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INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE

The IPCC Chairman's Overview
of the Next Tasks for the IPCC

To be discussed at the IPCC Plenary Meeting

13-15 March 1991

General

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The fifth IPCC plenary session will take place in Geneva on 13-15 March 1991. The objective of the meeting was tentatively discussed in October last year at an ad hoc meeting between those members of the Bureau that participated in the Second World Climate Conference. I outlined on that occasion in general terms my view on this matter and a preliminary agenda was sketched, which in principle found the approval of those that took part in the meeting. Since then I have on several occasions been in contact with the chairmen of the three Working Groups and also with other members of the IPCC. As a basis and starting point for the deliberations at the next IPCC session I will outline below in some more detail my view with regard to the present tasks of the IPCC and its continued work.

The IPCC report is available and has been extensively discussed at the Second World Climate Conference. A series of recommendations were agreed upon on this occasion.

The full reports of the three working groups have also become commercially available through the initiatives of IPCC supporting national secretariats to the three Working Groups, i.e. the UK, Australia and the US respectively. It is hoped that a printed booklet containing the IPCC overview, the policy-makers summaries of the three Working Group reports and the report by the Special Committee on the Participation of Developing Countries will also appear soon.

The report was the subject for lengthy discussions at the United Nations in November and December 1990 and a resolution on the status of the negotiations and the role of the UN was adopted, a copy of which is appended to this circular letter. It is clear that the IPCC report will serve as the basis for the negotiations that begin February 4, 1991 in Washington DC.

The three Working Group reports and particularly the policymakers summaries were prepared with great care. For example, the full report of Working Group I was reviewed by a large number of external reviewers from all over the world and the comments received were largely included in the final version. During the 8-10 months that have passed since the three working groups met for adoption of their respective reports, research and analyses of the subject matter has continued and as a matter of fact attracted an increasing number of researchers. New findings have been reported. It should be emphasized however, that care should be exercised before the IPCC conclusions are modified.

The IPCC should of course assist the negotiators as far as is possible and central issues that arise in the course of the negotiations should be referred back to the Working Groups for consideration. If such issues arise already at the first session in February this year the IPCC should attempt to take steps at the IPCC meeting in March and respond. Hopefully some small task group, particularly if Working Groups I and/or II is concerned, could be created to do the necessary analyses, but generally it will be difficult to complete more extensive studies that could serve in the context of the present round of negotiations being aimed at an agreement on a convention at the UNCED in Brazil, June 1992. Also, statements in the policymakers summaries might in some cases call for further interpretation. I propose that the IPCC chairman and the three Working Group chairmen and the chairman of the Special Committee be given the responsibility to handle such matters. In some cases the issue may be delegated to a small group in one or the other of the working groups under its chairmen or some of the vice chairmen that he wishes to call on.

It is clear that the first round of negotiations that will be conducted during the period until the UNCED in 1992 can only be the first steps towards resolving the climate change issue. We must be looking forward to a process which will evolve during decades. It is important that the fact-finding task that has been given to IPCC continues after the 1992 conference. The IPCC should now plan accordingly.

In my judgement, it does not seem desirable to attempt now another major assessment of the kind that was concluded in 1990. I can imagine that this maybe required in a few years time for example to be completed in 1994 or 1995, i.e. four to five years after the adoption of the first IPCC report. I do not think, however, that the three working groups should be dissolved, but rather be requested to follow the ongoing developments in respective fields and initiate assessments of specific issues as judged to be required. As a matter of fact the different groups have submitted proposals of this kind to the fourth IPCC plenary meeting but no time was available to discuss these tasks at Sundsvall. I propose that the IPCC discuss this matter and adopt a policy accordingly.

It is, however, obvious that there are several specific issues that soon are going to be important in the negotiating process, perhaps before June 1992, certainly soon thereafter. Further, several of these concern more than one of the working groups. The IPCC must accordingly foster closest possible collaboration between the working groups. Of course all countries are free to take part in the work of all the working groups, but it is important that also the scientists and experts from the various fields of relevance will be collaborating closely. I propose that the IPCC discuss this matter and adopt a clear policy.

On the basis of the IPCC deliberations so far and the ad hoc meeting of members of the Bureau in October last year I consider the following tasks to be of particular importance at present.

1. The establishment of a procedure aimed at reaching agreement of the magnitude of present annual emission of greenhouse gases from the countries of the world. The issue requires experts from all three working group areas of responsibility.

Many attempts to assess regional and national man-induced emissions have been made during the last few years. The figures that have appeared in the literature on CO₂ emissions due to fossil fuel burning and emissions of the different CFC-gases show reasonable agreement. This is, however, not the case with regard to CO₂ emissions from deforestation and changing land use, methane and nitrous oxide emission and the possible changes of ozone concentrations due to increased air pollution. I think that emissions of the latter group of gases at present hardly can serve as a basis for a more conclusive discussion because of the controversies that almost certainly would arise in the absence of sufficiently plentiful and accurate data. There is further a need to reach agreement on a precise terminology and to develop a satisfactory methodology for the required assessments in order to make national data truly comparable. The OECD has taken an initiative to analyse the problem more thoroughly and has called for an expert meeting in February 1991. I propose that IPCC discuss this matter and agree on a procedure to be followed.

2. The need for improved regional climate predictions and impact assessments.

It became very clear in the assessment process during the last two years that it is difficult to arrive at quantitative regional and even more so local impact assessment. The results are very uncertain due to uncertain regional predictions of climate change. This will certainly also be so for several years to come. It should first of all be made clear that regional climate changes to some degree are unpredictable. First of all climate has varied during past centuries in spite of the fact that the greenhouse gas concentrations in the atmosphere have remained approximately constant. An example is the Little Ice Age that began in late medieval times and ended a couple of hundred years ago. Further, climate variations have not been the same in different parts of the globe. For example, the temperature in North Polar regions declined from about 1940 well into the 1970's, while some increase simultaneously was observed in other parts of the world. The global average temperature remained about unchanged during this period of time.

We do not know the reason for these variations, nor the extent to which they may be stochastic (due to random variations of the weather on smaller time and space scales). It should be possible to obtain a better understanding of the predictability

of climate. Some, even rather general analyses of this problem would obviously be of great political importance.

Still, the pursuit of developing better climate models should obviously be given increased attention and more resources. Some predictability most likely can be developed if we can understand better how the features of the land surface and the oceans influence climate conditions on earth. Finally special attention should of course be given to the problem of how prediction can be validated before changes actually will occur.

There is a need for climate impact analysts to appreciate better the characteristics and reliability of climate predictions on a regional scale as well as their statistical interpretation, and vice versa for climate modellers to understand the kind of climate data that are needed by people in agriculture and forestry.

It is important to develop the prediction capability to the extent possible and to validate climate models with the aid of observed changes of climate as they presumably gradually will become noticeable.

I propose that this matter be discussed by the IPCC and that some action programme be agreed upon.

3. The acquisition of better data and improved knowledge about the role of forestry for greenhouse gas emissions and for the development of an international forest policy.

Much work has been done, particularly by FAO and ITTO (International Tropical Timber Organization), to find ways and means to establish sustainable forest management practices both in order to maintain the forests as a source base and to preserve biodiversity. Because of the similar needs for IPCC and these two organizations (and perhaps for other governmental as well as non-governmental organizations), more joint efforts are desirable in the future. Work is going on to prepare this issue for the UNCED.

Further, recent analyses of the carbon cycle reveal that middle and high northern latitude forests may have been a significant carbon sink during the last half century. It is not understood in which way this could have been brought about. The role of the forest soils may, for example, not have been adequately accounted for. Further there will be a number of issues that need attention in coming years.

I propose that IPCC discuss this matter and decide on proper actions. The FAO and ITTO are being invited to present their views on these issues and to prepare short written summaries on the present state of their work. The issue concerns

all three working groups.

4. Energy policy and greenhouse gases

The EIS subgroup of Working Group III has been extensively concerned with the problem of the future energy supply in the world. This issue is undoubtedly a most central one for the development of a policy for reduced CO₂ emission. There are many other international organizations and also non-governmental organizations that have engaged themselves for analysis of this problem. With the central role that the IPCC has been asked to play in this context, i.e. to provide a factual basis for the negotiation process, it is important that IPCC can bring together the different views that have been put forward in as clear a way as possible. The role of nuclear energy as a possible alternative energy source is obvious, but some advocate that renewable sources of energy, above all solar energy in the long term must be considered as a likely major source to be more efficiently exploited for continuous use. The further consideration of this issue requires a more penetrative analysis of the very different possibilities that different countries have in their development of sustainable energy supply systems.

The following international organizations have been asked to contribute: The International Energy Agency (IAE), the World Bank, the Asian Development Bank (ADB), the OECD and also the non-governmental organizations: the World Energy Council, the World Resources Institute, the Stockholm Environmental Institute and a few more are being considered.

I propose that IPCC discuss and decide how the further analysis of this problem should be dealt with to take advantage of ongoing work by these and possible other organizations. The task is one that primarily falls within the field of responsibility of Working Group III. It is, however, important to collaborate with scientists of Working Group I with regard to the possible development of alternative scenarios. Also the analysis of the exploration of biomass and biogas means calling on expertise outside the traditional energy sector. Clearly the development of energy policies requires analysis of the potential costs for alternative sources of energy and their likely change with time (see item 5 below) and particularly with consideration of the marked differences between nations. It is proposed that technical matters as sketched above first be subject for a discussion.

5. Costs and benefits for alternative energy strategies: economic analysis of global change.

This subject matter is again primarily in the purview of Working Group III. In the light of the increasing emphasis that is being given to this aspect of the global warming issue, it is, however, important to bring it up in the IPCC plenary session at this time for consideration of a broad pursuit of its further analysis. It has also been the subject for analysis by several other international governmental as well as non-governmental organizations.

Although it is important to consider the role of the market forces for the optimization of possible necessary changes in for example the energy systems in different countries, the relatively easy access to fossil fuels implies that also other means for achieving the changes that are desirable from an environmental point of view will have to be used. Thorough analyses of different options are required and the IPCC should consider ways and means to achieve this in collaboration with other appropriate international bodies and experts. Those listed under item 4 are invited to contribute also to this item of the IPCC agenda.

* * *

There may be other issues that at present deserve the special attention of the IPCC. National delegates are of course free to propose such issues to be dealt with by IPCC or by one or the other of the working groups. The working group chairmen are particularly asked to consider such items on the lists of proposed activities within the working groups that possibly should be discussed in the IPCC plenary session.

It is further proposed that a period of 12 to 18 months be devoted to such analysis in order for them to be presented to IPCC in late 1992 or early 1993. Together with other studies by the working groups these could possibly serve as a starting point for renewed policy discussions in IPCC. The special efforts that would be initiated in this way could be viewed as the formation of special task groups of limited duration that could be dissolved at the time of completion of their tasks. The method of work might be viewed as similar to the one employed by Working Group I during 1989-90 but given more time than was available during the first IPCC assessment.

I hope that this overview can serve as a basis for national delegations to the IPCC to prepare themselves for the next plenary meeting of the IPCC.

Bert Bolin
Chairman of IPCC
Stockholm, 31 January 1991

IPCC Sept 1990



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**INTERGOVERNMENTAL PANEL ON
CLIMATE CHANGE**

IPCC FIRST ASSESSMENT REPORT

OVERVIEW

31 AUGUST 1990

NOTE TO THE READER

THE FIRST ASSESSMENT REPORT OF THE
INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE (IPCC)

The IPCC First Assessment Report consists of

- * the Overview
- * the policymakers summaries of the IPCC Working Groups and Special Committee on the Participation of Developing Countries
- * the reports of the IPCC Working Groups.

This volume contains the IPCC Overview and the policymakers summaries.

The report of Working Group I has already been published commercially; there are plans to publish the other two reports also, each separately, by the end of the year. They are available, on request, from the IPCC Secretariat, World Meteorological Organization, P.O.Box 2300, CH 1211 Geneva 2, Switzerland.

N. Sundararaman
IPCC Secretary
October 1990



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UNEP

**INTERGOVERNMENTAL PANEL ON
CLIMATE CHANGE**

IPCC FIRST ASSESSMENT REPORT

OVERVIEW

31 AUGUST 1990

INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE

IPCC FIRST ASSESSMENT REPORT

VOLUME I:

OVERVIEW

ERRATUM

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gases, how to address equitably the consequences for all, any institutional mechanisms including research and monitoring that may be required, and in particular, the requests of the developing countries for additional financial resources and for the transfer of technology on a preferential basis. The possible elements of a framework convention on climate change were identified and discussed by Working Group III in its legal measures topic paper, appended to its Policymakers Summary.

* The IPCC recommends that

research regarding the science of climate change in general, technological development and the international economic implications, be intensified.

* Because climate change would affect, either directly or indirectly, almost every sector of society, broad global understanding of the issue will facilitate the adoption and the implementation of such response options as deemed necessary and appropriate. Further efforts to achieve such global understanding are urgently needed.

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PREFACE
TO THE IPCC OVERVIEW

The IPCC First Assessment Report consists of

- * this IPCC Overview,
- * the Policymakers Summaries of the three IPCC Working Groups (concerned with assessment respectively of the science, impacts and response strategies) and the IPCC Special Committee on the Participation of Developing Countries, and
- * the three reports of the Working Groups.

The Overview brings together material from the four Policymakers Summaries. It presents conclusions, proposes lines of possible action (including suggestions as to the factors which might form the basis for negotiations) and outlines further work which is required for a more complete understanding of the problems of climate change resulting from human activities.

Because the Overview cannot reflect all aspects of the problem which are presented in the three full reports of the Working Groups and the four Policymakers Summaries, it should be read in conjunction with them.

The issues, options and strategies presented in the Report are intended to assist policymakers and future negotiators in their respective tasks. Further consideration of the Report should be given by every government as it cuts across different sectors in all countries. It should be noted that the Report reflects the technical assessment of experts rather than government positions, particularly those governments that could not participate in all Working Groups of IPCC.

This Overview reflects the conclusions of the reports of (i) the three IPCC Working Groups on science, impacts, and response strategies, and (ii) the Policymakers Summaries of the IPCC Working Groups and the IPCC Special Committee on the Participation of Developing Countries.

1. SCIENCE

This section is structured similarly to the Policymakers Summary of Working Group I.

We are certain of the following:

- * There is a natural greenhouse effect which already keeps the Earth warmer than it would otherwise be.
- * Emissions resulting from human activities are substantially increasing the atmospheric concentrations of the greenhouse gases: carbon dioxide, methane, chlorofluorocarbons (CFCs) and nitrous oxide. These increases will enhance the greenhouse effect, resulting on average in an additional warming of the Earth's surface. The main greenhouse gas, water vapour, will increase in response to global warming and further enhance it.

We calculate with confidence that:

- * Some gases are potentially more effective than others at changing climate, and their relative effectiveness can be estimated. Carbon dioxide has been responsible for over half of the enhanced greenhouse effect in the past, and is likely to remain so in the future.
- * Atmospheric concentrations of the long-lived gases (carbon

dioxide, nitrous oxide and the CFCs) adjust only slowly to changes of emissions. Continued emissions of these gases at present rates would commit us to increased concentrations for centuries ahead. The longer emissions continue to increase at present-day rates, the greater reductions would have to be for concentrations to stabilize at a given level.

- * For the four scenarios of future emissions which IPCC has developed as assumptions (ranging from one where few or no steps are taken to limit emissions, viz., Scenario A or Business as Usual Scenario, through others with increasing levels of controls respectively called Scenarios B, C and D), there will be a doubling of equivalent carbon dioxide concentrations from pre-industrial levels by about 2025, 2040 and 2050 in Scenarios A, B, and C respectively (see the section "Which gases are the most important?" in the Policymakers Summary of Working Group I for a description of the concept of equivalent carbon dioxide). See the Appendix for a description of the IPCC emissions scenarios.
- * Stabilization of equivalent carbon dioxide concentrations at about twice the pre-industrial level would occur under Scenario D towards the end of the next century. Immediate reductions of over 60% in the net (sources minus sinks) emissions from human activities of long-lived gases would achieve stabilization of concentration at today's levels; methane concentrations would be stabilized with a 15-20% reduction.
- * The human-caused emissions of carbon dioxide are much smaller than the natural exchange rates of carbon dioxide between the atmosphere and the oceans, and between the atmosphere and the

terrestrial system. The natural exchange rates were, however, in close balance before human-induced emissions began; the steady anthropogenic emissions into the atmosphere represent a significant disturbance of the natural carbon cycle.

Based on current model results, we predict:

- * An average rate of increase of global mean temperature during the next century of about 0.3°C per decade (with an uncertainty range of 0.2 - 0.5°C per decade) assuming the IPCC Scenario A (Business as Usual) emissions of greenhouse gases; this is a more rapid increase than seen over the past 10,000 years. This will result in a likely increase in the global mean temperature of about 1°C above the present value by 2025 (about 2°C above that in the pre-industrial period), and 3°C above today's value before the end of the next century (about 4°C above pre-industrial). The rise will not be steady because of other factors.
- * Under the other IPCC emissions scenarios which assume progressively increasing levels of controls, rates of increase in global mean temperature of about 0.2°C per decade (Scenario B), just above 0.1°C per decade (Scenario C) and about 0.1°C per decade (Scenario D). The rise will not be steady because of other factors.
- * Land surfaces warm more rapidly than the oceans, and higher northern latitudes warm more than the global mean in winter.
- * The oceans act as a heat sink and thus delay the full effect of a greenhouse warming.

Therefore, we would be committed to a further temperature rise which would progressively become apparent in the ensuing decades and centuries. Models predict that as greenhouse gases increase, the realized temperature rise at any given time is between 50 and 80% of the committed temperature rise.

- * Under the IPCC Scenario A (Business as Usual) emissions, an average rate of global mean sea-level rise of about 6 cm per decade over the next century (with an uncertainty range of 3 - 10 cm per decade), mainly due to thermal expansion of the oceans and the melting of some land ice. The predicted rise is about 20 cm in global mean sea level by 2030, and 65 cm by the end of the next century. There will be significant regional variations.

With regard to uncertainties, we note that:

- * There are many uncertainties in our predictions particularly with regard to the timing, magnitude and regional patterns of climate change, especially changes in precipitation.
 - These uncertainties are due to our incomplete understanding of sources and sinks of greenhouse gases and the responses of clouds, oceans and polar ice sheets to a change of the radiative forcing caused by increasing greenhouse gas concentrations.
 - These processes are already partially understood, and we are confident that the uncertainties can be reduced by further research. However, the complexity of the system means that we cannot rule out surprises.

Our judgement is that:

- * Global mean surface air temperature has increased by 0.3 to 0.6°C over the last 100 years, with the five global-average warmest years being in the 1980's. Over the same period global sea-level increased by 10 to 20 cm. These increases have not been smooth in time, nor uniform over the globe.
- * The size of the warming over the last century is broadly consistent with the prediction by climate models, but is also of the same magnitude as natural climate variability. If the sole cause of the observed warming were the human-made greenhouse effect, then the implied climate sensitivity would be near the lower end of the range inferred from models. Thus the observed increase could be largely due to this natural variability; alternatively this variability and other human factors could have offset a still larger human-induced greenhouse warming. The unequivocal detection of the enhanced greenhouse effect from observations is not likely for a decade or more.
- * Measurements from ice cores going back 160,000 years show that the Earth's temperature closely paralleled the amount of carbon dioxide and methane in the atmosphere. Although we do not know the details of cause and effect, calculations indicate that changes in these greenhouse gases were part, but not all, of the reasons for the large (5-7°C) global temperature swings between ice ages and interglacial periods.

- * Natural sources and sinks of greenhouse gases are sensitive to a change in climate. Although many of the response (feedback) processes are poorly understood, it appears that, as climate warms, these feedbacks will lead to an overall increase, rather than a decrease, in natural greenhouse gas abundances. For this reason, climate change is likely to be greater than the estimates given above.

2. IMPACTS

The report on impacts of Working Group II is based on the work of a number of subgroups, using independent studies which have used different methodologies. Based on the existing literature, the studies have used several scenarios to assess the potential impacts of climate change. These have the features of:

- i) an effective doubling of CO₂ in the atmosphere between now and 2025 to 2050;
- ii) a consequent increase of global mean temperature in the range of 1.5°C to 4° - 5°C;
- iii) an unequal global distribution of this temperature increase, namely a smaller increase of half the global mean in the tropical regions and a larger increase of twice the global mean in the polar regions; and
- iv) a sea-level rise of about 0.3 - 0.5 m by 2050 and about 1 m by 2100, together with a rise in the temperature of the surface ocean layer of between 0.2° and 2.5°C.

These scenarios pre-date, but are in line with, the assessment of Working Group I which, for Scenario

A (Business as Usual) has estimated the magnitude of sea-level rise at about 20 cm by 2030 and about 65 cm by the end of the next century. Working Group I has also predicted the increase in global mean temperatures to be about 1°C above the present value by 2025 and 3°C before the end of the next century.

Any predicted effects of climate change must be viewed in the context of our present dynamic and changing world. Large-scale natural events such as El Niño can cause significant impacts on agriculture and human settlement. The predicted population explosion will produce severe impacts on land use and on the demands for energy, fresh water, food and housing, which will vary from region to region according to national incomes and rates of development. In many cases, the impacts will be felt most severely in regions already under stress, mainly the developing countries. Human-induced climate change due to continued uncontrolled emissions will accentuate these impacts. For instance, climate change, pollution and ultraviolet-B radiation from ozone depletion can interact, reinforcing their damaging effects on materials and organisms. Increases in atmospheric concentrations of greenhouse gases may lead to irreversible change in the climate which could be detectable by the end of this century.

