statement containing conclusions and recommendations concerning all above mentioned subjects is reproduced as Annex I to this document and due to the relevance to the Mediterranean only the section concerning specifically oceans, fisheries and coastal zones is reproduced herebelow:

"Oceans, Fisheries and Coastal Zones

The Earth's climate including shorter-term variations is influenced by the coupled atmosphere - ocean system. Coastal zones and their associated high biological productivity, including fisheries, are especially affected. Thus, an improved data base of oceanic parameters is considered indispensable for operational climate forecasting. It is recommended that a global ocean observing and data management system be developed for improving predictions of climate change. Research on the oceans will provide quantification of important feedback loops in climate processes. Observation and research on the El Niño - Southern Oscillation phenomena, on upwelling areas and on biological productivity of the open sea are also important.

Coastal zones, which are the source of most of the global fish catch, are especially susceptible to effects of global warming and sea level rise. Predicting the impact of changes would be of enormous benefit to the increasing number of people living in coastal areas. Thus, it is also recommended that a programme of coastal zone research and monitoring be established to identify the effects of climate change on the coast and coastal ecosystems, and to assess the vulnerability of various natural and managed ecosystems such as coral reefs, mangroves and coastal aquaculture.

Action should be taken now to develop coastal zone adaptation strategies and policies."

The Ministerial sessions were attended by 908 participants, including 730 delegates from 137 countries with 66 national Government Ministers. During the final session of the Conference the Ministerial Declaration was endorsed addressing:

- Global strategy;
- Policy considerations for action; and
- global framework Convention on climate change.

Because of the importance of the Ministerial Declaration, it is reproduced in full as Annex II to this document.

3. INTERGOVERNMENTAL NEGOTIATING COMMITTEE FOR FRAMEWORK CONVENTION ON CLIMATE CHANGE

General Assembly of UN, in resolution 45/212, established the Intergovernmental Negotiating Committee to prepare an effective framework convention on climate change, containing appropriate commitments and any related legal instruments as might be agreed upon. That instrument, the Assembly said, should be completed prior to the UNCED in Rio de Janeiro, June 1992, and opened for signature during the Conference.

The Committee met in Washington, D.C., 4-14 February 1991 with J. Ripert (France) as Chairman with the participation of representatives from 101 States, 11 UN Offices, 7 intergovernmental and 69 non-governmental organizations.

The Committee adopted guidelines for the negotiation on a framework convention on climate change, the organization of the Working Groups and procedural points on the holding of meetings and on the drafting to be done. It emphasized in those guidelines that all items in the negotiations should be dealt with in an integrated manner; that the work of the groups must be interrelated and integrated by the plenary; and that funding commitments, mechanisms, technology transfer and international scientific and technological co-operation should be an integral element in negotiations. Furthermore the guidelines state that the final agreement on the convention should cover, in an integrated manner, all areas of common concern, including emissions; sinks; transfer of technology; financial resources and funding mechanisms for developing countries; international scientific and technological co-operation; and measures to counter the effects of climate change and its possible adverse impact, particularly on small island developing countries, low-lying coastal, arid and semi-arid areas, tropical regions liable to seasonal flooding and areas prone to draught and desertification.

The mandates of the two Working Groups, which will prepare draft texts for consideration by the plenary, are as follows:

"Working Group I, on commitments, will prepare a text containing commitments for limiting and reducing net emissions of carbon dioxide and other greenhouse gases; on the protection, enhancement and increase of sinks and reservoirs; and in support of measures to counter the adverse effects of climate change, taking into account that contributions should be equitably differentiated according to countries' responsibilities and level of development.

That text will also include commitments on adequate and additional financial resources to enable developing countries to meet the costs required to fulfil their commitments, as well as commitments to facilitate the transfer of technology on a fair and most favourable basis.

The text to be prepared will, further, contain commitments addressing the special situation of developing countries, taking into account their development needs, including the problems of small island developing countries, low-lying coastal areas and areas threatened by erosion, flooding, desertification and high urban atmospheric pollution, as well as the problems of economies in transition.

Working Group II, on mechanisms, will prepare a text containing legal and institutional mechanisms relating to: entry into force, withdrawal, compliance and assessment and review of the convention; scientific co-operation, monitoring and information; and adequate and additional financial resources and technological needs and co-operation, as well as technology transfer to developing countries corresponding to the commitments agreed to in Working Group I.

The Chairman, Jean Ripert (France), speaking in his personal capacity at the conclusion of the general debate, said 68 Member States, and eight representatives of United Nations agencies, intergovernmental and non-governmental organizations had made statements. He felt "some optimism" about the outcome of the negotiations, based on what he had heard during the debate. There was a resolve to work on the framework convention and the will should be found, with all delegations participating on an equal footing. He regretted that the level of participation so far had not been as good as in Geneva, and undertook to seek a solution to the problem that had prevented attendance by a sizeable number of States.

He said there were certain points on which all delegations seemed to agree in their statements. First was the need for a common long-term and flexible strategy for the implementation of a convention, with shared responsibilities for all in eliminating the causes of greenhouse gases. The principle of equity had been mentioned.

It had been said, he went on, that the industrialized countries must take the lead, that they had a responsibility to act immediately. Those countries were committed to that course of action. It had been stated that an attempt must be made to stabilize emissions in the first stage, followed by a reduction of those emissions. The industrialized countries were committed to that objective and were ready to implement policies for stabilization.

Some delegations, he said, had stated that the strategy for the framework convention should cover all aspects of the causes of climate change, not just certain types of sinks, such as forests, but also agriculture, coral reefs and such. Forests and forest management had to be looked at in the overall context. The principle of the sovereignty of States had also been raised. There was a need for "a strategy for action", delegations had said -- one based on reasonable objectives and policies which would achieve specific results. Ways to organize policies at the national, and later regional and subregional levels, had to be found. Those must include economic means.

Speakers had stressed the need to pay attention to measures to enable developing countries to become full partners in the negotiating process, as well as their need for financial resources and the transfer of technology, he said. It had been stated that additional financial resources would be required if development policies were not to be thwarted. There was a need for additional resources for those countries, but that should not be a pretext for what some had described as "green conditionalities". The necessary instrument for such assistance would have to be found.

He said there had also been agreement on the need to expand scientific knowledge, and that IPCC could play a supporting role in those negotiations. The IPCC Chairman had already indicated that he was ready to reconvene that body.

The aim of all delegations, he said, was to ensure that this session not end with just one more report. It should seek to collate all possible elements of a convention for future discussion and to work on those points of easiest agreement. He was impatient for the Committee to get down to drafting the framework convention so that there would be something to work on by the next session. He reiterated the need for universality in the Committee's Work and said he felt encouraged by the way work was proceeding."

4. JOINT MEETING OF THE CO-ORDINATORS OF THE REGIONAL TASK TEAM ON IMPLICATIONS OF CLIMATIC CHANGES, SINGAPORE, 12-16 NOVEMBER 1990

The Joint Meeting of the Co-ordinators of the Regional Task Teams on Implications of Climatic Changes was held in Singapore, 12-16 November 1990. The report of the Meeting was published by OCA/PAC as UNEP(OCA) WG 8/2. The Meeting considered number of topics, amongst others:

- Main findings of the Task Teams (general assessment of potential impacts of climate change, specific regional feature, future strategies);
- experience of the Task Teams in bringing their findings to the attention of the relevant national authorities and international bodies and programmes;
- future work of the Task Teams.

4.1. Main findings

a) General Assessment of Potential Impacts of Climatic Changes

On the basis of the presentations and discussions held the statement was adopted by the Meeting which is reproduced below:

"Although it is difficult to predict the magnitude, significance and spacial distribution of specific climate change impacts on land-use practices, natural systems, physical processes and socio-economic activities in general it is nevertheless possible to state that there will be profound and sweeping changes.

It is clear that climate change and sea level rise will have major effects on all countries and that the areas which are likely to be most profoundly affected are the low-lying islands and coastal zones of the world where more than 70% of the world's population currently lives.

The work of the 9 regional task teams covers 109 countries and includes contributions by approximately 200 specialists from a wide range of disciplines. The results demonstrate the diversity and significance of potential impacts to all sectors of human activity, and in particular for freshwater management, agriculture, fisheries and forestry. The work further documents the impact of climate changes on the structure and functioning of natural ecosystems.

Predicted changes in temperature, precipitation, radiation budgets, as well as in patterns of atmospheric and oceanic circulation will alter the spatial distribution of primary and secondary productivity in both the land and ocean environments. Such changes will result in long-term changes in resource availability and use by different societies.

The frequency, intensity, and duration of extreme meteorological events, including hurricanes, storm surges, droughts, and rain-storms, if increased as predicted by some experts, will cause additional stress on societies, reducing their food security and ability to achieve sustainable development.

The rise in sea level will inundate lowland areas, erode beaches, exacerbate flooding and increase the salinity of soils and groundwater, rivers, estuaries, lagoons and aquifers. Some of the most adverse consequences can be diminished or mitigated if society takes timely anticipatory action.

A global rise in mean sea level of up to 20 cm would not, in itself have a significant impact except locally; however, relative changes could be as much as five times this value due to factors such as subsidence, groundwater extraction and sediment compaction.