Comprehensive estimates of the physical and biological effects of climate change at the regional level are difficult. Confidence in regional estimates of critical climatic factors is low. This is particularly true of precipitation and soil moisture, where there is considerable disagreement between various general circulation model and palaeoanalog results. Moreover, there are several scientific uncertainties regarding the

relationship between climate change and biological effects and between these effects and socioeconomic consequences.

This impact study part of the Overview does not attempt to anticipate any adaptation, technological innovation or any other measures to diminish the adverse effects of climate change that will take place in the same time frame. This is especially important for heavily managed sectors, e.g., agriculture, forestry and public health.

Finally, the issue of timing and rates of change need to be considered; there will be lags between:

- i) emissions of greenhouse gases and doubling of concentrations;
- ii) doubling of greenhouse gas concentrations and change in climate;
- iii) changes in climate and resultant physical and biological effects; and
- iv) changes in physical and ecological effects and resultant socioeconomic (including ecological) consequences. The shorter the lags, the less the ability to cope and the greater the socioeconomic impacts.

There is uncertainty related to these time lags. The changes will not be steady and surprises cannot be ruled out. The severity of the impacts will depend to a large degree on the rate of climate change.

Despite these uncertainties, Working Group II has been able to reach some major conclusions. These are presented below.

to changes in water supply, water demand may also change through human efforts to conserve, and through improved growth efficiency of plants in a higher CO₂ environment. Net socioeconomic consequences must consider both supply and demand for water. Future design in water resource engineering will need to take possible impacts into account when considering structures with a life span to the end of the next century. Where precipitation increases, water management practices, such as urban storm drainage systems, may require upgrading in capacity. Change in drought risk represents potentially the most serious impact of climate change on agriculture at both regional and global levels.

2.4 Human settlements, energy, transport, and industrial sectors, human health and air quality

The most vulnerable human settlements are those especially exposed to natural hazards, e.g. coastal or river flooding, severe drought, landslides, severe wind storms and tropical cyclones. The most vulnerable populations are in developing countries, in the lower-income groups: residents of coastal lowlands and islands, populations in semi-arid grasslands, and the urban poor in squatter settlements, slums and shanty towns, especially in megacities. In coastal lowlands such as in Bangladesh, China and Egypt, as well as in small island nations, inundation due to sea-level rise and storm surges could lead to significant movements of people. Major health impacts are possible, especially in large urban areas, owing to changes in availability of water and food and increased health problems due to heat stress spreading of infections. Changes in precipitation and temperature could radically alter the patterns

of vector-borne and viral diseases by shifting them to higher latitudes, thus putting large populations at risk. As similar events have in the past, these changes could initiate large migrations of people, leading over a number of years to severe disruptions of settlement patterns and social instability in some areas.

Global warming can be expected to affect the availability of water resources and biomass, both major sources of energy in many developing countries. These effects are likely to differ between and within regions with some areas losing and others gaining water and biomass. Such changes in areas which lose water may jeopardize energy supply and materials essential for human habitation and energy. Moreover, climate change itself is also likely to have different effects between regions on the availability of other forms of renewable energy such as wind and solar power. In developed countries some of the greatest impacts on the energy, transport and industrial sectors may be determined by policy responses to climate change such as fuel regulations, emission fees or policies promoting greater use of mass transit. In developing countries, climate-related changes in the availability and price of production resources such as energy, water, food and fibre may affect the competitive position of many industries.

Global warming and increased ultraviolet radiation resulting from depletion of stratospheric ozone may produce adverse impacts on air quality such as increases in ground-level ozone in some polluted urban areas. An increase of ultraviolet-B radiation intensity at the Earth's surface would increase the risk of damage to the eye and skin and may disrupt the marine food chain.

2.5 Oceans and coastal zones

Global warming will accelerate sea-level rise, modify ocean circulation and change marine ecosystems, with considerable socioeconomic consequences. These effects will be added to present trends of rising sea-level, and other effects that have already stressed coastal resources, such as pollution and over-harvesting. A 30-50 cm sea-level rise (projected by 2050) will threaten low islands and coastal zones. A 1 m rise by 2100 would render some island countries uninhabitable, displace tens of millions of people, seriously threaten low-lying urban areas, flood productive land, contaminate fresh water supplies and change coastlines. All of these impacts would be exacerbated if droughts and storms become more severe. Coastal protection would involve very significant costs. Rapid sea-level rise would change coastal ecology and threaten many important fisheries. Reductions in sea ice will benefit shipping, but seriously impact on ice-dependent marine mammals and birds.

Impacts on the global oceans will include changes in the heat balance, shifts in ocean circulation which will affect the capacity of the ocean to absorb heat and CO₂ and changes in upwelling zones associated with fisheries. Effects will vary by geographic zones, with changes in habitats, a decrease in biological diversity and shifts in marine organisms and productive zones, including commercially important species. Such regional shifts in fisheries will have major socioeconomic impacts.

2.6 Seasonal snow cover, ice and permafrost

The global areal extent and volume of elements of the

terrestrial cryosphere (seasonal snow cover, near-surface layers of permafrost and some masses of ice) will be substantially reduced. These reductions, when reflected regionally could have significant impacts on related ecosystems and social and economic activities. Compounding these impacts in some regions is that, as a result of the associated climatic warming positive feedbacks, the reductions could be sudden rather than gradual.

The areal coverage of seasonal snow and its duration are projected to decrease in most regions, particularly at mid latitudes, with some regions at high latitudes possibly experiencing increases in seasonal snow cover. Changes in the volume of snow cover, or the length of the snow cover season, will have both positive and negative impacts on regional water resources (as a result of changes in the volume and the timing of runoff from snowmelt), on regional transportation (road, marine, air and rail), and on recreation sectors.

Globally, the ice contained in glaciers and ice sheets is projected to decrease, with regional responses complicated by the effect of increased snowfall in some areas which could lead to accumulation of ice. Glacial recession will have significant implications for local and regional water resources, and thus impact on water availability and on hydroelectric power potential. Glacial recession and loss of ice from ice sheets will also contribute to sea-level rise. Permafrost, which currently underlies 20-25% of the land mass of the Northern Hemisphere, could experience significant degradation within the next 40-50 years. Projected increases in the thickness of the freeze-thaw (active) layer above the permafrost and a recession of permafrost to higher latitudes and altitudes could lead to increases in terrain instability, erosion and landslides in those areas which currently contain

2.1 Agriculture and forestry

Sufficient evidence is now available from a variety of different studies to indicate that changes of climate would have an important effect on agriculture and livestock. Studies have not yet conclusively determined whether, on average, global agricultural potential will increase or decrease. Negative impacts could be felt at the regional level as a result of changes in weather and pests associated with climate change, and changes in ground-level ozone associated with pollutants, necessitating innovations in technology and agricultural management practices. There may be severe effects in some regions, particularly decline in production in regions of high present-day vulnerability that are least able to adjust. These include Brazil, Peru, the Sahel Region of Africa, Southeast Asia, and the Asian region of the USSR and China. There is a possibility that potential productivity of high and mid latitudes may increase because of a prolonged growing season, but it is not likely to open up large new areas for production and it will be mainly confined to the Northern Hemisphere.

Patterns of agricultural trade could be altered by decreased cereal production in some of the currently high-production areas, such as western Europe, southern USA, parts of South America and western Australia. Horticultural production in mid-latitude regions may be reduced. On the other hand, cereal production could increase in northern Europe. Policy responses directed to breeding new plant cultivars, and agricultural management designed to cope with changed climate conditions, could lessen the severity of regional impacts. On the balance, the

evidence suggests that in the face of estimated changes of climate, food production at the global level can be maintained at essentially the same level as would have occurred without climate change; however, the cost of achieving this is unclear. Nonetheless, climate change may intensify difficulties in coping with rapid population growth. An increase or change in UV-B radiation at ground level resulting from the depletion of stratospheric ozone will have a negative impact on crops and livestock.

The rotation period of forests is long and current forests will mature and decline during a climate in which they are increasingly more poorly adapted. Actual impacts depend on the physiological adaptability of trees and the host-parasite relationship. Large losses from both factors in the form of forest declines can occur. Losses from wildfire will be increasingly extensive. The climate zones which control species distribution will move poleward and to higher elevations. Managed forests require large inputs in terms of choice of seedlot and spacing, thinning and protection. They provide a variety of products from fuel to food.

The degree of dependency on products varies among countries, as does the ability to cope with and to withstand loss. The most sensitive areas will be where species are close to their biological limits in terms of temperature and moisture. This is likely to be, for example, in semi-arid areas. Social stresses can be expected to increase and consequent anthropogenic damage to forests may occur. These increased and non-sustainable uses will place more pressure on forest investments, forest conservation and sound forest management.

2.2 Natural terrestrial ecosystems

Natural terrestrial ecosystems could face significant consequences

as a result of the global increases in the atmospheric concentrations of greenhouse gases and the associated climatic changes. Projected changes in temperature and precipitation suggest that climatic zones could shift several hundred kilometres towards the poles over the next fifty years. Flora and fauna would lag behind these climatic shifts, surviving in their present location and, therefore, could find themselves in a different climatic regime. These regimes may be more or less hospitable and, therefore, could increase productivity for some species and decrease that of others. Ecosystems are not expected to move as a single unit, but would have a new structure as a consequence of alterations in distribution and abundance of species.

The rate of projected climate changes is the major factor determining the type and degree of climatic impacts on natural terrestrial ecosystems. These rates are likely to be faster than the ability of some species to respond and responses may be sudden or gradual.

Some species could be lost owing to increased stress leading to a reduction of global biological diversity. Increased incidence of disturbances such as pest outbreaks and fire are likely to occur in some areas and these could enhance projected ecosystem changes.

Consequences of CO₂ enrichment and climate change for natural terrestrial ecosystems could be modified by other environmental factors, both natural and man-induced (e.g. by air pollution).

Most at risk are those communities in which the options for adaptability are limited (e.g. montane, alpine, polar, island and

coastal communities, remnant vegetation, and heritage sites and reserves) and those communities where climatic changes add to existing stresses. The socioeconomic consequences of these impacts will be significant, especially for those regions of the globe where societies and related economies are dependent on natural terrestrial ecosystems for their welfare. Changes in the availability of food, fuel, medicine, construction material and income are possible as these ecosystems are changed. Important fibre products could also be affected in some regions.

2.3 Hydrology and water resources

Relatively small climate changes can cause large water resource problems in many areas, especially arid and semi-arid regions and those humid areas where demand or pollution has led to water scarcity. Little is known about regional details of ~~greenhouse-gas-induced~~ hydrometeorological change. It appears that many areas will have increased precipitation, soil moisture and water storage, thus altering patterns of agricultural, ecosystem and other water use. Water availability will decrease in other areas, a most important factor for already marginal situations, such as the Sahelian zone in Africa. This has significant implications for agriculture, for water storage and distribution, and for generation of hydroelectric power. In some limited areas, for example, under an assumed scenario of a 1°C to 2°C temperature increase, coupled with a 10% reduction in precipitation, a 40-70% reduction in annual runoff could occur. Regions such as southern Asia, that are dependent on unregulated river systems, are particularly vulnerable to hydrometeorological change. On the other hand, regions such as the western USSR and western United States that have large regulated water resource systems are less sensitive to the range of hydrometeorological changes in the assumed scenario. In addition

permafrost. As a result, overlying ecosystems could be significantly altered and the integrity of man-made structures and facilities reduced, thereby influencing existing human settlements and development opportunities.

3. RESPONSE STRATEGIES

The consideration of climate change response strategies presents formidable difficulties for policymakers. The information available to make sound policy analyses is inadequate because of:

- (a) uncertainty with respect to how effective specific response options or groups of options would be in actually averting potential climate change;
- (b) uncertainty with respect to the costs, effects on economic growth, and other economic and social implications of specific response options or groups of options.

The IPCC recommends a programme for the development and implementation of global, comprehensive and phased action for the resolution of the global warming problem under a flexible and progressive approach.

- * A major dilemma of the issue of climate change due to increasing emission of greenhouse gases in the atmosphere is that actions may be required well before many of the specific issues that are and will be raised can be analyzed more thoroughly by further research.
- * The CFCs are being phased out to protect the stratospheric ozone layer. This action will also effectively slow down the rate of increase of radiative forcing of greenhouse gases in the atmosphere. Every effort

should be made to find replacements that have little or no greenhouse warming potential or ozone depletion potential rather than the HCFCs and HFCs that are now being considered.

- * The single largest anthropogenic source of radiative forcing is energy production and use. The energy sector accounts for an estimated 46% (with an uncertainty range of 38-54%) of the enhanced radiative forcing resulting from human activities.
- * It is noted that emissions due to fossil fuel combustion amounts to about 70-90% of the total anthropogenic emissions of CO₂ into the atmosphere, whereas the remaining 10-30% is due to human use of terrestrial ecosystems. A major decrease of the rate of deforestation as well as an increase in afforestation would contribute significantly to slowing the rate of CO₂ concentrations increase in the atmosphere; but it would be well below that required to stop it. This underlines that when forestry measures have been introduced, other measures to limit or reduce greenhouse emissions should not be neglected.

3.1 Roles of industrialized and developing countries

- * Industrialized and developing countries have a common but varied responsibility in dealing with the problem of climate change and its adverse effects. The former should take the lead in two ways:
 - i) A major part of emissions affecting the atmosphere at present originates in industrialized countries where the scope for change is greatest. Industrialized countries should adopt domestic measures to

limit climate change by adapting their own economies in line with future agreements to limit emissions.

- ii) To co-operate with developing countries in international action, without standing in the way of the latter's development by contributing additional financial resources, by appropriate transfer of technology, by engaging in close co-operation in scientific observation, analysis and research, and finally by means of technical co-operation geared to forestalling and managing environmental problems.
- * Sustainable development¹ in industrialized as well as developing countries requires proper concern for environmental protection as the basis for continued economic growth. Environmental considerations must be systematically integrated into all plans for development. The right balance must be struck between economic growth and environmental objectives.
- * Emissions from developing countries are growing in order to meet their development requirements and thus, over time, are likely to represent an increasingly significant

percentage of global emissions. As the greenhouse gas emissions in developing countries are increasing with their population and economic growth, rapid transfer, on a preferential basis, to developing countries, of technologies which help to monitor, limit or adapt to climate change, without hindering their economic development, is an urgent requirement. Developing countries should, within the limits feasible, take measures to suitably adapt their economies. Recognizing the poverty that prevails among the populations of developing countries, it is natural that achieving economic growth is given priority by them. Narrowing the gap between the industrialized and developing world would provide a basis for a full partnership of all nations in the world and would assist developing countries in dealing with the climate change issue.

3.2 Options

- * The climate scenario studies of Working Groups I and III outline control policies on emissions that would slow global warming from the presently predicted value of about 0.3°C per decade to about 0.1°C per decade (see Appendix).
- * The potentially serious consequences of climate change give sufficient reasons to begin adopting response strategies that can be justified immediately even in the face of significant uncertainties. The response strategies include:
 - o phasing out of CFC emissions and careful assessment of the greenhouse gas potential of proposed substitutes;

¹ Sustainable development is development that meets the needs of the present without compromising the ability of future generations to meet their own needs and does not imply in any way encroachment upon national sovereignty. (Annex II to decision 15/2 of the 15th session of the UNEP Governing Council, Nairobi, May 1989)

- o efficiency improvements and conservation in energy supply, conversion and end use, in particular through improving diffusion of energy-efficient technologies, improving the efficiency of mass-produced goods, reviewing energy-related price and tariff systems to better reflect environmental costs;
 - o sustainable forest management and afforestation;
 - o use of cleaner, more efficient energy sources with lower or no emissions of greenhouse gases;
 - o review of agriculture practices.
- * There is no single quick-fix technological option for limiting greenhouse gas emissions. Phased and flexible response strategies should be designed to enhance relevant technological research, development and deployment, including improvement and reassessment of existing technologies. Such strategies should involve opportunities for international co-operation. A comprehensive strategy addressing all aspects of the problem and reflecting environmental, economic and social costs and benefits is necessary.
- * Because a large, projected increase in world population will be a major factor in causing the projected increase in global greenhouse gases, it is essential that global climate change strategies take into account the need to deal with
- the issue of the rate of growth of the world population.
- * Subject to their particular circumstances, individual nations, or groups of nations, may wish to consider taking steps now to attempt to limit, stabilize or reduce the emission of greenhouse gases resulting from human activities and prevent the destruction and improve the effectiveness of sinks. One option that governments may wish to consider is the setting of targets for CO₂ and other greenhouse gases.
- * A large number of options were preliminarily assessed by IPCC Working Group III. It appears that some of these options may be economically and socially feasible for implementation in the near-term while others, because they are not yet technically or economically viable, may be more appropriate for implementation in the longer term. In general, the Working Group found that the most effective response strategies, especially in the short term, are those which are:
- o beneficial for reasons other than climate change and justifiable in their own right, for example increased energy efficiency and lower greenhouse gas emission technologies, better management of forests, and other natural resources, and reductions in emissions of CFCs and other ozone depleting substances that are also radiatively important gases;
 - o economically efficient and cost effective, in particular those that use market-based mechanisms;
 - o able to serve multiple social, economic and environmental purposes;

- o flexible and phased, so that they can be easily modified to respond to increased understanding of scientific, technological and economic aspects of climate change;
- o compatible with economic growth and the concept of sustainable development;
- o administratively practical and effective in terms of application, monitoring and enforcement;
- o reflecting obligations of both industrialized and developing countries in addressing this issue, while recognizing the special needs of developing countries, in particular in the areas of financing and technology.

The degree to which options are viable will also vary considerably depending on the region or country involved. For each country, the implications of specific options will depend on its social, environmental and economic context. Only through careful analysis of all available options will it be possible to determine which are best suited to the circumstances of a particular country or region. Initially, the highest priority should be to review existing policies with a view to minimizing conflicts with the goals of climate change strategies. New policies will be required.

- * In the long-term perspective, work should begin on defining criteria for selection of appropriate options which would reflect the impacts of climate change and its costs and benefits on the one hand, and

social and economic costs and benefits of the options on the other.

- * Consideration of measures for reducing the impacts of global climate change should begin as soon as possible, particularly with regard to disaster preparedness policies, coastal zone management and control measures for desertification, many of these being justified in their own right. Measures to limit or adapt to climate change should be as cost-effective as possible while taking into account important social implications. Limitation and adaptation should be considered as an integrated package.

- * Assessing areas at risk from sea-level rise and developing comprehensive management plans to reduce future vulnerability of populations and coastal developments and ecosystems as part of coastal zone management plans should begin as soon as possible.

- * Environmental objectives can be pursued through regulations and/or through market based economic instruments. The latter, through their encouragement of flexible selection of abatement measures, tend to encourage innovation and the development of improved technologies and practices for reducing emissions and therefore frequently offer the possibility of achieving environmental improvements at lower costs than through regulatory mechanisms. It is not likely, however, that economic instruments will be applicable to all circumstances.

- * Three factors are considered as potential barriers to the operation of markets and/or the achievement of environmental objectives through

market mechanisms. These are:

- i) information problems, which can often cause markets to produce less effective or unfavourable environmental outcomes;
- ii) existing measures and institutions, which can encourage individuals to behave in environmentally damaging ways; and
- iii) balancing competing objectives (social, environmental and economic).

An initial response strategy may therefore be to address information problems directly and to review existing measures which may be barriers. For example, prior to possible adoption of a system of emission charges, countries should examine existing subsidies and tax incentives on energy and other relevant greenhouse gas producing sectors.

* With respect to institutional mechanisms for providing financial co-operation and assistance to developing countries, a two track approach was considered:

- i) one track built on work underway or planned in existing institutions. Bilateral donors could further integrate and reinforce the environmental components of their assistance programmes and develop cofinancing arrangements with multilateral institutions while ensuring that this does not impose inappropriate environmental conditions.

- ii) parallel to this track the possibility of new mechanisms and facilities was considered. Some developing and industrialized countries suggested that new mechanisms directly related to a future climate convention and protocols that might be agreed upon, such as a new international fund, were required.

* Governments should undertake now:

- o accelerated and co-ordinated research programmes to reduce scientific and socioeconomic uncertainties with a view towards improving the basis for response strategies and measures;
- o review of planning in the fields of energy, industry, transportation, urban areas, coastal zones and resource use and management;
- o encouragement of beneficial behavioral and structural (e.g. transportation and housing infrastructure) changes;
- o expansion of the global ocean observing and monitoring systems.

It should be noted that no detailed assessments have been made as of yet of the economic costs and benefits, technological feasibility or market potential of the underlying policy assumptions.

4. PARTICIPATION OF DEVELOPING COUNTRIES

It is obvious that the impact on and the participation by the developing countries in the further

development of a future strategy is essential. The IPCC has attempted to address this specific issue by establishing a Special Committee on the Participation of Developing Countries and requested it to identify factors inhibiting the full participation of the developing countries in IPCC and recommend remedial measures where possible. The Committee stressed that full participation includes not only the physical presence at meetings but also the development of national competence to address all issues of concern such as the appreciation of the scientific basis of climate change, the potential impacts on society of such change and evaluations of practical response strategies for national/regional applications.

The factors that kept developing countries from fully participating were identified by the Special Committee as:

- o insufficient information;
- o insufficient communication;
- o limited human resources;
- o institutional difficulties;
- o limited financial resources.

On some of these factors, the IPCC Working Groups have developed policy options which are to be found in their respective reports.

- * Developing countries will, in some cases, need additional financial resources for supporting their efforts to promote activities which contribute both to limiting greenhouse gas emissions and/or adapting to the adverse effects of climate change, while at the same time promote economic development. Areas of co-operation could include, inter alia:

- o efficient use of energy resources, the use of fossil fuels with lower greenhouse gas emission rates or non-fossil sources, the development of clean and renewable energy sources, such as: biomass, windpower, wave-power, hydroelectric and solar, wherever applicable;
- o increased rational utilization of forest products, sound forest management practices and agricultural techniques which reduce the negative effects on climate;
- o facilitating the development and transfer of clean and safe technologies in areas which could include:
 - the building and manufacturing industries;
 - public transport systems;
 - industry;
- o measures which enhance the capacity of developing countries to develop programmes to address climate change, including research and development activities and public awareness and education programmes, such as:
 - the development of the human resources necessary to tackle the problem of climate change and its adverse effects;
 - the provision of study and training programmes in subjects and techniques related to climate change;
 - the provision of skilled personnel and the material necessary to organize education programmes to develop

locally the skills necessary to assess climate change and combat its adverse effects;

- the development of climate-related research programmes organized on a regional basis;

- o facilitating the participation of developing countries in fora and organizations such as: the International Geosphere-Biosphere Programme, the Land-Ocean Inter-actions in the Coastal Zone, the Biosphere Aspects of the Hydrological Cycle, the Global Change Impact on Agriculture and Society, the World Climate Programme, the Man and the Biosphere Programme;
- o facilitating participation by developing countries in international fora on global climate change such as the IPCC;
- o strengthening existing education and research institutions and the development of new ones at national and regional levels.

* Further, co-operation and assistance for adaptive measures would be required, noting that for some regions and countries, adaptation rather than limitation activities are potentially most important.

* The IPCC concludes that the recommendations of the Special Committee need not and should not await the outcome of future negotiations on a climate

convention. It appeals to the multilateral and bilateral funding organizations to implement its recommendations. It further appeals to governments for continuing and increased contributions to the IPCC Trust Fund on an urgent basis.

5. INTERNATIONAL CO-OPERATION AND FUTURE WORK

* The measures noted above require a high degree of international co-operation with due respect for national sovereignty of states. The international negotiations on a framework convention should start as quickly as possible after presentation of this Report in line with Resolution SS II/3 Climate.C. (August 1990) of the UNEP Governing Council and Resolution 8 (EC-XLII, June 1990) of the WMO Executive Council. Many, essentially developing, countries stressed that the negotiations must be conducted in the forum, manner and with the timing to be decided by the UN General Assembly.

This convention, and any additional protocols that might be agreed upon, would provide a firm basis for effective co-operation to act on greenhouse gas emissions and adapt to any adverse effects of climate change. The convention should recognize climate change as a common concern of mankind and, at a minimum, contain general principles and obligations. It should be framed in such a way as to gain the adherence of the largest possible number and most suitably balanced range of countries while permitting timely action to be taken.

Key issues for negotiations will include the criteria, timing, legal form and incidence of any obligations to control the net emissions of greenhouse

gases, how to address equitably the consequences for all, any institutional mechanisms including research and monitoring that may be required, and in particular, the requests of the developing countries for additional financial resources and for the transfer of technology on a preferential basis. The possible elements of a framework convention on climate change were identified and discussed by Working Group III in its legal measures topic paper, appended to its Policymakers Summary.

* The IPCC recommends that

research regarding the science of climate change in general, technological development and the international economic implications, be intensified.

* Because climate change would affect, either directly or indirectly, almost every sector of society, broad global understanding of the issue will facilitate the adoption and the implementation of such response options as deemed necessary and appropriate. Further efforts to achieve such global understanding are urgently needed.

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3. RESPONSE STRATEGIES

The consideration of climate change response strategies presents formidable difficulties for policymakers. The information available to make sound policy analyses is inadequate because of:

- (a) uncertainty with respect to how effective specific response options or groups of options would be in actually averting potential climate change;
- (b) uncertainty with respect to the costs, effects on economic growth, and other economic and social implications of specific response options or groups of options.

The IPCC recommends a programme for the development and implementation of global, comprehensive and phased action for the resolution of the global warming problem under a flexible and progressive approach.

- * A major dilemma of the issue of climate change due to increasing emission of greenhouse gases in the atmosphere is that actions may be required well before many of the specific issues that are and will be raised can be analyzed more thoroughly by further research.
- * The CFCs are being phased out to protect the stratospheric ozone layer. This action will also effectively slow down the rate of increase of radiative forcing of greenhouse gases in the atmosphere. Every effort

should be made to find replacements that have little or no greenhouse warming potential or ozone depletion potential rather than the HCFCs and HFCs that are now being considered.

- * The single largest anthropogenic source of radiative forcing is energy production and use. The energy sector accounts for an estimated 46% (with an uncertainty range of 38-54%) of the enhanced radiative forcing resulting from human activities.
- * It is noted that emissions due to fossil fuel combustion amounts to about 70-90% of the total anthropogenic emissions of CO₂ into the atmosphere, whereas the remaining 10-30% is due to human use of terrestrial ecosystems. A major decrease of the rate of deforestation as well as an increase in afforestation would contribute significantly to slowing the rate of CO₂ concentrations increase in the atmosphere; but it would be well below that required to stop it. This underlines that when forestry measures have been introduced, other measures to limit or reduce greenhouse emissions should not be neglected.

3.1 Roles of industrialized and developing countries

- * Industrialized and developing countries have a common but varied responsibility in dealing with the problem of climate change and its adverse effects. The former should take the lead in two ways:
 - i) A major part of emissions affecting the atmosphere at present originates in industrialized countries where the scope for change is greatest. Industrialized countries should adopt domestic measures to

2.5 Oceans and coastal zones

Global warming will accelerate sea-level rise, modify ocean circulation and change marine ecosystems, with considerable socioeconomic consequences. These effects will be added to present trends of rising sea-level, and other effects that have already stressed coastal resources, such as pollution and over-harvesting. A 30-50 cm sea-level rise (projected by 2050) will threaten low islands and coastal zones. A 1 m rise by 2100 would render some island countries uninhabitable, displace tens of millions of people, seriously threaten low-lying urban areas, flood productive land, contaminate fresh water supplies and change coastlines. All of these impacts would be exacerbated if droughts and storms become more severe. Coastal protection would involve very significant costs. Rapid sea-level rise would change coastal ecology and threaten many important fisheries. Reductions in sea ice will benefit shipping, but seriously impact on ice-dependent marine mammals and birds.

Impacts on the global oceans will include changes in the heat balance, shifts in ocean circulation which will affect the capacity of the ocean to absorb heat and CO₂ and changes in upwelling zones associated with fisheries. Effects will vary by geographic zones, with changes in habitats, a decrease in biological diversity and shifts in marine organisms and productive zones, including commercially important species. Such regional shifts in fisheries will have major socioeconomic impacts.

2.6 Seasonal snow cover, ice and permafrost

The global areal extent and volume of elements of the

terrestrial cryosphere (seasonal snow cover, near-surface layers of permafrost and some masses of ice) will be substantially reduced. These reductions, when reflected regionally could have significant impacts on related ecosystems and social and economic activities. Compounding these impacts in some regions is that, as a result of the associated climatic warming positive feedbacks, the reductions could be sudden rather than gradual.

The areal coverage of seasonal snow and its duration are projected to decrease in most regions, particularly at mid latitudes, with some regions at high latitudes possibly experiencing increases in seasonal snow cover. Changes in the volume of snow cover, or the length of the snow cover season, will have both positive and negative impacts on regional water resources (as a result of changes in the volume and the timing of runoff from snowmelt), on regional transportation (road, marine, air and rail), and on recreation sectors.

Globally, the ice contained in glaciers and ice sheets is projected to decrease, with regional responses complicated by the effect of increased snowfall in some areas which could lead to accumulation of ice. Glacial recession will have significant implications for local and regional water resources, and thus impact on water availability and on hydroelectric power potential. Glacial recession and loss of ice from ice sheets will also contribute to sea-level rise. Permafrost, which currently underlies 20-25% of the land mass of the Northern Hemisphere, could experience significant degradation within the next 40-50 years. Projected increases in the thickness of the freeze-thaw (active) layer above the permafrost and a recession of permafrost to higher latitudes and altitudes could lead to increases in terrain instability, erosion and landslides in those areas which currently contain

to changes in water supply, water demand may also change through human efforts to conserve, and through improved growth efficiency of plants in a higher CO₂ environment. Net socioeconomic consequences must consider both supply and demand for water. Future design in water resource engineering will need to take possible impacts into account when considering structures with a life span to the end of the next century. Where precipitation increases, water management practices, such as urban storm drainage systems, may require upgrading in capacity. Change in drought risk represents potentially the most serious impact of climate change on agriculture at both regional and global levels.

2.4 Human settlements, energy, transport, and industrial sectors, human health and air quality

The most vulnerable human settlements are those especially exposed to natural hazards, e.g. coastal or river flooding, severe drought, landslides, severe wind storms and tropical cyclones. The most vulnerable populations are in developing countries, in the lower-income groups: residents of coastal lowlands and islands, populations in semi-arid grasslands, and the urban poor in squatter settlements, slums and shanty towns, especially in megacities. In coastal lowlands such as in Bangladesh, China and Egypt, as well as in small island nations, inundation due to sea-level rise and storm surges could lead to significant movements of people. Major health impacts are possible, especially in large urban areas, owing to changes in availability of water and food and increased health problems due to heat stress spreading of infections. Changes in precipitation and temperature could radically alter the patterns

of vector-borne and viral diseases by shifting them to higher latitudes, thus putting large populations at risk. As similar events have in the past, these changes could initiate large migrations of people, leading over a number of years to severe disruptions of settlement patterns and social instability in some areas.

Global warming can be expected to affect the availability of water resources and biomass, both major sources of energy in many developing countries. These effects are likely to differ between and within regions with some areas losing and others gaining water and biomass. Such changes in areas which lose water may jeopardize energy supply and materials essential for human habitation and energy. Moreover, climate change itself is also likely to have different effects between regions on the availability of other forms of renewable energy such as wind and solar power. In developed countries some of the greatest impacts on the energy, transport and industrial sectors may be determined by policy responses to climate change such as fuel regulations, emission fees or policies promoting greater use of mass transit. In developing countries, climate-related changes in the availability and price of production resources such as energy, water, food and fibre may affect the competitive position of many industries.

Global warming and increased ultraviolet radiation resulting from depletion of stratospheric ozone may produce adverse impacts on air quality such as increases in ground-level ozone in some polluted urban areas. An increase of ultraviolet-B radiation intensity at the Earth's surface would increase the risk of damage to the eye and skin and may disrupt the marine food chain.

as a result of the global increases in the atmospheric concentrations of greenhouse gases and the associated climatic changes. Projected changes in temperature and precipitation suggest that climatic zones could shift several hundred kilometres towards the poles over the next fifty years. Flora and fauna would lag behind these climatic shifts, surviving in their present location and, therefore, could find themselves in a different climatic regime. These regimes may be more or less hospitable and, therefore, could increase productivity for some species and decrease that of others. Ecosystems are not expected to move as a single unit, but would have a new structure as a consequence of alterations in distribution and abundance of species.

The rate of projected climate changes is the major factor determining the type and degree of climatic impacts on natural terrestrial ecosystems. These rates are likely to be faster than the ability of some species to respond and responses may be sudden or gradual.

Some species could be lost owing to increased stress leading to a reduction of global biological diversity. Increased incidence of disturbances such as pest outbreaks and fire are likely to occur in some areas and these could enhance projected ecosystem changes.

Consequences of CO₂ enrichment and climate change for natural terrestrial ecosystems could be modified by other environmental factors, both natural and man-induced (e.g. by air pollution).

Most at risk are those communities in which the options for adaptability are limited (e.g. montane, alpine, polar, island and

coastal communities, remnant vegetation, and heritage sites and reserves) and those communities where climatic changes add to existing stresses. The socioeconomic consequences of these impacts will be significant, especially for those regions of the globe where societies and related economies are dependent on natural terrestrial ecosystems for their welfare. Changes in the availability of food, fuel, medicine, construction material and income are possible as these ecosystems are changed. Important fibre products could also be affected in some regions.

2.3 Hydrology and water resources

Relatively small climate changes can cause large water resource problems in many areas, especially arid and semi-arid regions and those humid areas where demand or pollution has led to water scarcity. Little is known about regional details of ~~greenhouse-gas-induced~~ hydrometeorological change. It appears that many areas will have increased precipitation, soil moisture and water storage, thus altering patterns of agricultural, ecosystem and other water use. Water availability will decrease in other areas, a most important factor for already marginal situations, such as the Sahelian zone in Africa. This has significant implications for agriculture, for water storage and distribution, and for generation of hydroelectric power. In some limited areas, for example, under an assumed scenario of a 1°C to 2°C temperature increase, coupled with a 10% reduction in precipitation, a 40-70% reduction in annual runoff could occur. Regions such as southern Asia, that are dependent on unregulated river systems, are particularly vulnerable to hydrometeorological change. On the other hand, regions such as the western USSR and western United States that have large regulated water resource systems are less sensitive to the range of hydrometeorological changes in the assumed scenario. In addition

2.1 Agriculture and forestry

Sufficient evidence is now available from a variety of different studies to indicate that changes of climate would have an important effect on agriculture and livestock. Studies have not yet conclusively determined whether, on average, global agricultural potential will increase or decrease. Negative impacts could be felt at the regional level as a result of changes in weather and pests associated with climate change, and changes in ground-level ozone associated with pollutants, necessitating innovations in technology and agricultural management practices. There may be severe effects in some regions, particularly decline in production in regions of high present-day vulnerability that are least able to adjust. These include Brazil, Peru, the Sahel Region of Africa, Southeast Asia, and the Asian region of the USSR and China. There is a possibility that potential productivity of high and mid latitudes may increase because of a prolonged growing season, but it is not likely to open up large new areas for production and it will be mainly confined to the Northern Hemisphere.

Patterns of agricultural trade could be altered by decreased cereal production in some of the currently high-production areas, such as western Europe, southern USA, parts of South America and western Australia. Horticultural production in mid-latitude regions may be reduced. On the other hand, cereal production could increase in northern Europe. Policy responses directed to breeding new plant cultivars, and agricultural management designed to cope with changed climate conditions, could lessen the severity of regional impacts. On the balance, the

evidence suggests that in the face of estimated changes of climate, food production at the global level can be maintained at essentially the same level as would have occurred without climate change; however, the cost of achieving this is unclear. Nonetheless, climate change may intensify difficulties in coping with rapid population growth. An increase or change in UV-B radiation at ground level resulting from the depletion of stratospheric ozone will have a negative impact on crops and livestock.

The rotation period of forests is long and current forests will mature and decline during a climate in which they are increasingly more poorly adapted. Actual impacts depend on the physiological adaptability of trees and the host-parasite relationship. Large losses from both factors in the form of forest declines can occur. Losses from wildfire will be increasingly extensive. The climate zones which control species distribution will move poleward and to higher elevations. Managed forests require large inputs in terms of choice of seedlot and spacing, thinning and protection. They provide a variety of products from fuel to food.

The degree of dependency on products varies among countries, as does the ability to cope with and to withstand loss. The most sensitive areas will be where species are close to their biological limits in terms of temperature and moisture. This is likely to be, for example, in semi-arid areas. Social stresses can be expected to increase and consequent anthropogenic damage to forests may occur. These increased and non-sustainable uses will place more pressure on forest investments, forest conservation and sound forest management.

2.2 Natural terrestrial ecosystems

Natural terrestrial ecosystems could face significant consequences

A (Business as Usual) has estimated the magnitude of sea-level rise at about 20 cm by 2030 and about 65 cm by the end of the next century. Working Group I has also predicted the increase in global mean temperatures to be about 1°C above the present value by 2025 and 3°C before the end of the next century.

Any predicted effects of climate change must be viewed in the context of our present dynamic and changing world. Large-scale natural events such as El Niño can cause significant impacts on agriculture and human settlement. The predicted population explosion will produce severe impacts on land use and on the demands for energy, fresh water, food and housing, which will vary from region to region according to national incomes and rates of development. In many cases, the impacts will be felt most severely in regions already under stress, mainly the developing countries. Human-induced climate change due to continued uncontrolled emissions will accentuate these impacts. For instance, climate change, pollution and ultraviolet-B radiation from ozone depletion can interact, reinforcing their damaging effects on materials and organisms. Increases in atmospheric concentrations of greenhouse gases may lead to irreversible change in the climate which could be detectable by the end of this century.

Comprehensive estimates of the physical and biological effects of climate change at the regional level are difficult. Confidence in regional estimates of critical climatic factors is low. This is particularly true of precipitation and soil moisture, where there is considerable disagreement between various general circulation model and palaeoanalog results. Moreover, there are several scientific uncertainties regarding the

relationship between climate change and biological effects and between these effects and socioeconomic consequences.

This impact study part of the Overview does not attempt to anticipate any adaptation, technological innovation or any other measures to diminish the adverse effects of climate change that will take place in the same time frame. This is especially important for heavily managed sectors, e.g., agriculture, forestry and public health.

Finally, the issue of timing and rates of change need to be considered; there will be lags between:

- i) emissions of greenhouse gases and doubling of concentrations;
- ii) doubling of greenhouse gas concentrations and change in climate;
- iii) changes in climate and resultant physical and biological effects; and
- iv) changes in physical and ecological effects and resultant socioeconomic (including ecological) consequences. The shorter the lags, the less the ability to cope and the greater the socioeconomic impacts.

There is uncertainty related to these time lags. The changes will not be steady and surprises cannot be ruled out. The severity of the impacts will depend to a large degree on the rate of climate change.

Despite these uncertainties, Working Group II has been able to reach some major conclusions. These are presented below.

Our judgement is that:

- * Global mean surface air temperature has increased by 0.3 to 0.6°C over the last 100 years, with the five global-average warmest years being in the 1980's. Over the same period global sea-level increased by 10 to 20 cm. These increases have not been smooth in time, nor uniform over the globe.
- * The size of the warming over the last century is broadly consistent with the prediction by climate models, but is also of the same magnitude as natural climate variability. If the sole cause of the observed warming were the human-made greenhouse effect, then the implied climate sensitivity would be near the lower end of the range inferred from models. Thus the observed increase could be largely due to this natural variability; alternatively this variability and other human factors could have offset a still larger human-induced greenhouse warming. The unequivocal detection of the enhanced greenhouse effect from observations is not likely for a decade or more.
- * Measurements from ice cores going back 160,000 years show that the Earth's temperature closely paralleled the amount of carbon dioxide and methane in the atmosphere. Although we do not know the details of cause and effect, calculations indicate that changes in these greenhouse gases were part, but not all, of the reasons for the large (5-7°C) global temperature swings between ice ages and interglacial periods.

- * Natural sources and sinks of greenhouse gases are sensitive to a change in climate. Although many of the response (feedback) processes are poorly understood, it appears that, as climate warms, these feedbacks will lead to an overall increase, rather than a decrease, in natural greenhouse gas abundances. For this reason, climate change is likely to be greater than the estimates given above.

2. IMPACTS

The report on impacts of Working Group II is based on the work of a number of subgroups, using independent studies which have used different methodologies. Based on the existing literature, the studies have used several scenarios to assess the potential impacts of climate change. These have the features of:

- i) an effective doubling of CO_2 in the atmosphere between now and 2025 to 2050;
- ii) a consequent increase of global mean temperature in the range of 1.5°C to 4° - 5°C;
- iii) an unequal global distribution of this temperature increase, namely a smaller increase of half the global mean in the tropical regions and a larger increase of twice the global mean in the polar regions; and
- iv) a sea-level rise of about 0.3 - 0.5 m by 2050 and about 1 m by 2100, together with a rise in the temperature of the surface ocean layer of between 0.2° and 2.5°C.

These scenarios pre-date, but are in line with, the assessment of Working Group I which, for Scenario

terrestrial system. The natural exchange rates were, however, in close balance before human-induced emissions began; the steady anthropogenic emissions into the atmosphere represent a significant disturbance of the natural carbon cycle.

Based on current model results, we predict:

- * An average rate of increase of global mean temperature during the next century of about 0.3°C per decade (with an uncertainty range of 0.2 - 0.5°C per decade) assuming the IPCC Scenario A (Business as Usual) emissions of greenhouse gases; this is a more rapid increase than seen over the past 10,000 years. This will result in a likely increase in the global mean temperature of about 1°C above the present value by 2025 (about 2°C above that in the pre-industrial period), and 3°C above today's value before the end of the next century (about 4°C above pre-industrial). The rise will not be steady because of other factors.
- * Under the other IPCC emissions scenarios which assume progressively increasing levels of controls, rates of increase in global mean temperature of about 0.2°C per decade (Scenario B), just above 0.1°C per decade (Scenario C) and about 0.1°C per decade (Scenario D). The rise will not be steady because of other factors.
- * Land surfaces warm more rapidly than the oceans, and higher northern latitudes warm more than the global mean in winter.
- * The oceans act as a heat sink and thus delay the full effect of a greenhouse warming.

Therefore, we would be committed to a further temperature rise which would progressively become apparent in the ensuing decades and centuries. Models predict that as greenhouse gases increase, the realized temperature rise at any given time is between 50 and 80% of the committed temperature rise.