More severe impacts can be expected if sea level rise exceeds the anticipated increase, or if the rate of the increase exceeds the capability of sensitive coastal ecosystems to respond.

In many cases the future impacts on society and the environment of non-climate factors may far exceed the direct impacts of climate related changes. In particular, the rate of population growth and human migration patterns are causes for concern. Such factors will increase the vulnerability of societies to climate related stress, and may trigger impacts of catastrophic proportions.

Environmental problems are already critical in many parts of the world, and the potential impacts of climate change will exacerbate current problems. Without prompt remedial action, such problems will increase, rendering sustainable development an unachievable goal in many countries. In addition a failure to address these problems now will make future responses to climate change and sea level rise more difficult and in some cases impossible."

b) Assessment of the Implications of climatic changes in the Mediterranean region

The Co-ordinator of the Mediterranean Task Team (L. Jetic) presented the main findings of the Task Team and substantive summary of these findings is reproduced below:

"With an assumed temperature increase of 1.5EC by the year 2025, potential evapotranspiration will increase throughout the Mediterranean, coupled with a possible decrease in precipitation in the South and an increase in the North. Hot dry summers and exceptional events of drought or rainfall and floods, marine storms, tidal surges and of water stagnation and eutrophication, could increase in frequency.

A 1.5EC increase in temperature would lead to an increase in land degradation, deterioration of water resources, decline in agricultural production and damage to natural, terrestrial and aquatic ecosystems. It could also alter marine circulation both in the Mediterranean and the Atlantic, thus affecting marine productivity and the pattern of pollutant dispersal.

The future impacts on Mediterranean society of non-climatic factors (e.g. population increases, present development plans) may far exceed the direct impacts of climate change. Non-climate factors will cause continuous increases in society's vulnerability to climatic stress, particularly in the South. Together, these demographic and climatic changes should increase the probability of catastrophic events and hasten their occurrence.

It is particularly difficult to forecast the effects of climatic change on agriculture, beyond concluding that irrigation systems will suffer increasing stress and soil degradation will reduce yields in rain-fed system. Salinization of irrigation water would have negative consequence on sensitive grain yield. Consequently new varieties of crops have to be introduced, adapted to the new natural settings and yield standards.

A global, eustatic rise in mean sea level of about 20 cm by 2025 would not, in itself, have a significant impact in the Mediterranean, except locally (e.g. lagoons). However, local sea level changes could be up to five times this amount because of natural land subsidence, enhanced by excessive groundwater withdrawal. Negative effects of this impact will be felt in low lying areas, deltas and coastal cities.

Most of the deltaic lowlands of the Mediterranean Sea are experiencing serious environmental problems because of agricultural, industrial, urban and tourist developments over the last two decades. Problems range from water pollution and salinization to land subsidence, shoreline erosion, and restriction and deterioration of wildlife habitats. These problems will be increased by adverse socio-economic conditions, the effects of which will be superimposed upon those of climatic change.

Generally marine and land weeds are expected to benefit from a warmer, CO₂ richer atmosphere. Flora and fauna of the wetlands will be forced to gradually adapt to changed conditions which might be crucial for species that possess reduced tolerance to high salinities. As bioclimatic zonation will gradually shift northwards, several species will migrate to the north, and insect populations might increase. There will be favourable conditions for an increasing risk from agricultural pests, bacteria and diseases, especially in the swamps.

To develop a strategy for responding to the impacts of change, it is essential to identify those parts of the Mediterranean coastal regions where knowledge is still inadequate.

Regarding sea level change, prospective actions can be either preventive or reactive. For example, entire coasts and lagoon margins can be walled in, or choices must be made between irreplaceable coastal uses (e.g. national and military harbours, towns of historical-artistic value, lagoonal resources, specialized agriculture) and adaptations. Examples of such reactive actions would be (a) shifting land uses; and (b) a different approach to beach recreation (i.e. less urbanized), the replacement of extensive, uneconomical crops in low lying lands, with lagoons destined for aquaculture and nature reserves. The lagoons would act as a buffer belt, since their inner margins can be more easily protected than the exposed coast.

The immediate task should be to identify all "high risk" areas, and to re-examine the present factors of coastal dynamics in the context of increasing air/water temperatures and sea levels. Storm impact maps should help provide a scientific basis for proper coastal zone protection. Engineering solutions, such as dikes and walls, are not likely to represent a realistic long term solution to the problem of rising sea level, except in very special cases. The coastal dynamics of erosion and deposition, the relative life span of most human installations, and the possibility of providing complete protection for small areas of special importance mean that it is most likely that adaptation, evolution and land use change will represent the most appropriate responses to sea level rise.

Clearly the first need is to develop a realistic sea level rise scenario, and secondly, to determine the physical impacts on inshore areas.

Close attention needs to be paid to the conservation of soil, groundwater and wetland resources in the Mediterranean, because they contribute substantially to environmental stability. The adverse effects on downstream human settlements and ecosystems of large dam schemes have not been considered sufficiently in past planning. Future water management plans must be scrutinized more closely in relation to climatic change.

Studies of the frequency of extreme events (high temperatures, high and low precipitation events, storms surges, etc.) and how these frequencies relate to mean climatic conditions, are required to help predict probabilities of occurrence.

The implications of climate impacts for some regions and processes are highly complex and therefore systems analysis seems to be the best approach to their study.

It is recommended that organizational and legal instruments be developed to control coastal development, land reclamation and groundwater exploitation. Lowlands could be analyzed and zoned in high, medium and low risk categories."

4.2. Experience of the Task Teams in bringing their findings to the attention of the relevant national authorities and international bodies and programmes

One of the two long-term objectives of the Task Teams is to assist Governments in the identification and implementation of suitable policy options and response measures which may mitigate the negative consequences of the impact.

The experiences of the Task Teams in bringing their findings to the attention of the relevant national authorities and international bodies were reviewed and are summarized below:

"(a) The regional overviews, or their draft versions, whenever available, were brought to the attention of intergovernmental and expert meetings convened under the relevant Regional Seas action plans. In general, the reports were favourably reviewed by these meetings but their impact on the future orientation of the action plans was slight or non-existent. The South Pacific (SPREP) action plan was the only exception, because on the request of the intergovernmental meeting of that action plan (Noumea, 27 June-1 July 1988) a separate ASPEI/SPREP/UNEP intergovernmental meeting was convened (Majuro, 17-20 July 1989) to consider the implications of expected climate changes on pacific islands. The meeting was highly successful and led to a series of concrete requests for further action which are the basis for the future activities of the South Pacific Task Team.

(b) Three of the completed site-specific case studies (deltas of Nile, Po and Ebro) prepared by the Mediterranean Task Team were presented to national seminars in 1988 and 1989. Although the seminars were found interesting by their participants and in spite of the high quality of the presented studies, the seminars and the studies had very little impact on national policies, even in cases when they were well attended (e.g. in Cairo) by numerous local experts and by representatives of national authorities.

(c) Due to insufficient interest on the part of the national authorities, two of the three remaining site-specific case studies prepared by the Mediterranean Task Team (Thermaikos Gulf, delta of Rhone River) have been awaiting presentation to national seminars since 1988.

(d) The study of the potential impact of expected climate changes was successfully incorporated into four coastal zone management projects (Izmir Bay, Rhodes, Kastela Bay and Coast of Syria) being carried out in the framework of the Mediterranean Action Plan.

(e) *The Meeting noted with satisfaction the input provided by the Task Teams into the work of IPCC through the participation of nineteen Task Team members in the meetings of the Coastal Zone Management sub-group of IPCC (Miami, 27 November-1 December 1989; Perth, 18-23 February 1990). Regrettably, this input was the only co-operation of the Task Teams with the IPCC process and the meeting expressed dissatisfaction at the fact that the Secretariat of IPCC, although aware of the work of the Task Teams, did not reciprocate by involving the Task Teams or their members in any other aspect of IPCC's work.*

(f) *The general conclusion of the meeting was that in spite of the high quality of the Task Teams's products, the impact of the Task Teams' work on national authorities and international bodies and programmes was, in most instances, below the expected level. This was largely due to the strategies used for the:*

- *preparation of regional overviews which generally lacked a strong involvement of national authorities; and*
- *selection of sites for site-specific case studies on the basis of the importance or vulnerability of the site as perceived by the Task Teams, and without close consultation and involvement of "end-users" in the preparation of the case studies."*

4.3. Future work of the Task Teams

- a) Principles for the preparation of future site specific case studies

In the discussion on the principles for the preparation of future site-specific case studies, Mr L. Jetic proposed a set of principles which were endorsed and expanded by the Meeting and following were adopted as elements of a general strategy for the preparation of future site-specific case studies:

- "(a) *case studies should be prepared either at the explicit request of the prospective end-users or after a firm confirmation of support has been received from a potential user of the case study; in both cases the intended use of the case study should be clearly stated;*
- (b) *the potential end-user(s) should be involved in the formulation of the outline of the study and should participate in carrying out the study, i.e. the study should not be done "for him" but "with him" with the assistance of the Task Team;*
- (c) *if at all possible, the study should be prepared within the framework of an integrated coastal zone management plan;*
- (d) *each case study should have a section containing specific recommendations for policy options and measures which may mitigate or avoid the negative implications of the predicted impact of expected climate changes;*
- (e) *the form in which the results and recommendations of the study are expressed should be clear, unambiguous and easily understandable by the prospective user(s) of the study;*
- (f) *the studies should not contain material irrelevant to the study, i.e. material which is not being used for supporting the conclusions and recommendations of the study;*

- (g) *no study should be considered complete if it is without social and economic considerations;*
 - (h) *the counterpart representative of national authorities, associated with the work of the Task Team, should be made responsible for ensuring the co-ordinated involvement of relevant national authorities in the preparation of the study; and*
 - (i) *the counterpart representative of local authorities, associated with the work of the Task Team, should be expected to contribute to the preparation of the study, at least in kind and services."*
- b) Future site-specific case studies in the Mediterranean

By the end of 1989, six site-specific case studies in the Mediterranean (Deltas of rivers Ebro, Rhone, Nile and Po, Thermaikos Gulf, Ishkeul/Bizerte lakes) were finalized. The Co-ordinator of the Mediterranean Task Team proposed six new site-specific case studies. Three referred to island areas (Island of Rhodes, Malta and the Northern Adriatic Islands) and three referred to coastal zones (Izmir Bay, Kastela Bay, Syrian Coast). For the island studies the background, introduction, basic facts, objectives, assumptions, outputs, workplan, institutional framework, budget and detailed outline of the study were presented in the document "Implications of expected climatic changes on the selected Mediterranean islands - project proposal" (UNEP(OCA)/WG.8/Inf.21). Three coastal studies are, apart from the location and basic facts, very similar in concept to the above mentioned Inf.21 document. All six case studies were submitted to OCA/PAC. The island of Rhodes study has already been launched and the remaining five studies will be launched by January 1991, subject to the availability of funds. The total request to UNEP (OCA/PAC) for support of all six case studies is US\$ 104,000. Duration of each study will be up to 12 months.

5. ACTIVITIES COORDINATED OR SUPPORTED BY THE COORDINATING UNIT FOR THE MEDITERRANEAN ACTION PLAN

Activities since the last meeting of the Joint Committee (Athens, 28 May-1 June 1990) were concentrated along the following lines of work:

- presentation of first generation of site-specific case studies;
- book on implications of climatic changes in the Mediterranean;
- regional scenario on future climatic changes in the Mediterranean;
- second generation of case studies.

Presentation of the first generation of site-specific case studies

In 1988-1989, six site-specific case studies were prepared (deltas of rivers Ebro, Rhone, Po and Nile, Thermaikos Gulf, Ichkeul/Bizerte Lakes). Three case studies were presented at national seminars (Nile, December 1988; Po, May 1989; Ebro, September 1989). For two case studies (Thermaikos Gulf, delta of Rhone), it was proposed to national authorities that they should be presented at respective national seminars but national authorities of Greece and France did not indicate interest for such seminars.

Books on implications of climatic changes in the Mediterranean

Contract between UNEP Headquarters and Arnolds Publishers for the publication of the book on implications of climatic changes in the Mediterranean was signed in 1990. All manuscripts (16 articles including six above mentioned case studies) will be submitted to the publisher in March 1991. It is expected that the book will be published before the end of 1991.

Regional scenario on climate changes in the Mediterranean Basin due to Global Greenhouse warming

The work on this project, financed by OCA/PAC, by the Climatic Research Unit of the University of East Anglia will be finalized by April 1991. Results of this project, which will concentrate on predictions in temperature and precipitation changes, will considerably help in future considerations. Its results will be presented on spatial scale which will allow sub-regional, almost local, considerations. Results are intended to be used in the second generation of site-specific case studies (Island of Rhodes, Kastela Bay, Izmir Bay, Syrian Coast) as well as in preparing of improved versions of the first generation of site-specific case studies (deltas of rivers Ebro, Rhone, Po and Nile, Thermaikos Gulf, Ichkeul/Bizerte Lakes).

Second generation of site-specific case studies

Second generation of case studies has also six specific sites which are: Island of Rhodes, Kastela Bay, Izmir Bay, Syrian coast, Island of Malta and Cres/Losinj Islands.

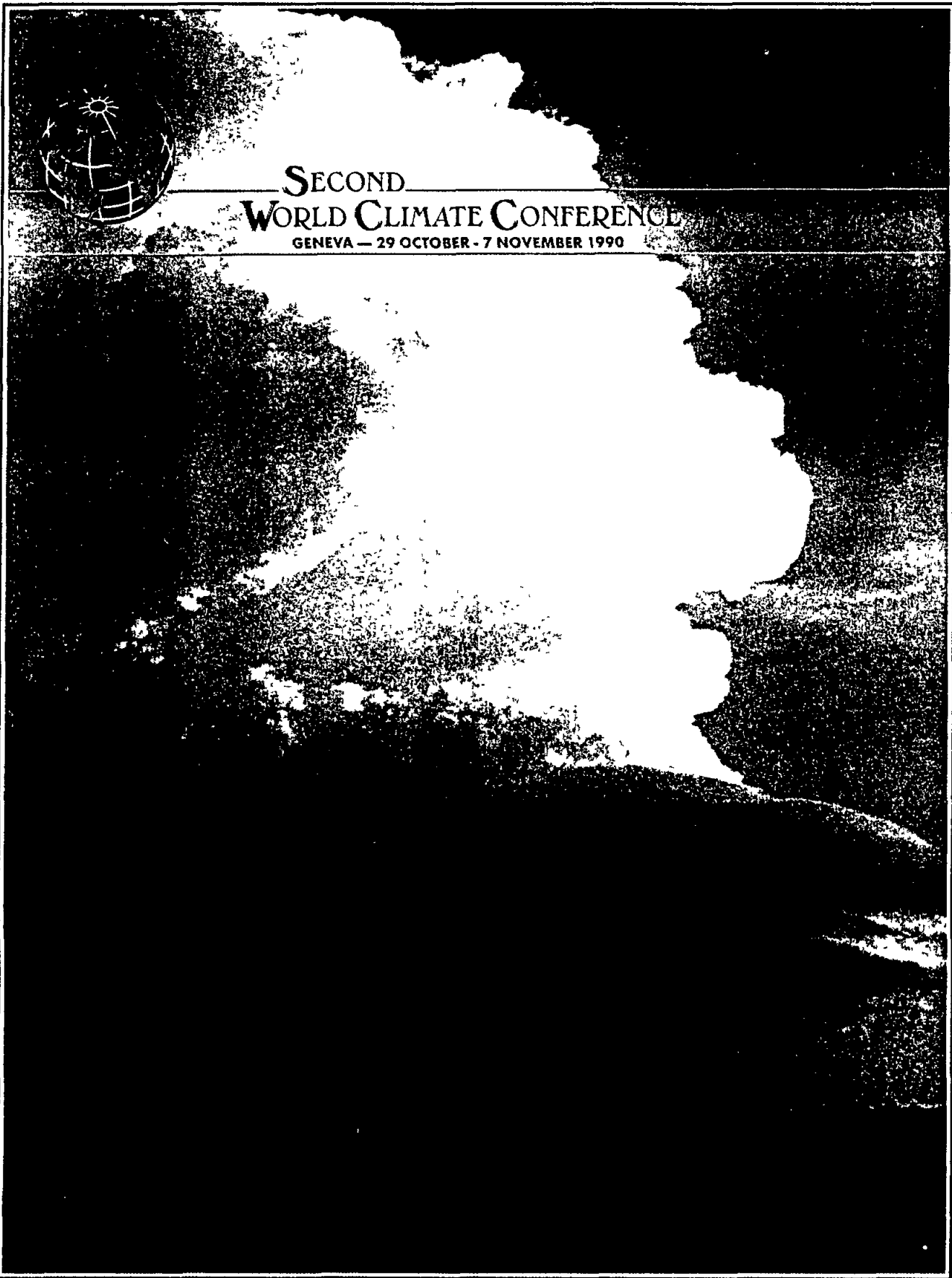
First four of above studies are being implemented in the framework of MAP's four Coastal Areas Management Projects.

For the study of the implications of climatic changes on the Island of Rhodes, two coordinators and six additional members of the Task Team were nominated. First meeting of the Task Team was held (Athens, 23-24 October 1990) at which detailed outline of the study, detailed workplan and calendar of implementation were agreed upon. It is envisaged that the study will be finalized by January 1992 and that it will be presented to national authorities and experts by March 1992.

For the study of the implications of climatic changes on the Kastela Bay the coordinator and additional six members of the Task Team were nominated. First meeting of the Task Team is planned for 25-26 April 1992 in Split, at which detailed outline of the study, detailed workplan and calendar of implementation will be proposed and adopted as amended. It is envisaged that the study will be finalized by March 1992.

Preparations for the initiations of case studies for Izmir Bay and Syrian coast are under way and it is envisaged that coordinators and Task Teams will be nominated by June 1991.

Case studies for the Island of Malta and Cres/Losinj Islands were proposed at the suggestion of OCA/PAC and they will be initiated if OCA/PAC will contribute financially for their implementation.