- * Under the IPCC Scenario A (Business as Usual) emissions, an average rate of global mean sea-level rise of about 6 cm per decade over the next century (with an uncertainty range of 3 - 10 cm per decade), mainly due to thermal expansion of the oceans and the melting of some land ice. The predicted rise is about 20 cm in global mean sea level by 2030, and 65 cm by the end of the next century. There will be significant regional variations.

With regard to uncertainties, we note that:

- * There are many uncertainties in our predictions particularly with regard to the timing, magnitude and regional patterns of climate change, especially changes in precipitation.
 - These uncertainties are due to our incomplete understanding of sources and sinks of greenhouse gases and the responses of clouds, oceans and polar ice sheets to a change of the radiative forcing caused by increasing greenhouse gas concentrations.
 - These processes are already partially understood, and we are confident that the uncertainties can be reduced by further research. However, the complexity of the system means that we cannot rule out surprises.

This Overview reflects the conclusions of the reports of (i) the three IPCC Working Groups on science, impacts, and response strategies, and (ii) the Policymakers Summaries of the IPCC Working Groups and the IPCC Special Committee on the Participation of Developing Countries.

1. SCIENCE

This section is structured similarly to the Policymakers Summary of Working Group I.

We are certain of the following:

- * There is a natural greenhouse effect which already keeps the Earth warmer than it would otherwise be.
- * Emissions resulting from human activities are substantially increasing the atmospheric concentrations of the greenhouse gases: carbon dioxide, methane, chlorofluorocarbons (CFCs) and nitrous oxide. These increases will enhance the greenhouse effect, resulting on average in an additional warming of the Earth's surface. The main greenhouse gas, water vapour, will increase in response to global warming and further enhance it.

We calculate with confidence that:

- * Some gases are potentially more effective than others at changing climate, and their relative effectiveness can be estimated. Carbon dioxide has been responsible for over half of the enhanced greenhouse effect in the past, and is likely to remain so in the future.
- * Atmospheric concentrations of the long-lived gases (carbon

dioxide, nitrous oxide and the CFCs) adjust only slowly to changes of emissions. Continued emissions of these gases at present rates would commit us to increased concentrations for centuries ahead. The longer emissions continue to increase at present-day rates, the greater reductions would have to be for concentrations to stabilize at a given level.

- * For the four scenarios of future emissions which IPCC has developed as assumptions (ranging from one where few or no steps are taken to limit emissions, viz., Scenario A or Business as Usual Scenario, through others with increasing levels of controls respectively called Scenarios B, C and D), there will be a doubling of equivalent carbon dioxide concentrations from pre-industrial levels by about 2025, 2040 and 2050 in Scenarios A, B, and C respectively (see the section "Which gases are the most important?" in the Policymakers Summary of Working Group I for a description of the concept of equivalent carbon dioxide). See the Appendix for a description of the IPCC emissions scenarios.
- * Stabilization of equivalent carbon dioxide concentrations at about twice the pre-industrial level would occur under Scenario D towards the end of the next century. Immediate reductions of over 60% in the net (sources minus sinks) emissions from human activities of long-lived gases would achieve stabilization of concentration at today's levels; methane concentrations would be stabilized with a 15-20% reduction.
- * The human-caused emissions of carbon dioxide are much smaller than the natural exchange rates of carbon dioxide between the atmosphere and the oceans, and between the atmosphere and the

PREFACE TO THE IPCC OVERVIEW

The IPCC First Assessment Report consists of

- * this IPCC Overview,
- * the Policymakers Summaries of the three IPCC Working Groups (concerned with assessment respectively of the science, impacts and response strategies) and the IPCC Special Committee on the Participation of Developing Countries, and
- * the three reports of the Working Groups.

The Overview brings together material from the four Policymakers Summaries. It presents conclusions, proposes lines of possible action (including suggestions as to the factors which might form the basis for negotiations) and outlines further work which is required for a more complete understanding of the problems of climate change resulting from human activities.

Because the Overview cannot reflect all aspects of the problem which are presented in the three full reports of the Working Groups and the four Policymakers Summaries, it should be read in conjunction with them.

The issues, options and strategies presented in the Report are intended to assist policymakers and future negotiators in their respective tasks. Further consideration of the Report should be given by every government as it cuts across different sectors in all countries. It should be noted that the Report reflects the technical assessment of experts rather than government positions, particularly those governments that could not participate in all Working Groups of IPCC.

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NOTE TO THE READER

THE FIRST ASSESSMENT REPORT OF THE
INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE (IPCC)

The IPCC First Assessment Report consists of

- * the Overview
- * the policymakers summaries of the IPCC Working Groups and Special Committee on the Participation of Developing Countries
- * the reports of the IPCC Working Groups.

This volume contains the IPCC Overview and the policymakers summaries.

The report of Working Group I has already been published commercially; there are plans to publish the other two reports also, each separately, by the end of the year. They are available, on request, from the IPCC Secretariat, World Meteorological Organization, P.O.Box 2300, CH 1211 Geneva 2, Switzerland.

N. Sundararaman
IPCC Secretary
October 1990

IPCC Sept 1990



WMO



UNEP

**INTERGOVERNMENTAL PANEL ON
CLIMATE CHANGE**

IPCC FIRST ASSESSMENT REPORT

OVERVIEW

31 AUGUST 1990

APPENDIX

Emissions scenarios developed by IPCC

The IPCC used two methods to develop scenarios of future emissions:

- * One method used global models to develop four scenarios which were subsequently used by Working Group I to develop scenarios of future warming. All of these four scenarios assumed the same global economic growth rates taken from the World Bank projections and the same population growth estimates taken from the United Nations studies. The anthropogenic emissions of carbon dioxide and methane from these scenarios are shown in Figures 1 and 2 below.
- * The second method used studies of the energy and agriculture sectors submitted by over 21 countries and international organizations to estimate CO₂ emissions.

Both scenario approaches indicate that CO₂ emissions will grow from about 7 BtC (billion or 1000 million tonnes carbon) per year now to 12-15 BtC per year by the year 2025. Scenario A (Business as Usual) includes a partial phase-out of CFCs under the Montreal Protocol and lower CO₂ and CH₄ emissions than the Reference Scenario. The Reference Scenario developed through country and international studies of the energy and agriculture groups, includes higher CO₂ emissions and assumed a total CFC phase-out. The results indicate that the CO₂ equivalent concentrations and their effects on global climate are similar.

Figure 1. Projected Man-Made CO₂ Emissions
(Billion or 1000 million tonnes carbon per year)

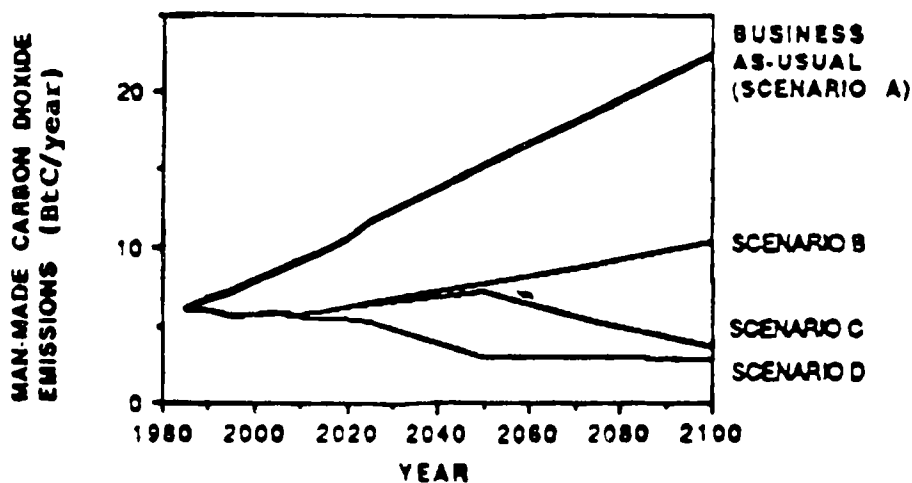
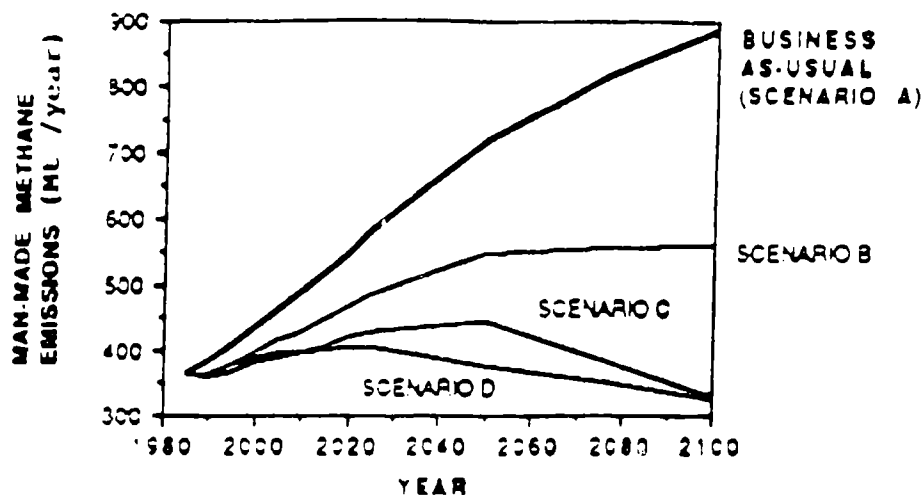


Figure 2. Projected Man-Made Methane Emissions
(Million tonnes per year)



Method 1²

Scenario A (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. Under this scenario, the equivalent of a doubling of pre-industrial CO₂ levels occurs, according to Working Group I, by around 2025.

Scenario B (Low Emissions Scenario) assumes that the energy supply mix of fossil fuels shifts towards natural gas, large efficiency increases

² All of the scenarios assumed some level of compliance with the Montreal Protocol but not with all of the (June 1990) amendments agreed to in London. The London amendments to the Montreal Protocol, when fully implemented, would result in a virtually complete elimination of production of fully halogenated CFCs, halons, carbon tetrachloride and methyl chloroform early in the 21st century. The Parties of the Protocol also call for later elimination of HCFCs. Thus, the assumptions of Scenarios A and B overestimate the radiative forcing potential of CFCs and halons. Additionally, the UN has provided recent population projections that estimate higher population than used in the global model scenarios (Scenarios A through D); use of these newer projections would increase future CO₂ emissions. Additionally, the Reference Scenario CO₂ emissions are higher than Scenario A (Business as Usual), suggesting Scenario A (Business as Usual) may be an underestimate.

are achieved, deforestation is reversed and emissions of CFCs are reduced by 50% from their 1986 levels. This results in an equivalent doubling of pre-industrial carbon dioxide by about 2040.

Scenario C (Control Policies Scenario) assumes that a shift towards renewable energies and safe nuclear energy takes place in the latter part of the next century, CFC gases are phased out and agricultural emissions (methane and nitrous oxide) are limited; an equivalent doubling of pre-industrial carbon dioxide will occur in about 2050.

Scenario D (Accelerated Policies Scenario) assumes that a rapid shift to renewable energies and safe nuclear energy takes place early in the next century, stringent emission controls in industrial countries and moderate growth of emissions in developing countries. This scenario, which assumes carbon dioxide emissions are reduced to 50% of 1985 levels, stabilizes equivalent carbon dioxide concentrations at about twice the pre-industrial levels towards the end of the next century.

Method 2 (see footnote 2 on previous page)

Using the second method, the so-called Reference Scenario was developed by the Energy and Industry Subgroup and Agriculture and Forestry Subgroup of Working Group III. Under the Reference Scenario, global CO₂ emissions from all sectors grow from approximately 7.0 BtC (per year) in 1985 to over 15 BtC (per year) in 2025. The energy contribution grows from about 5 BtC (per year) to over 12 BtC (per year). Primary energy demand more than doubles between 1985 and 2025 with an average growth rate of 2.1%. The per capita energy emissions in the industrialized countries increase from 3.1 tonnes carbon (TC) in 1985 to 4.7 TC in 2025; for the developing countries, they rise from 0.4 TC in 1985 to 0.8 TC in 2025.

Summary

All of the above scenarios provide a conceptual basis for considering possible future patterns of emissions and the broad responses that might affect those patterns. No full assessment was made of the total economic costs and benefits, technological feasibility, or market potential of the underlying policy assumptions. Because of the inherent limitations in our ability to estimate future rates of population and economic growth, individual behaviour, technological innovation, and other factors which are crucial for determining emission rates over the course of the next century, there is some uncertainty in the projections of greenhouse gas emissions. Reflecting these inherent difficulties, the IPCC's work on emissions scenarios are the best estimates at this time covering emissions over the next century, but continued work to develop improved assumptions and methods for scenario estimates will be useful to guide the development of response strategies.

U.S. IPCC NEWS

Volume 6, DECEMBER, 1989

NOORDWIJK DECLARATION ON ATMOSPHERIC POLLUTION AND CLIMATE CHANGE

MALTA SUMMIT: U.S. OFFERS TO HOST NEGOTIATIONS OF CLIMATE CONVENTION

PRESIDENT'S SCIENCE ADVISOR ESTABLISHES TASK FORCE ON CLIMATE CHANGE

THIS ISSUE:

TEXT OF NOORDWIJK DECLARATION

WHITE HOUSE STATEMENT ON NOORDWIJK

WHITE HOUSE STATEMENT ON MALTA SUMMIT

US AGENCY COORDINATION OF CLIMATE POLICY

UPDATED SCHEDULE OF IPCC MEETING

SCHEDULE FOR IPCC MEETING IN US IN FEBRUARY

Prepared by the OFFICE OF INTERNATIONAL ACTIVITIES, EPA AND NATIONAL CLIMATE PROGRAM OFFICE, NOAA. In Consultation with the OFFICE OF GLOBAL CHANGE, Department of State. For information, contact Mr. Mason Charak, NCPO/NOAA Universal Bldg, Suite 518, 1825 Connecticut Avenue, NW Washington D.C. 20235; 202 673-5360

U.S. IPCC NEWS

Volume 7 April 1990

SUMMARY OF IPCC MEETING IN FEBRUARY PRESIDENT BUSH ADDRESSES IPCC

PRESIDENT BUSH TO HOST WHITE HOUSE MEETING ON SCIENCE, ECONOMICS AND THE ENVIRONMENT

STATUS REPORTS OF IPCC WORKING GROUPS

SECOND WORLD CLIMATE CONFERENCE AGENDA

UPDATED SCHEDULE OF IPCC MEETINGS

TIMETABLE FOR COMPLETION OF IPCC REPORT

Prepared by the NATIONAL CLIMATE PROGRAM OFFICE, NOAA. In consultation with the OFFICE OF GLOBAL CHANGE, Department of State, and the OFFICE OF INTERNATIONAL ACTIVITIES, EPA. For information, contact Mr. Mason Charak, NCPO/NOAA, Universal Building, Suite 518, 1825 Connecticut Avenue, NW, Washington D.C. 20235; Telephone 202 673-5360.

Report of the Third Plenary Session of the IPCC

The IPCC met February 5-7, 1990 at Georgetown University, Washington, D.C. Professor B. Bolin, Chairman of the IPCC, Professor G.O.P. Obassi, Secretary General of the WMO; and Dr. M.K. Tolba, Executive Director of UNEP, addressed the meeting after President Bush's talk. The agenda included reports on highlights of various conferences that relate to climate change and to the IPCC; information on preparations for the Second World Climate Conference; a discussion of the UNEP/WMO activities for negotiation on a framework convention on climate change; statements by non-governmental organizations; progress reports of the three IPCC Working Groups; a report on the participation of the developing countries; the IPCC budget; and follow-on activities of the IPCC after completion of its first assessment report on Sept. 1, 1990.

THE WHITE HOUSE

Office of the Press Secretary

For Immediate Release

February 5, 1990

REMARKS BY THE PRESIDENT AT THE INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE

Georgetown University
Washington, D.C.

10:20 A.M. EST

THE PRESIDENT: Thank you, Dr. Bolin, and thank you for all you're doing in leading this very important effort here. To Professor Obasi and Dr. Tolba, and all the delegates of the World Meteorological Organization, and the UNEP -- the United Nations Environment Program. Let me commend all of you for coming together to examine an issue of such great importance.

I also want to salute Bill Riley, our able EPA Administrator. He will become the next Cabinet official in the U.S. government. I want to thank Assistant Secretary Bernthao for his leadership from the U.S. side of things. And also salute my able Science Advisor who is with us today, Dr. Bromley, who many of you know.

The recommendations that this distinguished organization makes can have a profound effect on the world's environmental and economic policy.

By being here today, I hope to underscore concern -- my country's and my own personal concern about your work, about environmental stewardship, and to reaffirm our commitment to finding responsible solutions. It's both an honor and a pleasure to be the first American President to speak to this organization, as its work takes shape.

You're called upon to deliver recommendations which strike a difficult and yet critical international bargain: a convergence between global environmental policy and global economic policy. A bargain where both perspectives benefit and neither is compromised.

As experts, you understand that economic growth and environmental integrity need not be contradictory priorities. One reinforces and complements the other. Each, a partner. Both are crucial.

A sound environment is the basis for the continuity and quality of human life and enterprise. Clearly, strong economies allow nations to fulfill the obligations of environmental stewardship. Where there is economic strength, such protection is possible. But where there is poverty, the competition for resources gets much tougher. Stewardship suffers.

For all of these reasons, I sincerely believe we must do everything in our power to promote global cooperation: for environmental protection and economic growth; for intelligent management of our natural resources and efficient use of our industrial capacity. And for sustainable and environmentally sensitive development -- around the world.

The United States is strongly committed to the I.P.C.C. process of international cooperation on global climate change. We consider it vital that the community of nations be drawn together in

an orderly, disciplined, rational way to review the history of our global environment, to assess the potential for future climate change and to develop effective programs.

The state of the science, the social and economic impacts, and the appropriate strategies all are crucial components to a global resolution. The stakes here are very high; the consequences, very significant.

The United States remains committed to aggressive and thoughtful action on environmental issues. Last week, in my State of the Union address, I spoke of stewardship, because I believe it's something we owe ourselves, our children and their children. So we are renewing the ethic of stewardship in our domestic programs; in our work to forge international agreements; in our assistance to developing and East bloc nations; and here, by chairing the Response Strategies Working Group.

I have just submitted a budget to our Congress for Fiscal 1991. It includes over \$2 billion in new spending to protect the environment. And underscoring our commitment to you efforts, I am pleased to note that funding for the U.S. Global Change Research Program will increase by nearly 60 percent, to over \$1 billion.

That commitment, by far the largest ever made by any nation, reflects our determination to improve our understanding of the science of climate change. We are working with our neighbors around the world to enhance global monitoring and data management, improve analysis, reduce the uncertainty of predictive models, and conduct regular reassessments of the state of science.

Our program allows NASA and her sister agencies and all our international partners to move forward with the "Mission to Planet Earth." That will initiate the U.S. Earth Observing System, in cooperation with Europe and Japan, to advance the state of knowledge about the planet we share.

Furthermore, even as we wait for the benefits of this research, the United States has already taken many steps in our country that bring both economic and environmental benefits. Steps that make sense on their own merits in terms of responsibility and efficiency, which help reduce emissions of CFC's and carbon dioxide and other pollutants now entering the atmosphere. Let me outline them very briefly:

We are pursuing new technology development that will increase the efficiency of our energy use and thus reduce total emissions.

We're crafting a revised Clean Air Act with incentives for our private sector to find creative, market-driven solutions to enhance air quality.

We've launched a major reforestation initiative to plant a billion trees a year on the private land across America.

And we're working out a comprehensive review and revision of our National Energy Strategy, with initiatives to increase energy efficiency and the use of renewable sources. These efforts, already underway, are the heart of a \$336 million Department of Energy program and are expected to produce energy savings through the year 2000 of over \$30 billion -- while achieving significant pollution reduction. Quite a return on investment.

We're also working, through diplomatic channels with our colleagues in other countries and through innovative measures like debt-for-nature swaps, to do more than simply reduce global deforestation. We hope to reverse it, turn it around -- not unilaterally, but by working with our international neighbors.

The economics of our response strategies to climate change are getting intensive study here in our country, in the United

States. We're developing real data on the costs of various strategies, assessing new measures, and encouraging other nations to follow suit. And we look forward to sharing this knowledge and technical support with our international colleagues.

As we work to create policy and agreements on action, we want to encourage the most creative, effective approaches. Wherever possible, we believe that market mechanisms should be applied -- and that our policies must be consistent with economic growth and free market principles in all countries. Our development efforts and our dialogue can help us reach effective and acceptable solutions.

Last December at Malta, in my meeting with President Gorbachev, I proposed that the United States offer a venue for the first negotiating session for a framework convention, once the I.P.C.C. completes its work. I reiterate that invitation here and look forward to your cooperation in that agenda.

We all know that human activities are changing the atmosphere in unexpected and in unprecedented ways. Much remains to be done. Many questions remain to be answered. Together, we have a responsibility to ourselves and the generations to come to fulfill our stewardship obligations. But that responsibility demands that we do it right.

We acknowledge a broad spectrum of views on these issues, but our respect for a diversity of perspective does not diminish our recognition of our obligation -- or soften our will to produce policies that work. Some may be tempted to exploit legitimate concerns for political positioning. Our responsibility is to maintain the quality of our approach, our commitment to sound science, and an open mind to policy options.

So the United States will continue its efforts to improve our understanding of climate change -- to seek hard data, accurate models, and new ways to improve the science -- and determine how best to meet these tremendous challenges. Where politics and opinion have outpaced the science, we are accelerating our support of the technology to bridge that gap. And we are committed to coming together periodically, for international assessments of where we stand.