CONFERENCE STATEMENT

Second World Climate Conference

INTERNATIONAL CONFERENCE CENTRE

GENEVA, SWITZERLAND

29 OCTOBER - 7 NOVEMBER 1990

Sponsors

World Meteorological Organization (WMO)
United Nations Environment Programme (UNEP)
United Nations Educational, Scientific and Cultural Organization (UNESCO)
and its Intergovernmental Oceanographic Commission (IOC)
Food and Agriculture Organization (FAO)
International Council of Scientific Unions (ICSU)

Financial Supporters

The Second World Climate Conference has benefited from the encouragement and support of many countries and organizations. The sponsors are pleased to acknowledge in particular the substantial financial support of: Canada, the Federal Republic of Germany, Italy, France, Japan, the Netherlands, Norway, Switzerland, the United Kingdom, the United States of America, the European Community, the Stockholm Environment Institute and the Environmental Defense Fund (USA)

CONFERENCE STATEMENT

FOREWORD

The Second World Climate Conference was convened in Geneva, Switzerland, from 29 October through 7 November, 1990, under the sponsorship of the World Meteorological Organization; the United Nations Environment Programme; the United Nations Educational, Scientific, and Cultural Organization and its Intergovernmental Oceanographic Commission; the Food and Agriculture Organization; and the International Council of Scientific Unions. This Statement was adopted by the participants in the scientific and technical sessions from 29 October to 3 November 1990, on the basis of the presentations at the Conference, the deliberations of task groups of participants organized to address various specific issues, and plenary discussions involving all participants. The scientific and technical sessions involved 747 participants from 116 countries.

The Conference discussed the results of the first decade of work under the World Climate Programme (WCP), the First Assessment Report of the Intergovernmental Panel on Climate Change (August, 1990) and the development of the International Geosphere-Biosphere Programme (IGBP) and other relevant global programmes. In particular, the Conference considered the role, priorities, and programme structure for the future development of the World Climate Programme.

FOR FURTHER INFORMATION

H.L. Ferguson
Co-ordinator, SWCC
c/o World Meteorological Organization
P.O. Box 2300, CH 1211 Geneva 2, Switzerland
Telephone + 41 22 730 8401 / Fax + 41 22 740 1439 / Telex 23 260 OMM CH

7 November 1990

SECOND WORLD CLIMATE CONFERENCE
FINAL CONFERENCE STATEMENT

SUMMARY

1. Climate issues reach far beyond atmospheric and oceanic sciences, affecting every aspect of life on this planet. The issues are increasingly pivotal in determining future environmental and economic well-being. Variations of climate have profound effects on natural and managed systems, the economies of nations and the well-being of people everywhere. A clear scientific consensus has emerged on estimates of the range of global warming which can be expected during the 21st century. If the increase of greenhouse gas concentrations is not limited, the predicted climate change would place stresses on natural and social systems unprecedented in the past 10,000 years.
2. At the First World Climate Conference in 1979, nations were urged "to foresee and to prevent potential man-made changes in climate that might be adverse to the well-being of humanity". The Second World Climate Conference concludes that, notwithstanding scientific and economic uncertainties, nations should now take steps towards reducing sources and increasing sinks of greenhouse gases through national and regional actions, and negotiation of a global convention on climate change and related legal instruments. The long-term goal should be to halt the build-up of greenhouse gases at a level that minimizes risks to society and natural ecosystems. The remaining uncertainties must not be the basis for deferring societal responses to these risks. Many of the actions that would reduce risk are also desirable on other grounds.
3. A major international observational and research effort will be essential to strengthen the knowledge-base on climate processes and human interactions, and to provide the basis for operational climate monitoring and prediction.

PART I

MAIN CONCLUSIONS AND RECOMMENDATIONS

A. Greenhouse Gases and Climate Change

1. Emissions resulting from human activities are substantially increasing atmospheric concentrations of the greenhouse gases. These increases will enhance the natural greenhouse effect, resulting on average in an additional warming of the Earth's surface. The Conference agreed that this and other scientific conclusions set out by the IPCC reflect the international consensus of scientific understanding of climate change. Without actions to reduce emissions, global warming is predicted to reach 2 to 5 degrees C over the next century, a rate of change unprecedented in the past 10,000 years. The warming is expected to be accompanied by a sea level rise of 65 cm \pm 35 cm by the end of the next century. There remain uncertainties in predictions, particularly in regard to the timing, magnitude and regional patterns of climate change.

2. Climate change and sea level rise would seriously threaten low-lying islands and coastal zones. Water resources, agriculture and agricultural trade, especially in arid and semi-arid regions, forests, and fisheries are especially vulnerable to climate change. Climate change may compound existing serious problems of the global mismatch between resources, population and consumption. In many cases the impacts will be felt most severely in regions already under stress, mainly in developing countries.

3. Global warming induced by increased greenhouse gas concentrations is delayed by the oceans; hence, much of the change is still to come. Inertia in the climate system due to the influence of the oceans, the biosphere and the long residence times of some greenhouse gases means that climate changes that occur may persist for centuries.

4. Natural sources and sinks of greenhouse gases are sensitive to a change in climate. Although many of the response or feedback processes are poorly understood, it appears likely that, as climate warms, these feedbacks will lead to an overall increase rather than a decrease in greenhouse gas concentrations.

5. The historical growth in emissions has been a direct consequence of the increase of human population, rising incomes, the related exploitation of fossil fuels by industrialized societies and the expansion of agriculture. Under "Business-as-Usual" assumptions*, it is projected that emissions will continue to grow in the future as a consequence of a projected doubling of energy consumption in the first half of the 21st century and an expected doubling of population by the latter half. As a result, the effect of human-induced greenhouse gas concentrations on the earth's radiation balance would by 2025 correspond to a doubling of carbon dioxide unless remedial actions are taken.

6. Over the last decade, emissions of carbon dioxide (CO₂) contributed 55% of the increased radiative forcing produced by greenhouse gases from human activities. The CFCs contributed about 24% of the past decade's changes, and methane 15%, with the balance due to other greenhouse gases. With controls on CFCs under the Montreal Protocol, the relative importance of CO₂ emissions will increase, provided the substitutes for CFCs have minimal

* "Business-as-Usual" assumes that few or no steps are taken to limit greenhouse gas emissions. Energy use and clearing of tropical forests continue and fossil fuels, in particular coal, remain the world's primary energy source. The Montreal Protocol comes into effect but without strengthening and with less than 100 percent compliance.

greenhouse warming potential. Some 75% of total CO₂ emissions have come from the industrialized countries.

7. The above emissions can be expected to change the planet's atmosphere and climate, and a clear scientific consensus has been reached on the range of changes to be expected. Although this range is large, it is prudent to exercise, as a precautionary measure, actions to manage the risk of undesirable climate change. In order to stabilize atmospheric carbon dioxide concentrations by the middle of the 21st century at about 50% above pre-industrial concentrations, a continuous world-wide reduction of net carbon dioxide emissions by 1 to 2% per year starting now would be required. The Intergovernmental Panel on Climate change (IPCC) also considered three other emissions scenarios, which would not lead to stabilization of CO₂ concentrations in the 21st century. A 15 to 20% reduction in methane emissions would stabilize atmospheric concentrations of that gas.

8. This Conference concludes that technically feasible and cost-effective opportunities exist to reduce CO₂ emissions in all countries. Such opportunities for emissions reductions are sufficient to allow many industrialized countries to stabilize CO₂ emissions from the energy sector and to reduce these emissions by at least 20 percent by 2005. The measures include increasing the efficiency of energy use and employing alternative fuels and energy sources. As additional measures to achieve further cost-effective reductions are identified and implemented, even greater decreases in emissions would be achieved in the following decades. In addition, reversing the current net losses in forests would increase storage of carbon. The economic and social costs and benefits of such measures should be urgently examined by all nations. An internationally coordinated assessment should be undertaken through the IPCC.

9. Countries are urged to take immediate actions to control the risks of climate change with initial emphasis on actions that would be economically and socially beneficial for other reasons as well. Nations should launch negotiations on a convention on climate change and related legal instruments without delay and with the aim of signing such a convention in 1992.

B. Use of Climate Information in Assisting Sustainable Social and Economic Development

Climate data, analyses, and eventually climate predictions, can contribute substantially to enhancing the efficiency and security of economic and developmental activities in environmentally sustainable ways. These benefits are particularly important in food and wood production, water management, transportation, energy planning and production (including assessment of potential resources of biomass, hydropower, solar and wind energy), urban planning and design, human health and safety, combatting of drought and land degradation, and tourism. This requires both data on the climate system, and its effective application. Data acquisition, collection, management and analysis must be more vigorously supported in all countries and special assistance provided to developing countries through international cooperation. Transfer of techniques for applying climate information should be accelerated through more widespread use of software (e.g. CLICOM) for readily available personal computers and other means. Further development of methods for predicting short-term variations in climate and the environmental and social impacts should be vigorously pursued. These advances would provide enormous economic and other welfare benefits in coping with droughts, prolonged rain, and periods of severe hot and cold weather. Such predictions will require major steps forward in ocean-atmosphere-biosphere observing systems. Much greater efforts are also needed to increase involvement in these fields by developing countries, especially through increased education and training.

C. Priorities for Enhanced Research and Observational Systems

1. A consensus exists among scientists as summarized in the Report of Working Group I of the IPCC that climate change will occur due to increasing greenhouse gases. However, there is substantial scientific uncertainty in the details of projections of future climate change. Projections of future regional climate and climate impacts are much less certain than those on a global scale. These uncertainties can only be narrowed through research addressing the following priority areas:

- clouds and the hydrological cycle
- greenhouse gases and the global carbon and biogeochemical cycles
- oceans: physical, chemical and biological aspects; and exchanges with the atmosphere
- paleo-climatic studies
- polar ice sheets and sea ice
- terrestrial ecosystems.