Therefore, this spring, the United States will host a White House conference on science and economic research on the environment -- convening top officials from a representative group of nations, to bring together the three essential disciplines: science, economics, and ecology. They will share their knowledge, assumptions, and state-of-the-art research models to outline our understanding and help focus our efforts. I look forward personally to participating in this seminar and to learning from its deliberations.

Our goal continues to be matching policy commitments to emerging scientific knowledge -- and a reconciling of environmental protection to the continued benefits of economic development. And as Secretary Baker observed a year ago, whatever global solutions to climate change are considered, they should be as specific and as cost-effective as they can possibly be.

If we hope to promote environmental protection and economic growth around the world, it will be important not to work in conflict, but with our industrial sectors. That will mean moving beyond the practice of command, control, and compliance -- toward a new kind of environmental cooperation -- and toward an emphasis on pollution prevention, rather than mere mitigation and litigation. Many of our industries, in fact, are already providing crucial research and solutions.

One corporation, for example -- and there are others, but I'll single out one of them -- 3M started an in-house program called Pollution Prevention Pays -- one company. And that has saved the company well over a half a billion dollars since 1975 -- prevented

112,000 tons of air pollutants, 15,000 tons of water pollutants, and almost 400,000 tons of sludge and solid waste from being released into the environment. They've done it by rewarding employees for coming up with ideas. And they have clearly demonstrated the benefits of doing it right.

Where developing nations are concerned, I know some argue that we'll have to abandon the free-market principles of prosperous economies. In fact, we think it's all the more crucial in the developing countries to harness incentives of the free enterprise system in the service of the environment.

I believe we should make use of what we know. We know that the future of the Earth must not be compromised. We bear a sacred trust in our tenancy here -- and a covenant with those most precious to us: our children and theirs. We also understand the efficiency of incentives -- and that well-informed free markets yield the most creative solutions. We must now apply the wisdom of that system, the power of those forces, in defense of the environment we cherish.

Working together, with good faith and earnest dialogue, I believe we can reconcile vitality with environmental protection. And so let me commend you on your outstanding work -- and wish you all deliberate speed in your efforts to address a very difficult, but very important, human concern.

Thank you all very much. It is a great pleasure to be the first President to address this distinguished group. Thank you very much. (Applause.)

END

10:36 A.M. EST

White House Conference on Science and Economics Research

- o On February 26, 1990, the President invited the Heads of State from seventeen countries, the European Community and the OECD to send ministerial-level delegates to a White House Conference on Science and Economics Research Related to Global Change.
- o The Conference will be held in Washington, D.C. on April 17-18, 1990.
- o The Conference will be devoted to science and economics research issues relevant to policy on global change, including climate. The Conference is designed to address important next steps that substantially enhance and broaden international understanding of science and economic research issues that relate to global change. Further, the Conference seeks to frame the initial steps towards a strategy for implementing joint international science and economics research efforts. It also seeks to integrate and link scientific and economic research results to both the domestic and international policy process. The Conference is unique as an international forum both because it focuses on the essential questions of research needed to support the international policy process and because it seeks for the first time to join research issues central to both the science and the economics related to global change.
- o The Conference focuses on "Global Change", a scope of research interest that has evolved out of the science that concerns itself with understanding the fundamental processes that govern the way the global Earth functions. Thus, the research agenda not only includes global climate change, but also includes other important global processes, such as ozone depletion in the polar regions and on global scales, biodiversity, large scale changes in land use and their impact on global processes, such as deforestation, and other large scale processes such as desertification.
- o The Conference is conceived as an integral part of the on-going international process of trying to understand changes in the global environment. The need for substantially improved understanding of both the science and economics of global change has been noted by virtually all world leaders. This Conference will focus on scientific and economic research issues as a complementary effort to the on-going Intergovernmental Panel on Climate Change (IPCC) and other up-coming international meetings that seek to address the serious policy issues that evolve out of the concerns for the changes in the global environment, particularly climate change. The President

strongly supports the IPCC efforts and expects that the results of the conference will contribute to the on-going international debate and action on these issues. For example, the leadership of the Intergovernmental Panel on Climate change has been invited to take an active role in the Conference

- o The Conference will convene a delegation of three ministerial-level officials from a representative group of nations, each representing one of three essential disciplines: science, economics, and the environment. The Conference was conceived with the idea that a small representative group of countries would be invited to participate; their selection is based on the simple criteria that the meeting should include countries or representatives of country interest that have substantial populations, large land masses, industrialized economies or heavy future energy needs, substantial research infrastructures, or have provided international leadership on issues related to climate and global change. A representative group of countries has been selected. The President has asked the heads of state in the following countries and organizations to send a delegation. These countries and organizations are:
 - 1. Australia
 - 2. Brazil
 - 3. Canada
 - 4. Federal Republic of Germany
 - 5. France
 - 6. India
 - 7. Indonesia
 - 8. Italy
 - 9. Japan
 - 10. Mexico
 - 11. Netherlands
 - 12. Nigeria
 - 13. Norway
 - 14. Poland
 - 15. Soviet Union
 - 16. United Kingdom
 - 17. Zaire
 - 18. European Community
 - 19. OECD
- o The Conference is designed to be a forum to bring a number of ministerial-level leaders together to enhance international cooperation and to build the basis for joint efforts in these vital areas. It is hoped that the delegates, working together, will agree upon those areas of opportunity for cooperative action in the areas of scientific and economic research.

- o The Conference is a White House Conference, initiated by the President. Hence, the President has asked three Assistants to the President, in the relevant areas, to be the Co-Chairmen of the Conference. The three Co-Chairmen are: the President's Science Advisor and Director of the Office of Science and Technology Policy, Dr. D. Allan Bromley; the Chairman of the President's Council of Economic Advisers, Dr. Michael J. Boskin; and the Chairman of the President's Council on Environmental Quality, Mr. Michael R. Deland.

STATUS REPORT OF IPCC WORKING GROUPS

All three working groups have continued to meet and correspond while preparing their reports. Lead authors for Working Group 1 (Science) met in late February in Edinburgh. Lead authors and co-chairs of Working Group 2 (Impacts) conferred in Moscow and Nalchik, and Working Group 3 (Response Strategies) subgroups held several meetings in recent months.

Working Group 1 - Science

A draft of the Scientific Assessment on Climate change is being reviewed by approximately 84 U.S. scientists as part of a broad international peer-review process. The IPCC comes under the auspices of the United Nations Environmental Program (UNEP) and the World Meteorological Organization (WMO) and has been strongly supported by all of the scientific agencies in Washington, D.C. This scientific assessment is particularly important in light of the recent visibility that global warming, i.e., the "human-induced greenhouse effect" has been afforded by world leaders. It will play an important role in national and international policy formulation. Among the policy issues on the international agenda are the content of a proposed international climate convention and possible international measures to control greenhouse gas emissions. The science assessment provides the community with the means to inform government, industry, and environmentalists worldwide of the current state of knowledge concerning global climate change and its potential consequences. However, it is important to note that the science assessment contains no policy recommendations.

Reviewers were selected through a nomination process undertaken by the Committee on Earth Sciences (CES) in concert with the National Academy of Sciences (NAS). CES agency representatives were asked to nominate respected scientists in different fields to serve as reviewers. Hundreds of names were submitted with some scientists receiving nominations to serve as reviewers on several chapters. This list was pared down to a manageable number; and on March 16, the review packages were sent out with an urgent request to return comments within a two-week period in order to meet a tight deadline to have the assessment ready by late June. At present, the reviews are being collected and prepared for return to the IPCC chapter authors. The review process is being coordinated by Dan Albritton of NOAA, Robert Watson of NASA (both representing the OSTP Committee on Earth Sciences), and John Perry of the National Academy of Sciences. It is intended to be a review by the best individual scientists in America but is not a U.S. government review. The working

group will meet May 23-25 in Windsor, U.K., to review the revised document.

Working Group 2 - Impacts

The second meeting of co-chairs and lead authors was held February 26 - March 4, 1990, in Moscow and Nalchik, USSR, with the U.S. represented by J. Reilly (USDA); H. Lins (USGS); A. Hecht (EPA); E. Stakhiv (Army COE); R. Ball (DOE); and J. Everett and W. Sprigg (both of NOAA). The group worked on an Executive Summary and the full report containing six chapters: Agriculture and Forestry; Natural Ecosystems; Hydrology and Water Resources; Human Settlement, Energy, Transport, Industry, Human Health, Air Pollution and UV-B; World Ocean and Coastal Zones; and Cryosphere. The proposed schedule provides for reviews, changes, and editing to be completed by May 14, 1990, and then transmittal of U.S. review results to the IPCC Secretariat.

The six chapters and the lead authors for the chapters of the Working Group 2 report are:

- 1) Agriculture and Forestry - Martin Parry (UK)
- 2) Natural Terrestrial Ecosystems - Kirk Dawson (Canada)
- 3) Hydrology and Water Resources - Harry Lins and Morgan Rees (US)
- 4) Human Settlement, Energy, Transport, Industry, Human Health, Air Pollution and UV-B - M. Hashimoto (Japan) and John Topping (US)
- 5) World Ocean and Coastal Zones - A. Tysban (USSR) and James Titus (US)
- 6) Cryosphere (Seasonal Snow Cover, Ice, and Permafrost) - Roger Street (Canada)

Working Group 3 - Response Strategies

The Energy and Industry Subgroup (EIS) has held a number of meetings to collect information for its report. Several countries have been preparing energy emissions case studies that provide the primary data base. The EIS is developing an integration framework for the reference case scenario using country case study submissions. The U.S. EPA has submitted a study of policy alternatives for selected developing countries, centrally-planned economies, and industrialized states which should assist in filling gaps in the available data.

The Agriculture, Forestry, and Other Human Activities Subgroup (AFOS) has conducted workshops on boreal forests, temperate forests, tropical forests, tropical savannahs, and agriculture. These workshops focused on assessing the current knowledge of emissions of carbon dioxide, methane, and nitrous oxide from these sources. In addition, the boreal and temperate forest workshops focused on silvicultural technology to improve production, while the tropical forest workshop considered policy options to promote conservation, sustainable agriculture, and reforestation, including the development of an international forestry protocol in conjunction with an energy protocol on fossil fuels. The agricultural emissions workshop focused on understanding and characterizing emissions and identifying emissions-mitigation technologies for agricultural systems in boreal, temperate, and tropical climate zones, and for rice and livestock production systems.

The Coastal Zone Management Subgroup (CZMS) held its first workshop in late November 1989 on potential strategies to adapt to sea-level rise and other impacts of climate change and considered the socio-economic, legal, environmental, financial, and cultural implications of such strategies. This workshop focused on the Americas, Europe, the Mediterranean, and West Africa. A second workshop in February 1990 examined the concerns of other continents and island nations. Draft chapters for the final CZMS report based on these two workshops are now being prepared.

The Resource Use Management Subgroup (RUMS) held a workshop in late October 1989 on food security, biological diversity, agriculture, forests, fisheries, animal husbandry, water resources, unmanaged ecosystems, salinization and desertification, and land-use management. Response strategies were classified in three categories: (1) those actions which are necessary to develop the knowledge base essential for making decisions; (2) those which could make sense whether or not climate were to change and, therefore, could be considered in the short run; and (3) those which, because of their costs, could wait for better definition of the magnitude and timing of climate change. A drafting group is now preparing a draft subgroup report which the RUMS is scheduled to finalize at a meeting in late April 1990.

In addition to the work of the subgroups, Working Group 3 has developed scenarios for future greenhouse gas emissions. A group of experts from the United States and the Netherlands developed scenarios for the radiative equivalent of a doubling of pre-industrial carbon dioxide levels by 2030, 2060, and 2090. In response to a request at the IPCC's second plenary for additional scenarios, the experts' group has developed a fourth and fifth scenario in which greenhouse gas concentrations stabilize by the

middle of the next century at a level well below an equivalent double of pre-industrial carbon dioxide. A level of 165 percent of pre-industrial levels has been adopted for these scenarios. In the fourth scenario, global carbon emissions from energy still continue to increase through 2000, but total emissions of carbon decline as a result of reforestation. In the fifth scenario, emissions' reductions similar to the fourth scenario are made on a tighter time schedule resulting in an earlier stabilization.

Working Group 3 sponsored a workshop in October 1989 to consider implementation mechanisms in the areas of public information and education, financial measures, technology development and transfer, economic measures, and legal measures, including elements of a framework convention on climate change. The five implementation measures reports remain open for further comment until April 1, after which the topic coordinators will finalize these papers.

The subgroup reports will be finalized by mid to late April with the exception of the EIS (which will be received by May 7). The Working Group 3 report is expected to be 200 pages long, and the large body of supporting data will also become available. Working Group 3 will meet in early June to review and adopt its final report to the IPCC.

Working Group 3 officers have considered recent international discussions relevant to its work, in particular the November 6-7, 1989, ministerial conference in Noordwijk. The conference declaration contains a number of demands to the IPCC which are within the area of competence of Working Group 3, in particular the EIS, AFOS, and the Task A group. A meeting will be held by the EIS subgroup in June in the U.K. to discuss some of these demands.

SECOND WORLD CLIMATE CONFERENCE AGENDA

OBJECTIVES

The objectives of the Second World Climate Conference are:

To create an awareness through specific case studies or examples drawn from experience in the World Climate Programme of the economic impact of climate and benefits from climate applications

To assess the current state of knowledge on the global issues of climate change and greenhouse gases and requirements for future scientific activity and implications for public policy

In terms of the Conference outputs now anticipated the objectives have been translated into the following goals:

To formulate recommendations for the continuing World Climate Programme taking into account the report of the IPCC, with a primary goal of insuring that authoritative scientific information is continually obtained and provided to governments for evaluating impacts, implementing responses, and developing additional international policies to address the issues of global climate change, environmentally sound and sustainable development, the survival of species, and the quality of human life

To provide an opportunity for ministers:

- 1) To consider specific follow-up actions pertaining to the Noordwijk Declaration and the IPCC Report in an effort to identify elements that could form the basis for negotiations of the climate convention;
- 2) To consider the special needs of developing countries including improvement of their access to climate data and information and to technology and additional financial resources;
- 3) To consider specific goals for enhancing intergovernmental co-operation in monitoring, detecting and predicting global climate change

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PROGRAMME NOTES

All sessions will take place at the International Conference Centre, Geneva.

The Scientific/Technical part of the Conference will occupy the first six days, 29 October to 3 November 1990 inclusive. Attendance will be by invitation, on the basis of personal expertise plus adjustments for appropriate interdisciplinary and geographical representation. For this part of the meeting the sessions will begin at 08:45 each day and will end at approximately 18:00. The lunch break will be from 12:15 to 14:00 and coffee breaks will be from 10:15 to 10:45 and from 15:45 to 16:15. All sessions will be in Salle I unless otherwise noted.

The sessions listed in the programme are identified by a number and a letter. For example session 3A is the first session on the 3rd day of the Conference (31 October). There are basically four sessions per day - A and B in the mornings and C and D in the afternoons. Extra sessions are designated by X, Y and Z. Roman numerals I, II and III designate the Salles (meeting rooms) in the case of concurrent events.

The Ministerial Meeting will take place on the final two days, 6-7 November. Those attending will be members of delegations named by participating countries, observers designated by international agencies and Conference staff and resource people.

An Accompanying Persons Programme is being planned which will include a listing of optional day trips commercially available on 4 and 5 November.

In general participants will be expected to bear their own costs. Some financial assistance is available for those from developing countries.

SECOND WORLD CLIMATE CONFERENCE PROGRAMME 3

Day 1 - Monday 29 October

Time Session

Introduction - Opening Remarks

- | | | | |
|-------|----|-----|---|
| 08:45 | 1A | (1) | Secretary-General, WMO
G.O.P. Obasi |
| | | (2) | Executive Director, UNEP
M. K. Tolba |
| | | (3) | Director General, Unesco
F. Mayor |
| | | (4) | President, ICSU
M.G.K. Menon |

The IPCC Report

- | | | | |
|-------|----|-----|---|
| 10:45 | 1B | (1) | The Intergovernmental Panel on Climate Change
B. Bolin (Sweden) |
| | | (2) | Greenhouse Gases and Climate Change
Research: The IPCC Work Group 1 Report
J. Houghton (UK) |
| | | (3) | Climate Change Impact Studies: The IPCC
Work Group 2 Report
Yu. Izrael (USSR) |
| 14:00 | 1C | (1) | Strategies Responding to Climate
Change: The IPCC Work Group 3 Report
F. Bernthal (USA) |

Overviews of the WCP

- | | | | |
|-------|----|-----|---|
| 15:00 | 1Y | (1) | The World Climate Programme
J.P. Bruce (Canada) |
| 16:15 | 1D | (1) | Modern Data and Applications: WCDP, WCAP
V. Boldirev (WMO) |
| | | (2) | Research on Climate: WCRP
P. Morel (WMO/ICSU) |
| | | (3) | Impacts of Climate: WCIP
J. Dooge (Ireland) |

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SECOND WORLD CONFERENCE PROGRAMME

Day 2 - Tuesday 30 OctoberTime SessionData and Applications (WCDP, WCAP)

- | | | | |
|-------|----|-----|--|
| 08:45 | 2A | (1) | Paleoclimatology, Proxy Data, Past Climates and Climate Changes
H. Oeschger (Switzerland) |
| | | (2) | Climate, Water and Development
J. Sircoulon (France) |
| 10:45 | 2B | (1) | Agriculture and Food Systems
M. S. Swaminathan (India) |
| | | (2) | Drought Planning
W. Degefu (Ethiopia)
M. Glantz (USA) |
| 14:00 | 2C | (1) | Energy
T. Johansson (Sweden) |
| | | (2) | Land Use
M. El Kassas (Egypt) |
| 16:15 | 2D | (1) | Forestry
R. Herrera (Venezuela) |
| | | (2) | Urban Planning
R. Taesler (Sweden) |
| | | (3) | Human Health
R. Mertens (Belgium)
W. Weihe (Switzerland) |

Day 3 - Wednesday 31 OctoberTime SessionData and Applications (WCDP, WCAP)(continued)

- | | | | |
|-------|----|-----|---|
| 08:45 | 3A | (1) | Oceans and Fisheries
P. A. Bernal (Chile)
T. Kawasaki (Japan) |
| | | (2) | Climate, Environment and Ecology
(TBA)
(TBA) |

Climate Research (WCRP)

- | | | | |
|-------|----|-----|---|
| 10:45 | 3B | (1) | Global Climate, Energy and Water Cycle
G. A. McBean (Canada) |
| | | (2) | World Ocean Circulation and Climate Change
D.J. Baker (USA) |
| 14:00 | 3C | (1) | Short-term Climate Variability and Predictions
J. Shukla (USA) |

Climate and Climate Change Impacts (WCIP)

- 14:40 3Y (1) Regional Impact Studies Methodology
A. Magalhaes (Brazil)
W. Riebsame (USA)
- (2) Agriculture Case Studies
Zhang Jia Chen (China)
M. Parry (UK)
- 16:15 3D (1) Sea Level Rise
E.M. Eid (Egypt)
C.H. Hulsbergen (Netherlands)
- (2) Climate, Climate Change and Economy
N.S. Jodha (Nepal)
J. Maunder (New Zealand)
- 17:30 3Z Introduction to Task Groups
H.L. Ferguson (Co-ordinator SWCC)
- 17:30 Poster Session*

Day 4 - Thursday 1 November

Time Session

- 08:45 4A Special Problems in Climate and Climate Change*
- (1) Climate and Climate Impact Prediction based on
Past and Current Analogues
M. Budyko (USSR)
- (2) Detecting Climate Change Using Current Data
T. Wigley (UK)
- 10:45 4B Round Tables:
- (I) Salle I - Global Climate Analogues and
Global Climate Models
- (II) Salle II - Climate and Environmentally
Sustainable Economic Development
- (III) Salle III - Industry's Response to
Climate Change
- 14:00 4C IPCC Work Group Activities
- (1) Greenhouse Gases and other Climate Forcing (WG1)
E. Sanhueza (Venezuela)
U. Siegenthaler (Switzerland)
- (2) Climate Change Publications (WG1)
J. Mitchell (UK)
Zeng Quing-cun (China)
- (3) Climate Trends and Variability (WG1)
M. Coughlan (Australia)
B.S. Nyenzi (Tanzania)
- 16:15 4D (1) Hydrology and Water Resource Impacts (WG2)
H. Linz (US)
J. A. Shiklamanov (USSR)
- (2) Impacts on Industry, Transportation, Settlements
and Health (WG2)
S.K. Sinha (India)
- (3) Impacts on Agriculture, Forestry and
Land Use (WG2)
M. Hashimoto (Japan)
S. Nishioka (Japan)

* For those not participating in Task Groups (See note on Task Groups, p. 9)

Day 5 - Friday 2 November

Time Session

<u>IPCC Work Group Activities (continued)</u>		
08:45	5A	(1) Future Emissions (WG3) P. Vellinga (Netherlands)
		(2) Adaptation Strategies (WG3) M. Sarma (India)
		(3) Limitation Strategies (WG3) K. Yokobori (Japan)
<u>Special Problems in Climate and Climate Change (continued)</u>		
10:45	5B	(1) Survey Paper on Risk Management K. Turner (UK)
11:45	5X	<u>Guidance for Task Groups</u> G. Goodman (Sweden)
11:45		<u>Poster Session*</u>
14:00	5PS	<u>Poster Session* (continued)</u>
<u>Special Problems in Climate and Climate Change* (continued) (Concurrent Sessions in Salles II and III)</u>		
14:30	5C-II	(1) Climate, Tropical Ecosystems and the Survivability of Species (TBA)
		(2) Remote Sensing and Global Climate Change H. Grassl (FRG) R. Watson (USA)
	5C-III	(1) Climate, Population and Global Climate Change N. Keyfitz (USA)
		(2) Public Information and Attitudes (TBA)
		<u>(Plenary)</u>
16:15	5D	(1) Statements by Non-Governmental Organizations
16:45		(2) Panel Discussion on Climate Change Science and Technology and Development Aid

* For those not participating in Task Groups

(07.03.90)

Special Problems in Climate and Climate Change (continued)

08:45 6A Panel Discussion on Co-operation in
International Research Programmes

Task Group Reports

10:45 6B Presentation and discussion of reports and
recommendations

14:00 6C Discussion continues

Conference Statement

16:15 6D Discussion of the Conference
Statement and Recommendations

Note on Task Groups

It is planned to have 12 Task Groups of 14 participants each (limited by the size of rooms available). These Task Groups will convene on 1 November (08:45-12:15) and on 2 November (14:00-18:00). The Task Groups are:

- TG 1 - Water
- TG 2 - Agriculture and Food
- TG 3 - Oceans and Coastal Zones
- TG 4 - Energy
- TG 5 - Land Use and Urban Planning
- TG 6 - Human Dimensions
- TG 7 - Environment and Development
- TG 8 - Forests
- TG 9 - World Climate Programme Overview and Future
- TG 10 - World Climate Programme Overview and Future
- TG 11 - Scientific Components of International Agreements
- TG 12 - Synthesis

Each Task Group will be expected to produce a one-page (or less) summary and recommendations by 18:00, 2 November and a longer report (up to 6 pages) subsequently for publication in the Proceedings. The recommendations would be discussed in Plenary on Saturday, 3 November.