2. These subjects are being addressed by national programmes, the World Climate Research Programme and the International Geosphere-Biosphere Programme and other related international programmes. Increased national support and substantially increased funding of these programmes is required if progress on the necessary time scale is to be made in reducing the uncertainties.

3. Present observational systems for monitoring the climate system are inadequate for operational and research purposes. They are deteriorating in both industrialized and developing regions. Of special concern is the inadequacy of observation systems in large parts of the southern hemisphere.

4. High priority must be placed on the provision and international exchange of high-quality, long-term data for climate-related studies. Data should be available at no more than the cost of reproduction and distribution. A full and open exchange of global and other data sets needed for climate-related studies is required.

5. There is an urgent need to create a *Global Climate Observing System* (GCOS) built upon the World Weather Watch Global Observing System and the Integrated Global Ocean Service System and including both space-based and surface-based observing components. GCOS should also include the data communications and other infrastructure necessary to support operational climate forecasting.

6. GCOS should be designed to meet the needs for:
- (a) climate system monitoring, climate change detection and response monitoring, especially in terrestrial ecosystems
 - (b) data for application to national economic development
 - (c) research towards improved understanding, modelling and prediction of the climate system.

7. Such a GCOS would be based upon:
- (1) an improved World Weather Watch Programme
 - (2) the establishment of a global ocean observing system (GOOS) of physical, chemical and biological measurements
 - (3) the maintenance and enhancement of monitoring programmes of other key components of the climate system, such as the distribution of important atmospheric constituents (including the Global Atmosphere Watch), changes in terrestrial ecosystems, clouds and the hydrological cycle, the earth's radiation budget, ice sheets, and precipitation over the oceans.

8. The further development and implementation of the GCOS concept should be pursued, with urgency, by scientists, governments and international organizations.

9. The impacts of climate variability on human socio-economic systems have provided major constraints to development. Climate change may compound these constraints. In semi-arid regions of Africa, drought episodes have been directly responsible for major human disasters. Research undertaken during the first decade of the WCP and through other international and national programmes has improved drought early warning systems, including FAO's Global Early Warning System, and increased the reliability of climate impact analyses. But much more remains to be done. Intensified efforts are required to refine further our ability to predict short-term climate variability, anticipate climate impacts, and identify rational strategies to mitigate or prevent adverse effects. The threat of climate change brings new challenges to the future well-being of people. This requires greater efforts to understand impacts of climate change. Mitigation and adaptation strategies are also essential. Immediate steps to be taken include:

- (a) national and regional analyses of the impacts of climate variability and change on society, and study of the range of response and adaptation options available
- (b) closer co-operation and communication among natural and social scientists, to ensure that climate considerations are accounted for in development planning
- (c) significant increases in resources to carry out impact/adaptation studies.

10. Improvements in energy efficiency and non-fossil fuel energy technologies are of paramount importance, not only to reduce greenhouse gas emissions but to move to more sustainable development pathways. Such advances will require research and development, as well as technology transfer and co-development.

11. A specific initiative would create a network of regional, interdisciplinary research centres, located primarily in developing countries, and focussing on all of the natural science, engineering and social science disciplines required to support fully integrated studies of global change and its impacts and policy responses. The centres would conduct research and training on all aspects of global change and study the interaction of regional and global policies.

D. Public Information

People need better information on the crucial role climate plays in development and the additional risks posed by climate change. Governments, intergovernmental and non-governmental organizations should give more emphasis to providing accurate public information on climate issues. The public information and education and training component in the WCP and IGBP must also be expanded.

PART II

SPECIFIC ISSUES

1. Water

1.1 Among the most important impacts of climate change will be its effects on the hydrological cycle and water management systems, and through these, on socio-economic systems. Increases in incidence of extremes, such as floods and droughts, would cause increased frequency and severity of disasters.

1.2 The design of many costly structures to store and convey water, from large dams to small drainage facilities, is based on analyses of past records of climatic and hydrological parameters. Some of these structures are designed to last 50 to 100 years or even longer. Records of past climate and hydrological conditions may no longer be a reliable guide to the future. The design and management of both structural and non-structural water resource systems should allow for the possible effects of climate change.

1.3 Data systems and research must be strengthened to predict water resources impacts, detect hydrological changes, and improve hydrological parameterization in global climate models.

1.4 Existing and novel technologies, for more efficient use of water for irrigation, should be made available to developing countries in semi-arid zones.

2. Agriculture and Food

2.1 Important uncertainties remain regarding the prediction of the magnitude and nature of potential impacts of changing climate and higher CO₂ levels on global food security. The potential impact on food production in developing countries, with more than half the world's population, could be more uncertain than recent reviews suggest.

2.2 High priority should therefore be given to research on the direct effects of rising CO₂ concentrations on food and fibre crop productivity and equal priority should be given to research on agricultural emissions so as to determine agriculture's present and potential role as a source of and sink for greenhouse gases, and to clarify the costs and possible trade-offs arising from limitation measures.

2.3 New or strengthened institutional mechanisms are required to upgrade natural resource inventories, research strategies and extension services to raise agricultural productivity and minimize emissions. These mechanisms should include collaborative programmes between FAO and international and national agencies with stress on interdisciplinary activities on food security and related topics.

3. Oceans, Fisheries and Coastal Zones

3.1 The earth's climate including shorter-term variations is influenced by the coupled atmosphere - ocean system. Coastal zones and their associated high biological productivity, including fisheries, are especially affected. Thus, an improved data base of oceanic parameters is considered indispensable for operational climate forecasting. It is recommended that a global ocean observing and data management system be developed for improving predictions of climate change. Research on the oceans will provide quantification of important feedback loops in climate processes. Observation and research on the El Niño - Southern Oscillation phenomena, on upwelling areas and on biological productivity of the open sea are also important.

3.2 Coastal zones, which are the source of most of the global fish catch, are especially susceptible to effects of global warming and sea level rise. Predicting the impact of changes

would be of enormous benefit to the increasing number of people living in coastal areas. Thus, it is also recommended that a programme of coastal zone research and monitoring be established to identify the effects of climate change on the coast and coastal ecosystems, and to assess the vulnerability of various natural and managed ecosystems such as coral reefs, mangroves and coastal aquaculture.

3.3 Action should be taken now to develop coastal zone adaptation strategies and policies.

4. Energy

4.1 In order to stabilize atmospheric concentrations of greenhouse gases while allowing for growth in emissions from developing countries, industrialized countries must implement reductions even greater than those required, on average, for the globe as a whole. However, even where very large technical and economic opportunities have been identified for reducing energy-related greenhouse gas emissions, and even where there are significant and multiple benefits associated with these measures, implementation is being slowed and sometimes prevented by a host of barriers. These barriers exist at all levels — at the level of consumers, energy equipment manufacturers and suppliers, industries, utilities, and governments. Overcoming the barriers obstructing least-cost approaches to meeting energy demands will require responses from all parts of society — individual consumers, industry, governments, and non-governmental organizations.

4.2 Developing countries also have an important role in limiting climate change. Maintaining development as a principal objective, energy and development paths can be chosen that have the additional benefit of minimizing radiative forcing.

5. Land Use and Urban Planning

Population growth, increasing urbanization, and competing demands for finite areas of arable land will produce increasingly severe problems of food supply, energy production, and water resources. Climate changes may exacerbate these problems in some regions. Prudent planning will require baseline analyses of land use, quality and quantity of water resources, and the assessment of vulnerability of urbanized societies to environmental change. In particular, improved adaptation of urban areas to local climatic regimes needs to be achieved by more appropriate layouts and building densities, and improved building construction through modifications to building and planning regulations. Because conurbations make a major contribution to energy-related greenhouse gas emissions, the design and efficiency of all aspects of urban systems should be enhanced.

6. Health and Human Dimensions

6.1 The direct impact of climate change on people, their health and cultural heritage, could be severe. There is likely to be increased health inequity between peoples of developing and developed countries. Climatic change could result in increasing numbers of environmental refugees with associated increases of ill-health, disease and death among them.

6.2 Global warming is likely to shift the range of favourable conditions for certain pests and diseases, causing additional stresses on people, particularly those of the semi-arid tropics. It must be appreciated however that serious problems may arise in all parts of the world.

6.3 Research into how human behaviour contributes to and responds to climate change must have increased emphasis. Public awareness and education programmes are particularly essential in this regard.

7. Environment and Development

7.1 Climate change, superimposed on population pressures, excessive consumption, and other stresses on the environment imperils the sustainability of socio-economic development

throughout the world. In addition, slowing climate change will give countries more time to enhance their prospects for sustainable development. The developed countries need to reduce emissions and assist the developing countries to adopt new, clean technologies.

7.2 Climate change has such important implications for the sustainability of development that policy responses, including measures to reduce greenhouse gases, measures to reduce deforestation, and the commitment of financial and other resources, are justified for that reason alone. Economic policies, such as subsidies and trade restraints, can distort markets so they harm the environment and contribute to global warming and sea level rise. There is an imperative need for development policies that not only reduce global warming trends but also increase economic and social resilience.