A Consultation Group on the Special Needs of Developing Countries will be organized in a similar fashion to the Task Groups. It will also be able to meet Thursday a.m. 1 November and Friday p.m. 2 November and provide its recommendations to Plenary.

10 SECOND WORLD CLIMATE CONFERENCE PROGRAMME

Day 9 - Tuesday 6 November

Time Session

Ministerial Meetings*

08:45	9A	Opening Ceremonies, Statements by Heads of Government
10:00		Coffee
10:30	9B	Statements by Heads of Government
12:00		Lunch
14:00	9C	Country Statements/Reports by Ministers
15:30		Coffee
16:00	9D	Country Statements (continued)

Day 10 - Wednesday 7 November

Ministerial Meeting (continued)

08:45	10A	Country Statements (continued)
10:00		Coffee
10:30	10B	Country Statements (continued)
12:00		Lunch
14:00	10C	Adoption of Declaration and Action Plan; Closing Ceremonies
16:00		Press Conference

* More detailed plans for the Ministerial part of the Second World Climate Conference will be developed in consultation with governments.

SECOND WORLD CLIMATE CONFERENCE PROGRAMME 11

TASK GROUP	CHAIR	DISCUSSION LEADER
1) WATER	Z. KACZMAREK (POLAND)	L. OYEBANDE (NIGERIA)*
2) AGRICULTURE AND FOOD	H. NIX (AUSTRALIA)	S. SCHNEIDER (USA)
3) OCEANS	G. MARCHUK (USSR)*	J. D. WOODS (UK)
4) ENERGY	J. GOLDEMBERG (BRAZIL)	A. REDDY (INDIA)*
5) LAND USE AND URBAN PLANNING	V. M. KOTLYAKOV (USSR)	R. L. KINTANAR (PHILIPPINES)
6) HUMAN HEALTH	L. GRANT (USA)	TBA
7) ENVIRONMENT & DEVELOPMENT	E. SALIM (INDONESIA)*	M. HOLDGATE (UK)
8) FORESTRY	J. GILBERT (NEW ZEALAND)*	A. SHUGART (USA)
9) WCP OVERVIEW	F. K. HARE (CANADA)	TBA
10) WCP OVERVIEW	W. BOHME (GDR)	I. LANG (HUNGARY)
11) SCIENCE & INTL AGREEMENTS	R. M. WHITE (USA)	A.O. ADEDE (UN)*
12) SYNTHESIS	T. MALONE (USA)	G. S. GOLITSYN (USSR)

* To be confirmed

(07.03.90)

(9.I.1990)

LIST OF IPCC MEETINGS

SECTION B: 1990

JANUARY

4-5	Reading UK	Workshop: Relative Importance of Climate Forcing Agencies	IPCC WGI
9-12	Sao Paulo Brazil	Workshop: Tropical Forests, WGIII (AFOS)	Govts. of USA/ Brazil/IPCC WGIII
10-11 (WCP-478)	Washington D.C.	Workshop Comparison of Observations and Simulations	IPCC WGI

FEBRUARY

2	Washington	Informal officers RSWG meeting	IPCC WG III
5-7	Washington	IPCC, Third Session	Govt. of USA/IPCC
8	Washington	IPCC Bureau, Second Session	Govt. of USA/IPCC
8-9	Washington	Energy and Industry Subgroup	IPCC WGIII
9	Washington	IPCC Special Committee on Developing Countries Second Session	Govt. of USA/IPCC
19-23	Perth Australia	Coastal Zone Management Subgroup	IPCC WGIII
26-2 March	Edinburgh	Lead Authors' Meeting	IPCC WGI
27 - 2 March	Nalchik USSR	Co-chairmen meeting	IPCC WGII

APRIL

5-6	Special Committee on Developing Country Participation, Designated Drafting Group, Paris		
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23-25	Geneva	Resource Use and Management Subgroup	IPCC WGIII
26-27	Geneva	Subgroup on Agriculture, Forestry and other Human activities	IPCC WGIII

MAY

1-3	IPCC Working Group 3, Subgroup on Coastal Zone Management, Final Drafting Session, The Hague (venue to be confirmed)		
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23-25	Windsor, UK	Second session, approval of report of the WG	Govt. of UK/ IPCC WGI
28-31	Moscow	Third session, approval of report of the WG	Govt. of USSR/ WGII

JUNE

5-8	TBD	Third Session, approval of report of the WG	IPCC WGIII
18-20	Geneva	Drafting Committee	IPCC

AUGUST

27-30	Sundsvall, Sweden	IPCC fourth session, approval of first assessment report of IPCC	Govt. Sweden/IPCC
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OCTOBER

29-7 Nov.	Geneva	Second World Climate Conference	WMO/UNEP/UNESCO ICSU
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ANNEX B

TIMETABLE FOR THE COMPLETION OF THE IPOC FIRST ASSESSMENT REPORT

1990

- 1 May WG + Special Committee drafts received in the IPOC Secretariat (except for the report of the Energy and Industry Subgroup (EIS) of WG III).
- 4 May First mailing of Part II and the 4 policy-makers' summaries without the EIS report (English only).
- 7 May EIS report received in the IPOC Secretariat.
- 10 May Second mailing of Part II and the 4 policy-makers' summaries including the EIS report (English only).
- 23-25 May WG I Plenary, Windsor, UK.
- 31- 1 June Special Committee Plenary, Geneva, Switzerland.
- 4 June Camera-ready copies (and diskettes)* of the report (a) of WG I and (b) of the Special Committee received in the IPOC Secretariat, together with the policy-makers' summaries.
- 5 June Distribution of the report (a) of WG I and (b) of the Special Committee to the translators (the policy-makers' summaries will be translated by the IPOC Secretariat).
- 28-31 May WG II Plenary, Moscow, USSR.
- 11 June Camera-ready copies (and diskettes)* of the report of WG II received in the IPOC Secretariat, together with the policy-makers' summaries.
- 12 June Distribution of the report of WG II to the translators (the policy-makers' summary will be translated by the IPOC Secretariat).
- 5- 8 June WG III Plenary, Geneva, Switzerland.

1990

- 14 June Camera-ready copies (and diskettes)* of the report of WG III received in the IPCC Secretariat, together with the policy-makers' summary.
- 15 June Distribution of the report of WG III to the translators (the policy-makers' summary will be translated by the IPCC Secretariat).
- First mailing of the WG and Special Committee reports and the policy-makers' summaries (in English) to all member governments of WMO and UN and others (intergovernmental organizations, NGO's, individuals) as per IPCC instructions.
- 18-20 June IPCC Drafting Committee to complete the draft IPCC summary. Draft IPCC summary to be translated by the IPCC Secretariat.
- 16 July All translated material received in the IPCC Secretariat.
- 23 July Second mailing of the IPCC first assessment report (containing the draft IPCC summary) to all member governments of WMO and UN and to others as instructed by IPCC.
- 27-30 August Fourth Plenary of IPCC, Sundsvall, Sweden.
- 1 September IPCC first assessment report completed.

* See format guidelines (Annex C) for requirements.

US PROPOSES TO HOST FIRST DISCUSSIONS OF FRAMEWORK CLIMATE CONVENTION

THE PRESIDENT'S ENVIRONMENTAL INITIATIVES DURING THE MALTA SUMMIT

President Bush proposed:

1. Hosting a conference to negotiate a framework convention on global climate change, after the working groups of the UN-sponsored IPCC submit their final report.
2. Convening an international meeting at the White House next spring for top-level scientific, environmental and economic officials to discuss global climate change. At the Summit, the President expressed hope that the Soviets will join us by sending their top officials in the field.

US AGENCY COORDINATION OF CLIMATE POLICY

The Department of State has created a new office of Global Change under the Assistant Secretary for Oceans and International Environmental and Scientific Affairs. The Office is directed by Mr. Daniel A. Reifsnyder (Telephone 647-4069).

Several fora provide development and coordination of U.S. policy on climate change and coordination of U.S. participation in the IPCC. The Committees and their responsibilities are summarized below:

DOMESTIC POLICY COUNCIL: WORKING GROUP ON GLOBAL CHANGE (Chaired by D. Allan Bromley, OSTP)

To insure aggressive development of U.S. policy on global change, the President set up a new Working Group on Global Change under the Domestic Policy Council, chaired by his Science Advisor, D. Allan Bromley. The working group has called for a series of studies to compile information for policy-making based on sound scientific principles and strong economic growth. Three studies are under way:

-----*Economic Impacts*, chaired by the Council of Economic Advisors;

-----*Role of the Private Sector*, chaired by Department of Interior and Department of Energy;

-----*Legal Precedents for International Agreements and Conventions*,
Chaired by Department of State and Department of Justice.

NATIONAL SECURITY COUNCIL POLICY COORDINATING COMMITTEE ON INTERNATIONAL OCEANS AND ENVIRONMENTAL AND SCIENTIFIC AFFAIRS:

(Chaired by Frederick Bernthal, DOS)

Provides overall coordination of U.S. policy regarding international climate issues.

POLICY COORDINATING COMMITTEE WORKING GROUP ON CLIMATE CHANGE
(Chaired by William Nitze, DOS)

-----Develops and implements policy and positions for participation in international climate negotiations,

-----Oversees U.S. participation in IPCC;

-----Provides overall coordination of U.S. participation in IPCC WG 3: Response Strategies, and organizes all WG 3 plenary meetings.

COMMITTEE ON EARTH SCIENCES
(chaired by Dallas Peck, USGS)

-----Provides overall coordination of planning of scientific research on global change

-----Provides overall coordination of U.S. participation in IPCC WG 1 on science

-----Prepares annual budget cross-cut with OMB

-----Provides liaison to IGBP

-----Reports to OSTP and President: Our Changing Planet: The FY 1990 Research Plan (July, 1989)

NATIONAL CLIMATE PROGRAM POLICY BOARD
(Chaired by Eugene Bierly, NSF)

-----Coordinates interagency activities in applied climatology and climate services

-----Provides overall coordination of U.S. participation in IPCC WG 2: Climate Impacts.

-----Reports to Congress and the President: National Climate Program 5 Year Plan. (1989)

IPCC SCHEDULE OF MEETINGS and related conferences

1989
DECEMBER

11-14 Bonn, Workshop: Energy and Environment.....WG 3
12-14 Washington, Workshop on agricultural impacts.....WG 3
18-21 **Cairo, World Conference on Preparing for Climate Change**
11-15 Brisbane, Subgroup on model predictions.....WG 1

JANUARY

9-12 Sao Paulo, Workshop on Tropical Forests.....WG 3

FEBRUARY 1990

5-7 Washington, Plenary Third Session.....IPCC

26 -

MARCH 2 UK: Meeting of lead authors to review first draft of report.....WG 1

MAY

8-16 **Bergen, Conference on "Action for our Future."**

23-25 UK: Meeting of lead authors to finalize assessment report.....WG 1

----- Tashkent, Meeting of Steering Committee and Lead authors.....WG 2

[Spring] Washington: Proposed White House Conference on Scientific and Economic Research

JUNE

4-8 Geneva, Meeting to adopt final report.....WG 3

25-26 Geneva, Bureau Meeting.....IPCC

JULY Houston: G-7 Economic Summit

AUGUST

27-30 Sundsvall, Sweden, 4th Session of IPCC

OCTOBER

29-NOV 7 Geneva, Second World Climate Conference

**FULL MEETING OF THE IPCC, WASHINGTON D.C.
February 2-9**

Tentative schedule for IPCC meeting. Georgetown University

February 2

- IPCC Working Group 3, informal meeting of officers
- WG 3 special committee on participation of LDCs

February 5-7

- IPCC Plenary - Leaveny Cnter, Georgetown University

February 8

- IPCC Bureau

February 8-9

- RSWG (WG 3) EIS Subgroup (Energy and Industry)

NOTICES

THE NCPO has moved its office to a new location:

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Universal Building, Suite 518
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Telephone 202 673-5360
FAX 202 673 5355

Dr. William Sprigg is the Acting Director of NCPO replacing Dr. Alan Hecht who is now Deputy Assistant Administrator for International Activities, EPA.



UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
Rockville, Md. 20852
NATIONAL CLIMATE PROGRAM OFFICE

U.S. IPCC NEWS

NUMBER 1/MARCH 1989

The National Climate Program Office (NCPO) will report on activities of the IPCC to federal agencies, nongovernmental organizations, industry and other groups. Please direct all inquiries to:

Mr. Mason Charak,
NCPO/NOAA, 11400 ROCKVILLE PIKE,
ROCKVILLE, MARYLAND 20852, (301 443-8981)

COMPILED AND EDITED BY THE NATIONAL CLIMATE
PROGRAM OFFICE IN COOPERATION WITH THE
DEPARTMENT OF STATE.



INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE ORGANIZED

At the request of the governing bodies of the World Meteorological Organization (WMO) and the United Nations Environmental Program (UNEP), an Intergovernmental Panel on Climate Change (IPCC) was established to address the issue of climate change, its environmental, economic and social impacts, and possible national and international response to such changes. The first meeting of the IPCC took place in Geneva, November 9-11, 1988. Approximately 35 countries, including the U.S. and U.S.S.R and several international organizations were in attendance.

At this meeting both the Secretary General of WMO, G.O.P. Obasi and Executive Director of UNEP, M. Tolba, underscored the importance of the IPCC particularly in light of discussion within the UN General Assembly on climate change. A resolution introduced by Malta calls for the General Assembly to declare "climate as part of the common heritage of mankind." The General Assembly has requested that the report of the IPCC be delivered to them by September of 1990.

Consequently, the IPCC established three working groups on research, impacts and policy responses:

1) Working Group 1: review state and knowledge of the science of climate and climate change, with special emphasis on global warming

(2) Working Group 2: review programs and conduct studies of the social and economic impacts

(3) Working Group 3: develop and evaluate possible policy responses by Governments to delay, or mitigate the impact of adverse climate change

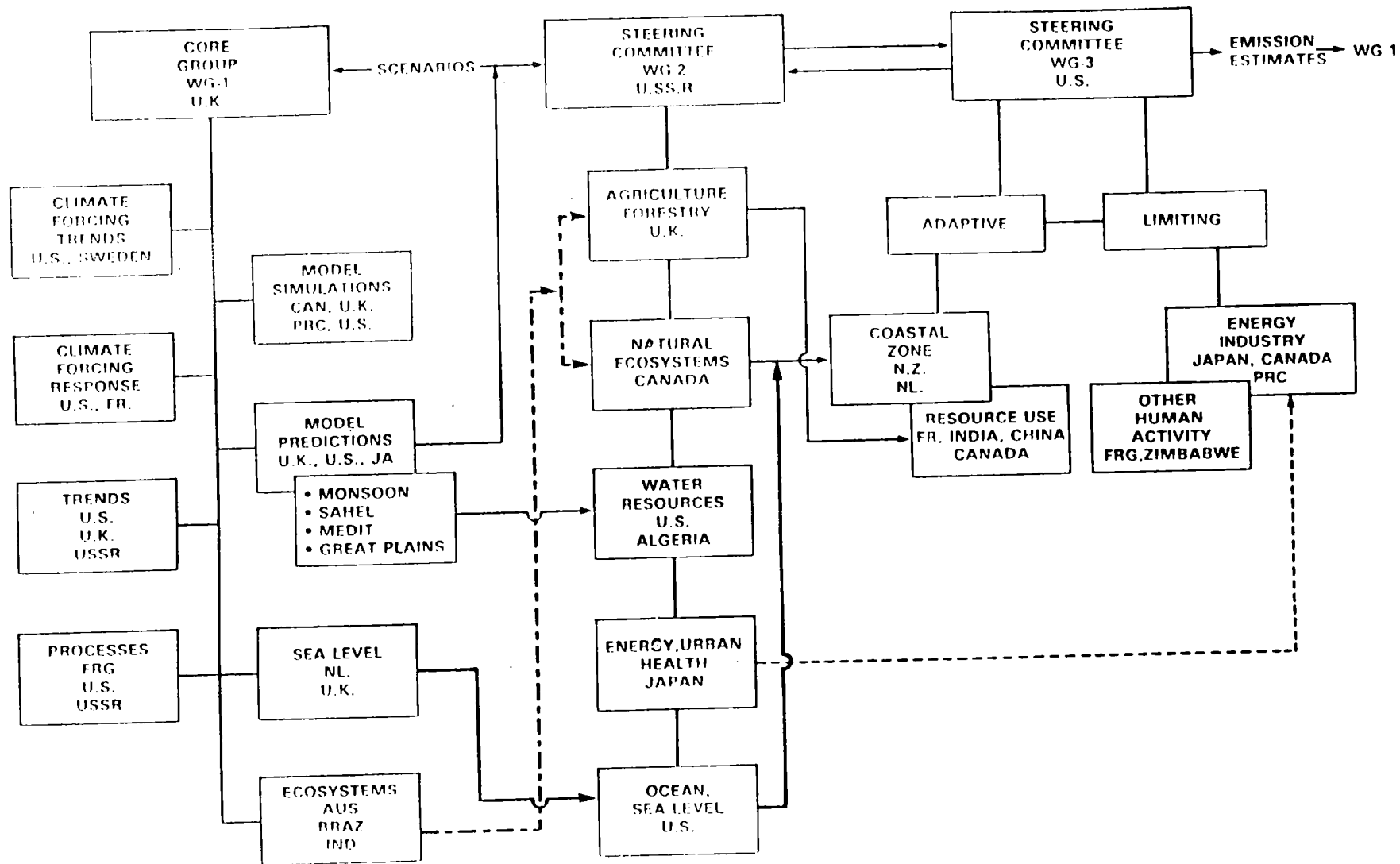
Nations which will chair the groups, vice-chairs and members are shown below. Others nations can participate in the working groups as they desire:

	WG 1 SCIENCE	WG 2 IMPACTS	WG 3 RESPONSES
CHAIR:	UK	USSR	US
V/CHAIR:	BRAZIL SENEGAL	AUSTRALIA JAPAN	CANADA CHINA MALTA NETHEPLANDS ZIMBAWE
MEMBERS:	CHINA FRG ITALY JAPAN DENMARK SWITZERLAND TANZANIA USA USSR KENYA	ALGERIA CANADA FINLAND INDIA ISRAEL MEXICO NEW ZEALAND NIGERIA INDONESIA	AUSTRALIA BRAZIL GDR INDIA JAPAN SWEDEN UK USSR NORWAY FRANCE SAUDI ARABIA

ORGANIZATION OF WORKING GROUPS OF THE IPCC

Each WG of the IPCC has established a Steering Committee, or Core Group and several subgroups to organize the preparation of each report. The attached figure shows the subgroups and identifies countries which have lead roles. (Note for WG 2, the USSR will co-chair each subgroup). While the US (and the UK) are not core members of WG 2, each country is expected to play a major role in activities of this group. The connections shown in the figure indicate similar subjects addressed by different working groups.

INTERACTIONS OF IPCC SUBGROUPS



SCHEDULE OF IPCC AND RELATED MEETINGS 1

1989	WG 1	WG2	WG3
1	UK: Organization (Jan 27-29)		
2		Moscow: Organization (Feb 2-3)	DC: Organization (Jan 30-Feb 2)
	IIASA Modeling	IIASA Regional Impact (Feb 20-25)	IEA Study Group (Paris)
3	Lead authors GFDL (March 7-8)		
4	Subgroup Workshops		OECD/IEA Technology Options (Paris)
			IEA "Analytical tool for dealing with climate change" (Paris)
5	Trends and modeling: Amherst 2	Moscow: Lead authors	WG 3 Review: Geneva (May 8-12)
6		Impact and scenarios Berlin 3	
7	First draft of Subgroup report		
8	UK IAMAP [authors meetings]	[Authors' meeting]	
9	IAMAP FRG	Coastal zone workshops	
10	WMO Modeling Subgroup workshops		
12	Lead authors meeting Peer review	First Draft of report	

NOTES FOR TIMETABLE:

1. Schedule will be updated regularly. IPCC will meet in Nairobi June 28-30, 1989; Organizing committee of the Second World Climate Conference meets in Geneva in June 1-2.
2. Meeting organized by DOE and NCPO to focus on comparing model projections and climate trends. WG 1 authors will meet to review chapter on climate trends.
3. US-USSR Bilateral meeting to prepare special report on climate and review paleoclimate models as analogues of future climates. Jointly organized by Aspen Institute and NCPO.

WG 1 LEAD AUTHORS MEETING, GFDL, PRINCETON MARCH 7-8, 1989

NOAA'S GFDL will host a meeting of lead authors to plan preparation and review of the science assessment. Agenda for meeting:

1. Opening and introduction--short review of IPCC activities
2. Agreement of objectives
3. Guidelines for report to IPCC
4. Discussion of section outlines provided by lead authors
5. Work Plan and timetable
6. Contributors to sections
7. Peer Review Process

MODELING AND CLIMATE TRENDS CONFERENCE

Working Groups of the IPCC will take advantage of planned national and international meetings and conferences as an opportunity to prepare material for the IPCC reports. One especially important conference has been organized by DOE on Greenhouse-Gas-Induced Climatic Change: A Critical Appraisal of Simulations and Observations which will be held in May 1989, at the University of Massachusetts. The NCPO Climate Trends Panel and members of IPCC WG 1 will meet concurrently at this meeting to:

- 1) Present and evaluate the current status of the observed and reconstructed climate data sets and the climate model simulations of climate, and
- 2) Critically evaluate the comparison of the observations and the model simulations as to whether or not climate has changed and whether or not any changes are greenhouse-gas-related.

The workshop is designed to ascertain whether or not a greenhouse-induced climate change has occurred and if not, to estimate when such a climate change will likely become detectable against the background of natural climate variability. It is expected that some 45 scientists from 11 countries will participate in the workshop.

CONTACT MICHAEL RICHES, DOE (301 353-3281)
FOR ADDITIONAL INFORMATION

*any
updates
avail?*

SECOND WORLD CLIMATE CONFERENCE PLANNED

Reports of the IPCC will be presented at the SWCC being organized by WMO and UNEP for Geneva, November, 1990. U.S. representatives to the organizing committee of the SWCC are Eugene Bierly, NSF and Chairman Climate Program Policy Board and Ted Williams, DOE

A Planning meeting for the SWCC is scheduled for June, 1989. At this meeting, the organizing committee will review the following proposed structure for the SWCC and list of invited speakers.

The Climate Program Policy Board will meet in April to review plans for the SWCC.

For Information, please contact Eugene Bierly, NSF 202 357-9874

STRUCTURE OF THE SECOND WORLD CLIMATE CONFERENCE *

	<u>Session</u> (half-day)	<u>Topic</u>
Mon	1.	Opening statements
	2.	Nature of climate applications Progress under WCAP and WCDP Food and land use Fisheries
Tues	3.	Forestry Water resources Health Urban development
	4.	Energy General discussion on Applications
Weds	5.	Past and present climate Detection of climate change — Climate and terrestrial eco-systems Progress under WCRP
	6.	Greenhouse gases Climate prediction Role of ocean in climate change Global hydrological cycle
Thurs	7.	Discussion of the report (if available) of the IPCC WG I General discussion on scientific aspects of climate change
	8.	Report on the WCIP Climate impact methodology Modelling of climate impact Integrated regional assessments Education and training on climate impacts
Fri	9.	Agricultural case studies Drought planning and preparedness Sea level rise Environmental impact Social impact and response
	10.	Discussion of reports (if available) of the IPCC WG II and WG III General discussion on impacts and responses
Mon	11.) 12.)	Statements by national representatives, IGOs, NGOs **
Tues	13.	Reserve (Drafting)
	14.	Conference summary and statement

* Details of structure and list of suggested speakers under items 5-10 are subject to development of activities of the IPCC Working Groups

** Possibility of poster display would be envisaged

TENTATIVE LIST OF SPEAKERS

A. Applications

General	Maunder (N.Z.)
WCAP	Chairman of ACCAD
Food	Zhang (PRC)
Fisheries	Expert from Japan
Forestry	Herrera (Venezuela)
Water Resources	Shiklomanov (USSR)
Health	Weihe (Switzerland)
Urban	Taesler (Sweden)
Energy	Jäger (FRG)
Discussion leader	

B. Scientific aspects

Past and present climate	Oeschger (Switzerland)
Detection of climate change	Wigley (UK)
Climate and terrestrial eco-systems	Kassas (Egypt)
Programmes under WCRP	President of JSC
Greenhouse gases	Golitsyn (USSR)
Climate prediction	Gates (USA)
Role of ocean in climate change	Bryan (USA)
Global hydrological cycle	André (France)
Discussion leader	

C. Impacts and responses

WCIP	Chairman of SAC
Methodology	Riebsame (USA)
Modelling	Panturat (Thailand)
Integrated assessment	Magelhaes (Brazil)
Education and training	Njoroge (Kenya)
Agriculture	Parry (UK)
Drought preparedness	Degefu (Ethiopia)
Sea level	Vellinga (Netherlands)
Environmental impact	Izrael (USSR)
Social impact and responses	Expert from FRG

DIRECTORY OF U.S. AGENCY CONTACTS

The following list will be updated periodically. Agencies should send additions and changes to the NCPD.

See annex for AGENCY CONTACT TELEPHONE DIRECTORY

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202 377-3567

Alan D. Hecht: National Climate Program Office
301 443-8646 OMNET: A.Hecht
Fax: 301 443-8328

NATIONAL CLIMATE PROGRAM POLICY BOARD

The CPPB provides a forum for discussion of IPCC issues among Federal agencies. An updated list of agency representatives to the Policy Board is being prepared.

Chairman: E. Bierly, NSF: 202 357-9874 OMNET: E.Bierly

Executive Secretary:

Alan Hecht, NCPD 301 443-8646 OMNET: A.Hecht
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WORKING GROUP 1 SCIENCE

U.K. provides overall organization and coordination. Contact is Dr. Geoffrey Jenkins, British Meteorological Office, London Road, Bracknell U.K.

Telephone (44) 344 420242 Ext 2673
Fax 44 344 51719

OVERALL U.S. COORDINATION

The Committee on Earth Sciences (CES) is providing overall coordination for US participation in WG1. Contacts are:

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Fax: FTS 969-4466 or 703 648-5470

Robert Corell: NSF and Committee on Earth Sciences
202 357-9715 Omnet: R.Corell
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SCIENCE COORDINATORS

Lead U.S. scientific coordinators and representatives to WG I

Robert Watson: NASA

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Dan Albritton: NOAA/ERL/Boulder

303 497-5785 Omnet: D.Albritton

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CLIMATE FORCING RESPONSES:

RAMANATHAN (UNIV. CHICAGO), MORCRETTE (FRANCE)

CLIMATE VARIABILITY AND TRENDS:

FOLLAND (UK), TRENBERTH (NCAR), VINNIKOV (USSR)

PROCESS STUDIES:

FASSELLMANN (FRG), SCHLESINGER (OSU), MELESHKO (USSR)

MODEL SIMULATIONS:

ROWNTREE (UK), BOER (CANADA), BRYAN (GFDL/NOAA), ZENG (PRC)

MODEL PROJECTIONS:

MITCHELL (UK), MANABE (GFDL/NOAA), GATES (OSU), TOKIOKA (JAPAN)

SEA LEVEL:

OERLEMENS (NETHERLANDS), WARRICK (UK)

ECOSYSTEMS:

SINHA (INDIA), SALATI (BRAZIL)

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Col.Ted Cress: DOD
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Ari Patrinos: DOE
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Eugene Bierly: NSF
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202 357-9892 Omnet: NSF.ATM

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Jack Fellows: OMB
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Fax FTS 395-4817

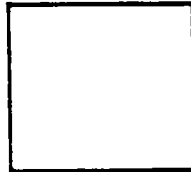
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NATIONAL ACADEMY OF SCIENCE

Board of Atmospheric Sciences
and Committee on Global Change

John Perry:
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WORKING GROUP 2 IMPACTS

THE USSR provides overall coordination; Contact is Dr. Yuri Izrael, State Committee for Hydrometeorology, Moscow. One USSR scientist cochairs each subgroup). Steering Committee chairmen are:

Dr. Michel Budyko, USSR
Dr. Bo Doos, IIASA, Vienna
Dr. Alan D. Hecht, NCPD

Lead U.S. coordinators and representatives to WG 2

Alan Hecht: NCPD
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Mason Charak: NCPD
301 443-8981 Omnet: A.Hecht

Garth Paltridge: NCPD
301 443-8981 Omnet: A.Hecht

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202 343-4951

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202 395-4336

Courtney Riordan: EPA Omnet: P.Jutro
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Joel Smith: EPA Omnet: D.Tirpak
202 475-9655

Robert Hirsch: USGS
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Steve Gaddy: DOI
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Stephen Rawlins: USDA Omnet: S.Rawlins
202 344-4034

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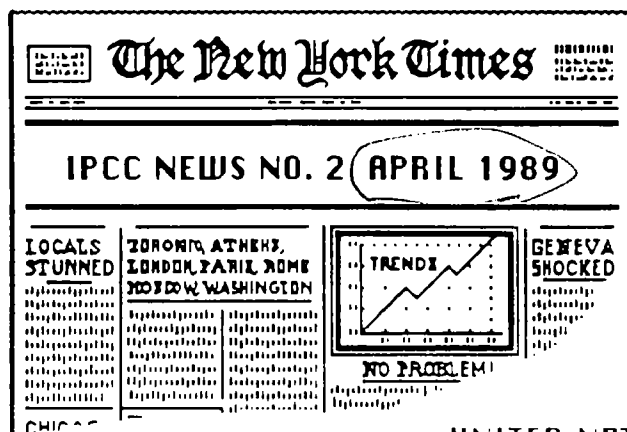
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THIS ISSUE:

UNITED NATIONS RESOLUTION 43/53

UPDATED SCHEDULE OF MEETINGS

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WORKING GROUP 1: REVISED OUTLINE

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NON-GOVERNMENTAL ORGANIZATIONS

WORKING ON GLOBAL CLIMATE CHANGE

**COMPILED AND EDITED BY THE NATIONAL CLIMATE PROGRAM
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General Assembly

Distr.
GENERAL

A/RES/43/53
27 January 1989

Forty-third session
Agenda item 148

RESOLUTION ADOPTED BY THE GENERAL ASSEMBLY

[on the report of the Second Committee (A/43/905)]

43/53. Protection of global climate for present and future generations of mankind

The General Assembly,

Welcoming with appreciation the initiative taken by the Government of Malta in proposing for consideration by the Assembly the item entitled "Conservation of climate as part of the common heritage of mankind",

Concerned that certain human activities could change global climate patterns, threatening present and future generations with potentially severe economic and social consequences,

Noting with concern that the emerging evidence indicates that continued growth in atmospheric concentrations of "greenhouse" gases could produce global warming with an eventual rise in sea levels, the effects of which could be disastrous for mankind if timely steps are not taken at all levels,

Recognizing the need for additional research and scientific studies into all sources and causes of climate change,

Concerned also that emissions of certain substances are depleting the ozone layer and thereby exposing the earth's surface to increased ultra-violet radiation, which may pose a threat to, inter alia, human health, agricultural productivity and animal and marine life, and reaffirming in this context the appeal, contained in its resolution 42/182 of 11 December 1987, to all States that have not yet done so to consider becoming parties to the Vienna Convention for the Protection of the Ozone Layer, adopted on 22 March 1985, and the Montreal Protocol on Substances that Deplete the Ozone Layer, adopted on 16 September 1987, as soon as possible,

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/...

Recalling its resolutions 42/186 and 42/187 of 11 December 1987 on the Environmental Perspective to the Year 2000 and Beyond and on the report of the World Commission on Environment and Development, respectively,

Convinced that changes in climate have an impact on development,

Aware that a considerable amount of valuable work, particularly at the scientific level and in the legal field, has already been initiated on climate change, in particular by the United Nations Environment Programme, the World Meteorological Organization and the International Council of Scientific Unions and under the auspices of individual States,

Welcoming the convening in 1990 of a second World Climate Conference,

Recalling also the conclusions of the meeting held at Villach, Austria, in 1985, 1/ which, inter alia, recommended a programme on climate change to be promoted by Governments and the scientific community with the collaboration of the World Meteorological Organization, the United Nations Environment Programme and the International Council of Scientific Unions,

Convinced that climate change affects humanity as a whole and should be confronted within a global framework so as to take into account the vital interests of all mankind,

1. Recognizes that climate change is a common concern of mankind, since climate is an essential condition which sustains life on earth;

2. Determines that necessary and timely action should be taken to deal with climate change within a global framework;

3. Reaffirms its resolution 42/184 of 11 December 1987, in which, inter alia, it agreed with the Governing Council of the United Nations Environment Programme that the Programme should attach importance to the problem of global climate change and that the Executive Director of the United Nations Environment Programme should ensure that the Programme co-operates closely with the World Meteorological Organization and the International Council of Scientific Unions and maintains an active, influential role in the World Climate Programme;

4. Considers that activities in support of the World Climate Programme, approved by the Congress and Executive Council of the World Meteorological Organization and elaborated in the system-wide medium-term environment programme for the period 1990-1995, which was approved by the Governing Council of the United Nations Environment Programme, 2/ be accorded high priority by the relevant organs and programmes of the United Nations system;

1/ See United Nations Environment Programme, Annual Report of the Executive Director, 1985 (UNEP/GC.14/2), chap. IV, paras. 138-140.

2/ See Official Records of the General Assembly, Forty-third Session, Supplement No. 25 (A/43/25), annex, decision SS.I/3.

5. Endorses the action of the World Meteorological Organization and the United Nations Environment Programme in jointly establishing an Intergovernmental Panel on Climate Change to provide internationally co-ordinated scientific assessments of the magnitude, timing and potential environmental and socio-economic impact of climate change and realistic response strategies, and expresses appreciation for the work already initiated by the Panel;

6. Urges Governments, intergovernmental and non-governmental organizations and scientific institutions to treat climate change as a priority issue, to undertake and promote specific, co-operative action-oriented programmes and research so as to increase understanding on all sources and causes of climate change, including its regional aspects and specific time-frames as well as the cause and effect relationship of human activities and climate, and to contribute, as appropriate, with human and financial resources to efforts to protect the global climate;

7. Calls upon all relevant organizations and programmes of the United Nations system to support the work of the Intergovernmental Panel on Climate Change;

8. Encourages the convening of conferences on climate change, particularly on global warming, at the national, regional and global levels in order to make the international community better aware of the importance of dealing effectively and in a timely manner with all aspects of climate change resulting from certain human activities;

9. Calls upon Governments and intergovernmental organizations to collaborate in making every effort to prevent detrimental effects on climate and activities which affect the ecological balance, and also calls upon non-governmental organizations, industry and other productive sectors to play their due role;

10. Requests the Secretary-General of the World Meteorological Organization and the Executive Director of the United Nations Environment Programme, through the Intergovernmental Panel on Climate Change, immediately to initiate action leading, as soon as possible, to a comprehensive review and recommendations with respect to:

- (a) The state of knowledge of the science of climate and climatic change;
- (b) Programmes and studies on the social and economic impact of climate change, including global warming;
- (c) Possible response strategies to delay, limit or mitigate the impact of adverse climate change;
- (d) The identification and possible strengthening of relevant existing international legal instruments having a bearing on climate;
- (e) Elements for inclusion in a possible future international convention on climate;

11. Also requests the Secretary-General to bring the present resolution to the attention of all Governments, as well as intergovernmental organizations, non-governmental organizations in consultative status with the Economic and Social Council and well-established scientific institutions with expertise in matters concerning climate;

12. Further requests the Secretary-General to report to the General Assembly at its forty-fourth session on the implementation of the present resolution;

13. Decides to include this question in the provisional agenda of its forty-fourth session, without prejudice to the application of the principle of biennialization.

70th plenary meeting
6 December 1988

SCHEDULE OF IPCC AND RELATED MEETINGS

1989	WG 1*	WG2 **	WG3***
1	UK: Organization (Jan 27-29)		
2	IIASA Modeling	Moscow: Organization (Feb 2-3) IIASA Regional Impact (Feb 20-25)	DC: Organization (Jan 30-Feb 2) IEA Study Group (Paris)
3	Lead authors GFDL (March 7-8)	NCAR, Climate impacts March 14-16	OECD Env group on Energy and Envir March 16-17
4	Subgroup Workshops		Netherlands, EPA/ DOE-Netherlands Emission scenarios April 7-8 Paris, IEA "Analytical tool for dealing with climate change" April 10-11 Paris, OECD-IEA Meeting on energy technologies April 12-14
5	Trends and modeling: Amherst, May 8-12	Lead authors meeting Geneva or Moscow	WG 3 Working Groups Geneva May 8-12

* Working Group 1: review state and knowledge of the science of climate and climate change, with special emphasis on global warming

** Working Group 2: review programs and conduct studies of the social and economic impacts

*** Working Group 3: develop and evaluate possible policy responses by Governments to delay, or mitigate the impact of adverse climate change

SCHEDULE OF IPCC AND RELATED MEETINGS

(FULL MEETING OF THE IPCC WILL BE IN NAIROBI, JUNE 28-30)

7	First draft of Subgroup report	
8	UK IAMAP	[Authors' meeting]
9	IAMAP FRG	Coastal zone workshops
10	WMO Modeling Subgroup workshops	
12	Lead authors meeting	First Draft of report Peer review

MEETING SUMMARIES

REPORT OF IIASA MEETING ON REGIONAL CLIMATE SCENARIOS

Robert Chen, Brown University

The Environment Program of the International Institute for Applied Systems Analysis held a Task Force Meeting on Development of Regional Climate Scenarios for Impact Assessment on 20-22 February 1989 in Laxenburg, Austria. Organized by Dr. Robert S. Chen of Brown University and Dr. Peter J. Lamb of the Illinois State Water Survey, the meeting brought together leading scientists from diverse disciplines to consider new opportunities for improving the development and application of regional climate scenarios to investigations of the impacts of climate change.

The meeting focused especially on the integration of climate model results with empirically based methods for generating scenarios and on the three sectors, agriculture, water, and forests. These three sectors have been the subject of several major climate impacts studies in recent years that have used relatively simple climate scenarios as inputs.

Participants in the meeting included representatives of eight different organizations that now support studies of climate change using general circulation models (GCMs) and leading specialists in the analysis of paleoclimatic and instrumental climate data. Overview papers were presented by Dr. Timothy Carter of the University of Birmingham, Dr. Peter Gleick of the Pacific Institute for Studies in Development, Environment, and Security, Dr. Dean Urban of the University of Virginia, Dr. John Mitchell of the U.K. Meteorological Office, and Academician M.I. Budyko and Dr. K. Ya. Vinnikov of the U.S.S.R. State Hydrological Institute.

Meeting participants emphasized the importance of regional climate scenarios as a tool for exploring the sensitivity of natural resources and human activities to climatic variation and change. A key need is to use a set of alternative scenarios that span a realistic range of uncertainty in impact studies and to base such scenarios on different but complementary methods and data, e.g., GCMs and paleoclimatic and instrumental analogs.

Major recommendations of the meeting include the establishment of a climate scenario "clearinghouse" to facilitate and encourage the consistent, scientifically sound, and efficient use of climate scenarios in impact studies. Participants also felt strongly that continuing two-way dialogue between the climatological and impact assessment communities is critical not only to improve the application of scenarios in impact studies but also to improve the scenarios themselves.

The Task Force meeting was cosponsored by the World Meteorological Organization and the United Nations Environment Program. The U.S. National Science Foundation and the German Marshall Fund of the United States provided funding for the meeting. IPCC travel support was provided for U.S. participants. For further information about the meeting, contact Dr. Bo Doos, Environment Program Leader at IIASA (A)2361 Laxenburg, Austria).

Report on Ottawa Meeting of Legal and Policy Experts on the Protection of the Atmosphere, February 20-24, From Susan Biniaz/U.S. DOS, edited by A. Hecht/NCPO

Eighty legal and policy experts participated in this meeting. Roughly half of the experts were from various government ministries, including several current and former legal advisers. The experts were divided into four workshops dealing with various elements of a hypothetical convention on the law of the atmosphere.

After much discussion participants concluded that a law of the air was too large a subject to address at this time. Participants favored focusing immediate international efforts on the climate change issue. Specifically, there was general consensus that work should begin on the development of a skeletal framework convention on climate change, along the lines of the Vienna Ozone Convention, under which specific protocols would later be negotiated as scientific knowledge and political decisions permit.

There was broad support for developing legal mechanisms relevant to climate change in the IPCC forum, although it was made clear that other fora exist for this purpose if the issue was not adequately addressed by IPCC. The issue of legal framework for climate change is being addressed by the IPCC/WS 3 steering committee and the IPCC Bureau.

OECD MEETING: Group on Energy and Environment, March 16-17, 1989

This group and invited countries met to review the proposed outline and draft papers for the upcoming (April) workshops on Analytical Methods and on technologies to address climate change. Papers from these workshops will be published and will provide input to the IPCC WG 3 draft reports. Agenda and letters of invitation for the April meeting have been distributed.