8. Forests

While increasing forest cover can contribute to the slowing of global climate change, this is not the major cure for the problem.

Five priority actions are recommended:

- (1) Assessing national opportunities to increase forest carbon storage commensurate with national resource development policies, developing an approach by 1992 and completing assessment by 1995
- (2) Managing the world's forests to optimize biomass and resultant carbon storage in addition to the maintenance of sustainable yields of forest products, biological diversity, water quality and the many other values that forests provide
- (3) Accelerating research to assess the added contribution that forests can make to atmospheric CO₂ reduction and the impacts of climate change on the world's forests
- (4) Designing and implementing international monitoring systems to determine conditions and changes in forest ecosystems in response to anticipated climate changes
- (5) Supporting the development of an international instrument on conservation and development of the world's forests linked with climate and biodiversity conventions.

PART III

ORGANIZATIONAL AND POLICY ISSUES FOR INTERNATIONAL ACTIVITIES

1. The Future Structure of the WCP

1.1 The WCP should be broadened and closely coordinated with related programmes of other agencies in response to increased emphasis on the prediction of climate and its impacts.

1.2 The World Climate Data Programme, renamed the World Climate System Monitoring Programme, should be redefined to take into account new objectives.

1.3 Greater emphasis in the strengthened WCP (WCP-2) should be given to adaptation, mitigation and education, with adaptation and mitigation activities closely linked to the Impact Studies Programme (WCIP).

1.4 The World Climate Applications Programme should be renamed the World Climate Applications and Services Programme (WCASP) to reflect the need for intensifying efforts to provide climatological services to a wide variety of users. There should be strong interaction between WCIP and WCASP.

1.5 The organizational framework for international scientific research is in place, constituted by the WCRP, emphasizing the physical aspects, and the IGBP, covering bio-geochemical aspects.

1.6 Governments should establish national committees for the WCP to mobilize support for national activities and to coordinate efforts. The UN agencies and ICSU should work towards ensuring regular contact and exchange of information with national committees.

1.7 The mechanism established for overall coordination of the WCP, involving meetings of the chairs of steering bodies for the various components, should be actively supported by WMO, the other UN bodies concerned and ICSU. Annual meetings of Executive Heads should consider their recommendations.

1.8 Restructuring and strengthening of the WCP will also be necessary to support new activities, such as the development of the proposed GCOS. The Conference recommended that a proposal for the new structure of WCP be formulated by the organizations involved, taking into account the above comments, and presented to the Eleventh World Meteorological Congress, May 1991, and at appropriate meetings of other participating organizations.

2. Special Needs of the Developing Countries

2.1 As stated in the IPCC report, industrialized and developing countries have a common but differentiated responsibility for dealing with the problems of climate change. The problem is largely the consequence of past patterns of economic growth in the industrial countries. However, in future the much needed economic growth in the developing countries could play an important role in determining the rate of climate change.

2.2 Developing countries are being asked to participate in the alleviation of the legacy of environmental damage from prior industrialization. If they are to avoid the potentially disastrous course followed by industrialized countries in the past, they need to adopt modern technologies early in the process of development, particularly in regard to energy efficiency. They also must be full partners in the global scientific and technical effort that will be required. It is clear that developing countries must not go through the evolutionary process of previous industrialization but rather, must "leapfrog" ahead directly from a status of under-development through to efficient, environmentally benign, technologies.

2.3 Although developing countries have collaborated in providing data, and participated to a degree in meetings and research, they have benefited to a lesser extent from the analyses developed from their contributions, and even less so from the applications derived therefrom.

2.4 Therefore, a massive and sustained flow of scientific and technological expertise towards the development of the intellectual resources, technical and institutional capacity of the developing countries is a necessary complement to the efforts of those countries.

- 2.5 Developing countries should be assisted to build up their capabilities
- to monitor, assess and apply climate information
 - to prepare inventories of greenhouse gases emissions and future emissions projections
 - to identify impacts of potential global warming
 - to prepare cost estimates and priorities for response strategies to adapt and mitigate problems posed by climate change
 - to participate in the World Climate Programme.

2.6 The mechanisms of the transfer of technology and provision of technical assistance and co-operation to developing countries should take into account considerations such as the need for preferential and assured access, intellectual property rights, the environmental soundness of such technology and the financial implications.

2.7 Taking note that industry plays a significant role in the development and transfer

of science and technology, efforts by industry to promote further the development and transfer of environmentally sound technologies should be encouraged, and policies to encourage such efforts should be formulated.

2.8 Additional financial resources will have to be channelled to developing countries for those activities which contribute both to limiting greenhouse gas emissions and/or adapting to any adverse effects of climate change, and promoting economic development. Areas for co-operation and assistance could include the efficient use of energy, land use planning, forest management, soil and water conservations, strengthening of observational systems and scientific and technological capabilities.

3. Co-operation in International Research

3.1 The existing and planned research projects of the WCRP and the IGBP address the highest priority scientific issues related to the understanding and prediction of climate variability and change.

3.2 These programmes should be implemented completely and rigorously. It is particularly important that adequate funding, including long-term funding commitments, be provided.

3.3 In view of the progress made in climate research, it is now timely to proceed to the detailed design of an operational global climate observing system (Section C, paras. 5 - 8), together with the data communications and other infrastructure needed to support operational climate forecasting. Governments should enter into early discussions aimed at international cooperation in operational climate forecasting.

4. Co-ordinated International Activities and Policy Development

4.1 The Conference endorsed the three streams of international activity:

- a. Global measurement and research efforts through the WCP, IGBP, and other related international programmes
- b. Assessment functions of a continuing IPCC to support negotiation of and provide technical input to a Convention
- c. Development of a Convention on Climate Change.

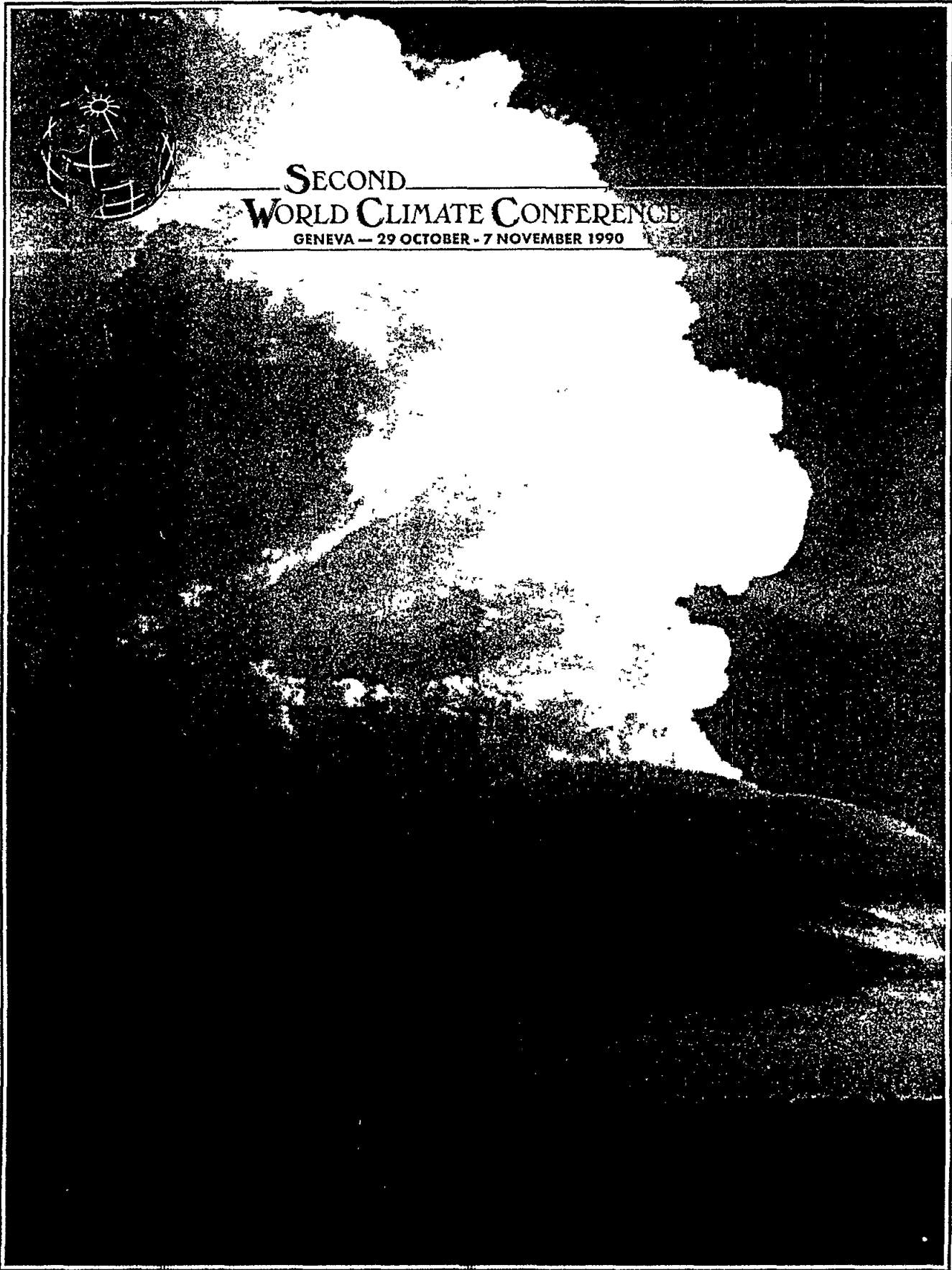
It is essential that all parties to a Convention and related legal instruments should, as part of their obligations, be required to participate fully in the free exchange and flow of information necessary for technical input to the convention. Such a convention should include a technical annex to provide for:

- International co-operation in research, systematic observation and exchange of related information
- Adjustments based on up-dates of scientific knowledge
- Strengthening national scientific and environmental capabilities of developing countries.

4.2 The development of policy regarding climate change requires on the part of policy makers an understanding of the underlying science and a weighing of the scientific uncertainties associated with the prediction of climate change and its likely impacts. An important aspect of future work is therefore a continued dialogue between scientists and policy makers.

4.3 The UN Conference on Environment and Development (Brazil 1992) provides a valuable opportunity to relate the above three themes to the other environment/development issues and objectives being examined by the Conference. It is therefore essential that the three streams should interact effectively with UNCED.

4.4 It is proposed that the sponsoring agencies for the SWCC consider the possibility of holding a Third World Climate Conference at an appropriate time about the year 2000.



MINISTERIAL DECLARATION

Second World Climate Conference

INTERNATIONAL CONFERENCE CENTRE

GENEVA, SWITZERLAND

29 OCTOBER - 7 NOVEMBER 1990

Sponsors

World Meteorological Organization (WMO)
United Nations Environment Programme (UNEP)
United Nations Educational, Scientific and Cultural Organization (UNESCO)
and its Intergovernmental Oceanographic Commission (IOC)
Food and Agriculture Organization (FAO)
International Council of Scientific Unions (ICSU)

Financial Supporters

The Second World Climate Conference has benefited from the encouragement and support of many countries and organizations. The sponsors are pleased to acknowledge in particular the substantial financial support of: Canada, the Federal Republic of Germany, Italy, France, Japan, the Netherlands, Norway, Switzerland, the United Kingdom, the United States of America, the European Community, the Stockholm Environment Institute and the Environmental Defense Fund (USA)

MINISTERIAL DECLARATION

FOREWORD

The Ministerial Sessions of The Second World Climate Conference (SWCC) took place at the International Conference Centre in Geneva, Switzerland, on 6 and 7 November 1990. There were 908 participants, including 730 delegates from 137 countries. From these countries, there were 66 National Government Ministers. Also present were 99 observers from the Sponsoring Agencies, other UN Agencies, UN Specialised Agencies and related Organizations, 28 observers from other Intergovernmental Organizations and 51 observers from Non-Governmental Organizations.

During the final Session of the conference on 7 November, the Ministerial Declaration was endorsed by the delegations present.

FOR FURTHER INFORMATION

H.L. Ferguson
Co-ordinator, SWCC
c/o World Meteorological Organization
P.O. Box 2300, CH 1211 Geneva 2, Switzerland
Telephone +41 22 730 8401 / Fax +41 22 740 1439 / Telex 23260 OMM CH

7 November 1990

MINISTERIAL DECLARATION OF THE SECOND WORLD CLIMATE CONFERENCE

PREAMBLE

1. We, the Ministers and other representatives from 137 countries and from the European Communities, meeting in Geneva from 6 to 7 November 1990 at the Second World Climate Conference, declare as follows:
2. We *note* that while climate has varied in the past and there is still a large degree of scientific uncertainty, the rate of climate change predicted by the Intergovernmental Panel on Climate Change (IPCC) to occur over the next century is unprecedented. This is due mainly to the continuing accumulation of greenhouse gases, resulting from a host of human activities since the industrial revolution, hitherto particularly in developed countries. The potential impact of such climate change could pose an environmental threat of an up to now unknown magnitude; and could jeopardize the social and economic development of some areas. It could even threaten survival in some small island States and in low-lying coastal, arid and semi-arid areas.
3. We *appreciate* the work of the World Climate Programme (WCP) during the past decade which has improved understanding of the causes, processes and effects of climate and climate change. We also *congratulate* the IPCC, established by the United Nations Environment Programme (UNEP) and the World Meteorological Organization (WMO) on its First Assessment Report on Climate Change. It has identified causes and possible effects and strategies to limit and adapt to climate change, and in the light of the United Nations General Assembly resolutions, has identified possible elements for inclusion in a framework convention on climate change.
4. Recognizing climate change as a common concern of mankind, we commit ourselves and intend to take active and constructive steps in a global response, without prejudice to sovereignty of States.

I. GLOBAL STRATEGY

5. Recognizing that climate change is a global problem of unique character and taking into account the remaining uncertainties in the field of science, economics and response options, we *consider* that a global response, while ensuring sustainable development ⁽¹⁾ of all countries, must be decided and implemented without further delay based on the best available knowledge such as that resulting from the IPCC assessment. Recognizing further that the principle of equity and the common but differentiated responsibility of countries should be the basis of any global response to climate change, developed countries must take the lead. They must all commit themselves to actions to reduce their major contribution to the global net emissions and enter into and strengthen co-operation with developing countries to enable them to adequately address climate change without hindering their national development goals and objectives. Developing countries must, within the limits feasible, taking into account the problems regarding the burden of external debt and their economic circumstances, commit themselves to appropriate action in this regard. To this end, there is a need to meet the requirements of developing countries, that adequate and additional financial resources be mobilized and the best available environmentally-sound technologies be transferred expeditiously on a fair and most favourable basis.

II. POLICY CONSIDERATIONS FOR ACTION

6. We *reaffirm* that, in order to reduce uncertainties, to increase our ability to predict climate and climate change on a global and regional basis, including early identification of as yet unknown climate-related issues, and to design sound response strategies, there is a need to strengthen national, regional and international research activities in climate, climate change and sea level rise. We *recognize* that commitments by governments are essential to sustain and strengthen the necessary research and monitoring programmes and the exchange of relevant data and information, with due respect to national sovereignty. We *stress* that special efforts must be directed to the areas of uncertainty as identified by the IPCC. We *maintain* that there is a need to intensify research on the social and economic implications of climate change and response strategies. We *commit*

(1) Statement of sustainable development as agreed at the 15th session of UNEP Governing Council (Annex II UNEP/GC 15/L.37).

ourselves to promoting the full participation of developing countries in these efforts. We *recognize* the importance of supporting the needs of the World Climate Programme, including contributions to the WMO Special Fund for Climate and Atmospheric Environmental Studies. The magnitude of the problem being addressed is such that no nation can tackle it alone and we stress the need to strengthen international cooperation. In particular, we *invite* the 11th Congress of the World Meteorological Organization, in the formulation of plans for the future development of the World Climate Programme, to ensure that the necessary arrangements are established in consultation with UNEP, UNESCO (and its IOC), FAO, ICSU and other relevant international organizations for effective coordination of climate and climate change related research and monitoring programmes. We *urge* that special attention be given to the economic and social dimensions of climate and climate change research.

7. In order to achieve sustainable development in all countries and to meet the needs of present and future generations, precautionary measures to meet the climate challenge must anticipate, prevent, attack, or minimize the causes of, and mitigate the adverse consequences of, environmental degradation that might result from climate change. Where there are threats of serious or irreversible damage, lack of full scientific certainty should not be used as a reason for postponing cost-effective measures to prevent such environmental degradation. The measures adopted should take into account different socio-economic contexts.

8. The potentially serious consequences of climate change, including the risk for survival in low-lying and other small island States and in some low-lying coastal, and arid and semi-arid areas of the world, give sufficient reasons to begin by adopting response strategies even in the face of significant uncertainties. Such response strategies include phasing out the production and use of CFC's, efficiency improvements and conservation in energy supply and use, appropriate measures in the transport sector, sustainable forest management, afforestation schemes, developing contingency plans for dealing with climate related emergencies, proper land use planning, adequate coastal zone management, review of intensive agricultural practices and the use of safe and cleaner energy sources with lower or no emissions of carbon dioxide, methane, nitrous oxide and other greenhouse gases and ozone precursors, paying special attention to new and renewable sources. Further actions should be pursued in a phased and flexible manner on the basis of medium and long-term goals and strategies and at the national, regional or global level, taking advantage of scientific advances and technological developments to meet both environmental and economic objectives.

9. We *note* that per capita consumption patterns in certain parts of the world along with a projected increase in world population are contributing factors in the projected increase in greenhouse gases.
10. We *agree* that the ultimate global objective should be to stabilize greenhouse gas concentrations at a level that would prevent dangerous anthropogenic interference with climate.
11. We *stress*, as a first step, the need to stabilize, while ensuring sustainable development of the world economy, emissions of greenhouse gases not controlled by the Montreal Protocol on Substances that Deplete the Ozone Layer. Contributions should be equitably differentiated according to countries' responsibilities and their level of development. In this context, we acknowledge efforts already undertaken by a number of countries to meet this goal.
12. Taking into account that the developed world is responsible for about 3/4 of all emissions of greenhouse gases, we *welcome* the decisions and commitments undertaken by the European Community with its Member States, Australia, Austria, Canada, Finland, Iceland, Japan, New Zealand, Norway, Sweden, Switzerland, and other developed countries to take actions aimed at stabilizing their emissions of CO₂, or CO₂ and other greenhouse gases not controlled by the Montreal Protocol, by the year 2000 in general at 1990 level, yet recognizing the differences in approach and in starting point in the formulation of the above targets. We also acknowledge the initiatives of some other developed countries which will have positive effects on limiting emissions of greenhouse gases. We *urge* all developed countries to establish targets and/or feasible national programmes or strategies which will have significant effects on limiting emissions of greenhouse gases not controlled by the Montreal Protocol. We *acknowledge*, however, that those developed countries with as yet relatively low energy consumption (measured on a per capita or other appropriate basis) which can be reasonably expected to grow, and some countries with economies in transition, may establish targets, programmes and/or strategies that accommodate socio-economic growth, while improving the energy efficiency of their economic activities.
13. We *urge* developed countries, before the 1992 UN Conference on Environment and Development, to analyze the feasibility of and options for, and, as appropriate in light of these analyses, to develop

programmes, strategies and/or targets for a staged approach for achieving reductions of all greenhouse gas emissions not controlled by the Montreal Protocol, including carbon dioxide, methane and nitrous oxide, over the next two decades and beyond.

14. *We recommend* that in the elaboration of response strategies, over time, all greenhouse gases, sources and sinks be considered in the most comprehensive manner possible and also that limitation and adaptation measures be addressed.
15. *We recognize* that developing countries have as their main priority alleviating poverty and achieving social and economic development and that their net emissions must grow from their, as yet, relatively low energy consumption to accommodate their development needs. Narrowing the gap between the developed and the developing world would provide a basis for a full partnership of all nations and would assist the developing countries in dealing with the climate change issue. To enable developing countries to meet incremental costs required to take the necessary measures to address climate change and sea-level rise, consistent with their development needs, *we recommend* that adequate and additional financial resources should be mobilized and best available environmentally sound technologies transferred expeditiously on a fair and most favourable basis. Developing countries also should, within the limits feasible, take action in this regard.
16. The specific difficulties of those countries, particularly developing countries, whose economies are highly dependent on fossil fuel production and exportation, as a consequence of action taken on limiting greenhouse gas emissions, should be taken into account.
17. *We recommend* that consideration should be given to the need for funding facilities, including the proposed World Bank/UNEP/UNDP Global Environmental Facility, a clearing house mechanism and a new possible international fund composed of adequate additional and timely financial resources and institutional arrangements for developing countries; taking into account existing multilateral and bilateral mechanisms and approaches. Such funding should be related to the implementation of the framework convention on climate change and any other related instruments that might be agreed upon. In the meantime, developed countries are urged to co-operate with developing countries to support immediate action in addressing climate change including sea-level rise without

imposing any new conditionality on developing countries.

18. We *recommend* further that resources be assessed. Such assessments, to be conducted as soon as possible, should include country studies and mechanisms to meet the financing needs identified, taking note of the approaches developed under the Montreal Protocol.

19. Financial resources channelled to developing countries should, *inter alia*, be directed to:
 - (i) Promoting efficient use of energy, development of lower and non-greenhouse gas emitting energy technologies and paying special attention to safe and clean new and renewable sources of energy;
 - (ii) Arranging expeditious transfer of the best available environmentally sound technology on a fair and most favourable basis to developing countries and promoting rapid development of such technology in these countries;
 - (iii) Co-operating with developing countries to enable their full participation in international meetings on climate change;
 - (iv) Enhancing atmospheric, oceanic and terrestrial observational networks, particularly in developing countries, to facilitate conducting research, monitoring and assessment of climate change and the impact on those countries;
 - (v) Rational forest management practices and agricultural techniques which reduce greenhouse gas emissions;
 - (vi) Enhancing the capacity of developing countries to develop programmes to address climate change, including research and development activities and public awareness and education.

Funding should also be directed to the creation of regional centres to organize information networks on climate change in developing countries.

20. Appropriate economic instruments may offer the potential for achieving environmental improvements in a cost-effective manner. The adoption of any form of economic or regulatory measures would require careful and substantive analyses. We *recommend* that relevant policies make use of economic instruments appropriate to each country's socio-economic

conditions in conjunction with a balanced mix of regulatory approaches.

21. We *note* that energy production and use account for nearly half of the enhanced radiative forcing resulting from human activities and is projected to increase substantially in the absence of appropriate response actions. We *recognize* the promotion of energy efficiency as the most cost-effective immediate measure, in many countries, for reducing energy-related emissions of carbon dioxide, methane, nitrous oxide and other greenhouse gases and ozone precursors, while other safe options such as no or lower greenhouse gas emitting energy sources should also be pursued. These principles apply to all energy sectors. Transport energy use attracts special attention of many of us in the light of its role in many developed countries and of its expected importance in many developing countries.
22. We *recognize* that there is no single quick-fix technological option for limiting greenhouse gas emissions. However, we are *convinced* that technological innovation as well as individual and social behaviour and institutional adaptations is a key element of any long-term strategy that deals with climate change in a way that meets the goal of sustainable development. Therefore, we *urge* all countries, the developed countries in particular, to intensify their efforts and international cooperation in technological research, development and dissemination of appropriate and environmentally sound technologies, including the reassessment and improvement of existing technologies and the introduction of new technologies.
23. We *urge* that environmentally sound and safe technologies be utilized by all sectors in all countries to the fullest extent possible and further *urge* all countries, developed and developing, to identify and take effective measures to remove barriers to the dissemination of such technologies. To this end, the best available environmentally sound and safe technologies should be transferred to developing countries expeditiously on a fair and most favourable basis.
24. We *note* that the conservation of the world's forests in their role as reservoirs of carbon along with other measures are of considerable importance for global climatic stability, keeping in mind the important role of forests in the conservation of biological diversity and the protection of soil stability and of the hydrological system. We *recognize* the need to reduce the rate of deforestation in consonance with the objective of sustained yield

development and to enhance the potential of the world's forests through improved management of existing forests and through vigorous programmes of reforestation and afforestation, and to support financially the developing countries in this regard through enhanced and well-coordinated international cooperation including strengthening Tropical Forest Action Plan (TFAP) and International Tropical Timber Organization (ITTO). We *recommend* that the protection and management of boreal, temperate, sub-tropical and tropical forest ecosystems must be well-coordinated and preferably compatible with other possible types of action related to reduction of emission of greenhouse gases, rational utilization of biological resources, provision of financial resources, and the need for more favourable market conditions for timber and timber products. The developing countries should be able to realize increased revenue from these forests and forest products.

25. We also *recognize* that forests and forest products play a key social and economic role in many nations and communities. We *recognize* that States have, in accordance with the Charter of the United Nations and the principles of international law, the sovereign right to exploit their own resources pursuant to their own environmental policies, and the responsibility to ensure that activities within their jurisdiction or control do not cause damage to the environment of other States or of areas beyond the limits of national jurisdiction.
26. We *recommend* that appropriate precautionary and control measures be developed and implemented at regional, sub-regional and country levels as appropriate to counter the increasing degradation of land, water, genetic and other productive resource bases by drought, desertification and land degradation. Observatories on climate and climate change and observatories on ecosystems should be encouraged to work together on drought risks consequences. Studies must be undertaken on drought and desertification. We *stress* that stepped-up financial and scientific contributions be provided to facilitate these efforts.
27. We *recommend* that similar measures be adopted to address the particular problems and needs, including funding, of low-lying coastal and small vulnerable island countries, some of whose very existence is placed at risk by the consequences of climate change.

III. GLOBAL FRAMEWORK CONVENTION ON CLIMATE CHANGE

28. *We call for negotiations on a framework convention on climate change to begin without delay after a decision is taken by the 45th Session of the General Assembly of the United Nations recommending ways, means and modalities for further pursuing these negotiations. Taking note of all the preparatory work, particularly the recommendations adopted 26 September 1990 by the ad hoc working group of government representatives and regional economic integration organizations to prepare for negotiations on a framework convention on climate change, we urge all countries and regional economic integration organizations to join in these negotiations and recognize that it is highly desirable that an effective framework convention on climate change, containing appropriate commitments, and any related instruments as might be agreed upon on the basis of consensus, be signed in Rio de Janeiro during the United Nations Conference on Environment and Development. We welcome the offer of the Government of the United States of America to host the first negotiating meeting.*
29. *We recommend that such negotiations take account of the possible elements compiled by the IPCC, and that the framework convention on climate change be framed in such a way as to gain the support of the largest possible number of countries while allowing timely action to be taken. We reaffirm our wish that this convention contain real commitments by the international community. We stress, given the complex and multi-faceted nature of the problem of climate change, the need for new and innovative solutions including the need to meet the special needs of developing countries.*
30. *We also welcome the invitations of Thailand and Italy to host workshops, respectively on the feasibility of forestry options, and on all technologies for energy production and use and their transfer to developing countries.*
31. *We believe that a well-informed public is essential for addressing and coping with as complex an issue as climate change, and the resultant sea-level rise, and urge countries, in particular, to promote the active participation at the national and when appropriate, regional levels of all sectors of the population in addressing climate change issues and developing appropriate responses. We also urge relevant United Nations organizations and programmes to disseminate relevant information with a view to encouraging as wide a participation as possible.*