FORTHCOMING MEETINGS

PARIS, IEA, APRIL 10-11

This expert group meeting, organized by the Sub-group on Energy and Industry of the Response Strategies Working Group, Intergovernmental Panel on Climate Change will focus on appropriate methodologies and analytical tools for assessing policy options for reducing greenhouse gas emissions and assessing their economic and social effects. Representatives of over 35 countries have been invited to attend.

BELGIUM JUNE 5, 1989

The Government of Belgium has announced a one-day conference on "The World's Environment" to be held in Brussels on June 5, 1989. The major theme of this event will be global climate warming.

TOYKO, SEPTEMBER 11-13, 1989

The objectives of the conference are to expand man's knowledge base relating to global environmental issues, to identify priority areas for international cooperation and to agree on an agenda for action. This is the first major conference of its kind in Asia. Conference will be chaired by Dr. Saburo Okita, former Foreign Minister of Japan, Chairman Institute for Domestic and International Policy Studies.

ITALY, NOVEMBER 1-3, 1989

The President of the Italian League for the Environment has announced a conference on "Global Management of the Environment and New Limits on Development". The Conference is hosted by the League and the University of Siena and will cover issues such as ozone depletion, desertification, deforestation, acid rain, atmospheric and ocean pollution and the greenhouse effect.

CAIRO, DECEMBER, December 17-21, 1989

The Climate Institute (U.S.) is organizing a World Conference on Preparing for Climate Change with Mrs Suzanne Mubarak, serving as honorary chairperson and keynote speaker. The focus of the conference, with attendees from the UN and other international organizations, will be on international and geographically specific responses to climate change. Discussions will also explore the vulnerability of the antiquities and cultural assets of the world to the combined effects of climate change, sea level rise and pollution, especially with respect to sites in Egypt.

WG 1 REVISED OUTLINE

Based on meeting March 6-7, 1989, GFDL Princeton, New Jersey

SECTION 1

Greenhouse Gases and Other Forcing Agencies

WATSON, ROHDE, OESCHGER

SECTION 2

Relative Importance of Climate Forcing Agencies

MORCRETTE, RAMANATHAN

SECTION 3

Methods of Projecting Future Climates Including Analogues

HASSELMANN, MELESHKO, CESS

SECTION 4

How Big Are The Potential Effects? (2 x CO₂ Steady State Simulations)

MITCHELL, TOKIOKA, MANABE

SECTION 5

How Well do Models Simulate The Present Day And Paleoclimate (Atmos. & Coupled Models)

including: Regional, Variability and Other Planets

GATES, ROWNTREE, ZENG, SIEGENTHALER

SECTION 6

Transient Simulations 1850-2100

BRYAN, SCHLESINGER

SECTION 7

Climate Observations 1850-1989 and Last 1000 Years

FOLLAND, VINNIKOV, TRENBERTH/KARL

SECTION 8

Comparison of Transient Simulations With Observations Over Last 100 Years

BARNETT, WIGLEY

SECTION 9

Sea Level Rise

WARRICK, OERLEMANS

SECTION 10

Effects on Ecosystems

TO BE IDENTIFIED

SECTION 11

Research Requirements

JSC/IGBP

WORKING GROUP 2 UPDATE:

Subgroup 1: Agriculture and Forestry: Martin Parry (UK) after consultation with US contributors has prepared a new outline and timetable. He will be in contact with his Soviet co-chairmen. This subgroup appears to be well organized and work will soon begin on drafting the chapter.

Subgroup 2: Natural Ecosystems: Kirk Dawson (Canada) is finalizing the Canadian contribution to this report. A meeting of US and Canadian contributors is scheduled for April 27 in Ottawa. After consultation with other countries, a revised outline will be prepared.

Subgroup 3: Water resources. Dr. Harry Lins, USSG (replaces Dr. Robert Hirsch) and Mr. Morgan Rees, Army Corps of Engineers will co-chair US contribution to this subgroup. This working group, in consultation with other agencies, is preparing a revised outline and will contact other countries involved in this report. Algeria has the lead in organizing a subsection on implications of climate change for the Sahel region.

Subgroup 4: Energy and urban environment: US coordinator, Ted Williams and Japan Cochairmen have consulted on preparation of their report. OECD is beginning its contribution to this report.

Subgroup 5: Oceans and sea level: US side is well coordinated with other countries on the sea level component. US coordinators Joel Snow and Jim Titus (EPA) have prepared an extensive bibliography of studies on impacts of sea level rise for contribution to the Dutch chapter leader.

A meeting of WG 2 lead authors has been proposed for Geneva May 10-12 concurrent with meeting of WG 3.

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Canada
U.S.A.
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¹ The organizations listed represent an initial attempt to capture a range of organizations working on global climate change. Therefore, this list is not necessarily comprehensive. It includes trade associations, environmental/conservation organizations and various institutes in the United States. However, it does not include international, for-profit or any organizations affiliated with universities.

All of the organizations listed have given their permission to be included in the U.S. IPCC Newsletter. This list was prepared by Ms. Judith Johnson, an EPA Management Intern working under the supervision of Dr. James Vail of the American Petroleum Institute. Ms. Johnson was detailed to API for six weeks under the auspices of the Office of Personnel Management's Women's Executive Leadership Training Program.

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U.S. IPCC NEWS

Volume 4, August, 1989

G-7 NATIONS IDENTIFY ENVIRONMENTAL ISSUES AS A MAJOR CONCERN IN THEIR JOINT COMMUNIQUE

**IPCC PROCESS AND GOAL OF FRAMEWORK CONVENTION
SUPPORTED. FULL ENVIRONMENTAL TEXT FOLLOWS**

THIS ISSUE:

**UPDATE OF FEDERAL AGENCY PARTICIPANTS IN IPCC
TEXT OF G-7 COMMUNIQUE
UPDATE OF IPCC WG ACTIVITIES
PAST AND FUTURE MEETINGS
IPCC SCHEDULE**

**SPECIAL SUPPLEMENT:
DIRECTORY OF INTERNATIONAL PARTICIPANTS IPCC**

The IPCC News is compiled and edited by the National Climate Program Office in cooperation with the Department of State. For information and contributions to the IPCC News contact Mr. Mason Charak, NCPO/NOAA, 11400 Rockville Pike, Rockville Maryland 20852 301 443-8981.

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ENVIRONMENTAL STATEMENT OF G-7 SUMMIT

33) There is growing awareness throughout the world of the necessity to preserve better the global ecological balance. This includes serious threats to the atmosphere, which could lead to future climate changes. We note with great concern the growing pollution of air, lakes, rivers, oceans and seas; acid rain, dangerous substances; and the rapid desertification and deforestation. Such environmental degradation endangers species and undermines the well-being of individuals and societies.

Decisive action is urgently needed to understand and protect the earth's ecological balance. We will work together to achieve the common goals of preserving a healthy and balanced global environment in order to meet shared economic and social objectives and to carry out obligations to future generations.

34) We urge all countries to give further impetus to scientific research on environmental issues, to develop necessary technologies and to make clear evaluations of the economic costs and benefits of environmental policies.

The persisting uncertainty on some of these issues should not unduly delay our action. In this connection, we ask all countries to combine their efforts in order to improve observation and monitoring on a global scale.

35) We believe that international cooperation also needs to be enhanced in the field of technology and technology transfer in order to reduce pollution or provide alternative solutions.

36) We believe that industry has a crucial role in preventing pollution at source, in waste minimization, in energy conservation, and in the design and marketing of cost-effective clean technologies. The agricultural sector must also contribute to tackling problems such as water pollution, soil erosion and desertification.

37) Environmental protection is integral to issues such as trade, development, energy, transport, agriculture and economic planning. Therefore, environmental considerations must be taken into account in economic decision-making. In fact good economic policies and good environmental policies are mutually reinforcing.

In order to achieve sustainable development, we shall ensure the compatibility of economic growth and development with the protection of the environment. Environmental protection and related investment should contribute to economic growth. In this respect, intensified efforts for technological breakthrough are important to reconcile economic growth and environmental policies.

Clear assessments of the costs, benefits and resource implications of environmental protection should help governments to take the necessary decisions on the mix of price signals (e.g., taxes or expenditures) and regulatory actions, reflecting where possible the full value of natural resources.

We encourage the World Bank and regional development banks to integrate environmental considerations into their activities. International organizations such as the OECD and the United Nations and its affiliated organizations, will be asked to develop further techniques of analysis which would help governments assess appropriate economic measures to promote the quality of the environment. We ask the OECD, within the context of its work

on integrating environment and economic decision-making, to examine how selected environmental indicators could be developed. We expect the 1992 UN Conference on Environment and Development to give additional momentum to the protection of the global environment.

38) To help developing countries deal with past damage and to encourage them to take environmentally desirable action, economic incentives may include the use of aid mechanisms and specific transfer of technology. In special cases, ODA debt forgiveness and debt for nature swaps can play a useful role in environmental protection.

We also emphasize the necessity to take into account the interests and needs of developing countries in sustaining the growth of their economies and the financial and technological requirements to meet environmental challenges.

39) The depletion of the stratospheric ozone layer is alarming and calls for prompt action. We welcome the HELSINKI conclusions related, among other issues, to the complete abandonment of the production and consumption of chlorofluorocarbons covered by the MONTREAL protocol as soon as possible and not later than the end of the century. Specific attention must also be given to those ozone-depleting substances not covered by the Montreal protocol. We shall promote the development and use of suitable substitute substances and technologies. More emphasis should be placed on projects that provide alternatives to chloro-fluorocarbons.

40) We strongly advocate common efforts to limit emissions of carbon dioxide and other greenhouse gases, which threaten to induce climate change, endangering the environment and ultimately the economy. We strongly support the work undertaken by the Intergovernmental Panel on Climate Change, on this issue.

We need to strengthen the worldwide network of observatories to: greenhouse gases and support the World Meteorological Organization initiative to establish a global climatological reference network to detect climate changes.

41) We agree that increasing energy efficiency could make a substantial contribution to these goals. We urge international organizations concerned to encourage measures, including economic measures, to improve energy conservation and, more broadly, efficiency in the use of energy of all kinds and to promote relevant techniques and technologies.

We are committed to maintaining the highest safety standards for nuclear power plants and to strengthening international cooperation in safe operation of power plants and waste management, and we recognize that nuclear power also plays an important role in limiting output of greenhouse gases.

42) Deforestation also damages the atmosphere and must be reversed. We call for the adoption of sustainable forest management practices, with a view to preserving the scale of world forests. The relevant international organizations will be asked to complete reports on the state of the world's forests by 1990.

43) Preserving the tropical forests is an urgent need for the world as a whole. While recognizing the sovereign rights of developing countries to make use of their natural resources, we encourage, through a sustainable use of tropical forests, the protection of all the species therein and the traditional rights to land and other resources of local communities. We welcome the German initiative in this field as a basis for progress.

To this end, we give strong support to rapid implementation of the Tropical Forest Action Plan which was adopted in 1986 in the framework of the Food and Agricultural Organization. We appeal to both consumer and producer countries, which are united in the International Tropical Timber Organization, to join their efforts to ensure better conservation of the forests. We express our readiness to assist the efforts of nations with tropical forests through financial and technical cooperation, and in international organizations.

44) Temperate forests, lakes and rivers must be protected against the effects of acid pollutants such as sulphur dioxide and nitrogen oxides. It is necessary to pursue actively the bilateral and multilateral efforts to this end.

45) The increasing complexity of the issues related to the protection of the atmosphere calls for innovative solutions. New instruments may be contemplated. We believe that the conclusion of a framework or umbrella convention on climate change to set out general principles or guidelines is urgently required to mobilize and rationalize the efforts made by the international community. We welcome the work under way by the United Nations Environment Program, in cooperation with the World Meteorological Organization, drawing on the work of the Intergovernmental Panel on Climate Change and the results of other international meetings. Specific protocols containing concrete commitments could be fitted into the framework as scientific evidence requires and permits.

46) We condemn indiscriminate use of oceans as dumping grounds for polluting waste. There is a particular problem with the deterioration of coastal waters. To ensure the sustainable management of the marine environment, we recognize the importance of international cooperation in preserving it and conserving the living resources of the sea. We call for relevant bodies of the United Nations to prepare a report on the state of the world's oceans.

We express our concern that national, regional and global capabilities to contain and alleviate the consequences of maritime oil spills be improved. We urge all countries to make better use of the latest monitoring and clean-up technologies. We ask all countries to adhere to and implement fully the international conventions for the prevention of oil pollution of the oceans. We also ask the International Maritime Organization to put forward proposals for further preventive action.

47) We are committed to ensuring full implementation of existing rules for the environment. In this respect, we note with interest the initiative of the Italian government to host in 1990 a forum on international law for the environment with scholars, scientific experts and officials, to consider the need for a digest of existing rules and to give in-depth consideration to the legal aspects of environment at the international level.

48) We advocate that existing environment institutions be strengthened within the United Nations system. In particular, the United Nations Environment Program urgently requires strengthening and increased financial support. Some of us have agreed that the establishment within the United Nations of a new institution may also be worth considering

49) We have taken note of the report of the sixth conference on bioethics held in Brussels which examined the elaboration of a universal code of environmental ethics based upon the concept of the "human stewardship of nature".

50) It is a matter of international concern that Bangladesh, one of the poorest and most densely populated countries in the world, is periodically devastated by catastrophic floods.

We stress the urgent need for effective, coordinated action by the international community, in support of the Government of Bangladesh, in order to find solutions to this major problem which are technically, financially, economically and environmentally sound. In that spirit, and taking account of help already given, we take note of the different studies concerning flood alleviation, initiated by France, Japan, the US and the United Nations Development Program, which have been reviewed by experts from all our countries. We welcome the World Bank's agreement, following those studies, to coordinate the efforts of the international community so that a sound basis for achieving a real improvement in alleviating the effects of flood can be established. We also welcome the agreement of the World Bank to chair, by the end of the year, a meeting to be held in the United Kingdom by invitation of the Bangladesh Government, of the countries willing to take an active part in such a program.

51) We give political support to projects such as the joint project to set up an observatory of the Saharan areas, which answers the need to monitor the development of that rapidly deteriorating, fragile, arid region, in order to protect it more effectively.

UPDATE OF IPCC WORKING GROUPS

WG 1: SCIENCE ASSESSMENT: WG 1 has agreed to undertake an evaluation of the use of past climate intervals as analogues (scenarios) of future climates. In this regard, a special report of future climates is being prepared jointly by the US-USSR under the US-USSR Bilateral on Environmental Protection. One part of this report will focus on reconstruction of past warm climate intervals and on the theoretical basis for using such intervals as an analogue for future climates. US and USSR scientists involved in preparing this report will meet in Orlando, October 12-19. WG 1 scientific coordinator, Dr. Geoffrey Jenkins will attend on behalf of the IPCC.

Updated outline of IPCC Scientific Assessment and lead authors:

Section 1: Greenhouse gases and other forcing agents: Watson (US), Siegenthaler (Switzerland), Oescher (Switzerland) and Rodhe (Sweden).

Section 2: Relative importance of climate forcing agents: Morcrette (France), Ramanathan (US)

Section 3 Processes and modeling: Cubasch (FRG) and Cess (US)

Section 4: How large are potential effects? Mitchell (UK), Tokioka (Japan), Manabe (US) and Meleshko (USSR)

Section 5: Validation of GCM models: Gates (US), Rowntree (UK), Zeng (PRC)

Section 6: Transient Climate Change: Schlesinger (US) , Bryan (US)

Section 7: Climate Observations: Folland (UK), Karl (US), Trenberth (US), Vinnikov (USSR)

Section 8: Comparison of observations and simulations: Wigley (UK), Barnett (US)

Section 9: Sea Level Rise: Warrick (UK), Oerlemans (Netherlands)

Section 10: Effects on ecosystems: Mellilo (US), Salati (Brazil), Sinha (India), Woodward (UK)

WG 2 CLIMATE IMPACTS: At the request of OMB, the NCPO in conjunction with the Agricultural Research Service of USDA has organized a workshop concerned with methodologies of cost-benefit analysis applied to climate impacts. Twenty participants who are experts in agriculture, forestry, water resources and coastal infrastructure will meet at Coolfont, West Virginia, September 11-14. The specific goal of the workshop is to define best-guess impacts response functions on the national scale for the above economic sectors for each of five representative countries. The functions will be subsequently incorporated into a demonstrative system for national cost-benefit analysis where benefit is defined in terms of actual reduction in the impacts of a specific scenario for climate change. For more information, please contact Dr. Garth Paltridge, NCPO, 301 443-8981. The output of this workshop will be presented to U.S. IPCC working groups for evaluation.

WG 3: RESPONSE STRATEGIES: The next meeting of WG 3 (October, Geneva) will focus on possible elements of a framework convention. In preparation for this meeting, reports are being prepared on five major topics as defined in IPCC News Number 3:

1. Legal measures and processes: Canada, Malta, UK
2. Technology transfer and development measures: India, Japan
3. Financial measures: France, Netherlands (in consultation with Egypt)
4. Public education and information: China, U.S.
5. Economic (market) measures: Australia, New Zealand.

US contributions to these papers have been drafted by agency representatives and reviewed at several interagency meetings. Countries listed above are coordinating contributions from all IPCC members.

REPORT OF MEETINGS

ORGANIZING COMMITTEE FOR THE SECOND WORLD CLIMATE CONFERENCE (SWCC), GENEVA, JUNE 1-2

The third session of the organizing committee for the SWCC, scheduled for the week of November 12, 1990 in Geneva, reviewed the draft outline and plans for this meeting. The conference will be divided into two phases. The first six days will emphasize the components, achievements and future activities of the World Climate Program (organized by WMO, UNEP and ICSU) and the components, findings and future activities of the IPCC. Drafting of a conference statement will complete phase one.

Following a two day recess, Government ministers will be invited to meet to review the conclusions and recommendations of the Conference.

Mr. Howard Ferguson of Canada was appointed conference coordinator and will assume his duties in Geneva in August. Professor James Dooge of Ireland will be the Conference Chairman.

WMO EXECUTIVE COMMITTEE MEETS JUNE 5-17, 1989

The WMO EC strongly endorsed the activities of the IPCC and agreed to set up a voluntary fund for climate and atmospheric environment studies with an initial target of 20 million US dollars for the period 1990-1991. Contributions are being sought from UNDP, the World Bank, and other international development agencies and members.

The EC also approved the establishment of a "GLOBAL ATMOSPHERIC WATCH" for improved monitoring of the chemistry of the atmosphere. This new activity will integrate and expand upon existing background monitoring networks of WMO and UNEP. The EC also requested its Commission on Climatology to implement a CLIMATE CHANGE DETECTION PROJECT aimed at assessing climate data reliability and trends.

WORLD HEALTH ORGANIZATION (WHO) REVIEWS POTENTIAL HEALTH EFFECTS OF CLIMATE CHANGE, June 12-16, 1989

A small group of experts was convened by the WHO to discuss the basis for a WHO review of potential health effects associated with climate change. Through its Environmental Health Division, WHO is undertaking this analysis as a contribution to the IPCC WG 2 report (coordinated by Japan).

IPCC PANEL MEETING IN NAIROBI, JUNE 28-30:

The IPCC had its second session in Nairobi and reviewed progress of its three working groups in completing their assessment reports. The IPCC agreed that all reports should be completed by May, 1990. Formal government reviews of the IPCC reports will take place over the summer of 1990 in time for a final IPCC meeting in September in Stockholm (see revised schedule for activities).

With regard to participation of developing countries in the activities of the IPCC, Dr. Algain of Saudi Arabia presented a report on behalf of the IPCC ad-hoc subgroup consisting of Brazil, Senegal and Zimbabwe dealing with this issue. The report recommended that the IPCC increase its funding for the travel of LDC experts to IPCC related activities, sponsor conferences and seminars to heighten the awareness of LDC scientists on climate change and assist in forming national committees on climate change in developing countries.

The report will receive further consideration by the IPCC. A number of countries pledged new or additional support for LDC travel and related activities including:

FRG	50,000	Marks
Finland	10,000	US Dollars
Japan	50,000	US Dollars
Netherlands	25,000	US Dollars
UK	25,000	Pounds
PRC	10,000	US Dollars
US	100,000	US Dollars

In addition, Norway offered 100,000 US Dollars for a program of roving seminars to disseminate information in LDC countries.

The next meeting of the IPCC was tentatively scheduled for early February in the United States.

SCHEDULE OF IPCC AND RELATED MEETINGS

UPDATED MEETING OF THE IPCC

	WG 1	WG 2	WG 3
AUG	UK / IAMAP Conference		
SEPT	FRG/ IAMAP Conference	NCPO/OMB/USDA Workshop on Measuring Climate Impacts [NEW]	Workshop on Problems of Boreal Forests, Finland
OCT	US-USSR Bilateral Meeting, Orlando, Analysis of future Climates, Oct 12-19 [NEW]		Resource Use and Management subgroup workshops in Geneva Oct. 30-Nov. 3 Workshop on elements of a framework climate convention, Oct 3-5, Geneva [CHANGE IN LOCATION] Agriculture and Forestry workshops in US, FRG and Brazil
		Meeting on climate impacts on oceans and fisheries, Moscow [NEW]	
NOV		First draft of chapters to WG Chairman: Possible meeting in Moscow	Workshop: Policy options on coastal states in temperate regions; Miami, US Meeting of subgroup on agriculture, forestry, Geneva, Nov 2-3.
DEC	Lead authors meeting England		

continued.....

SCHEDULE OF IPCC AND RELATED MEETINGS UPDATED MEETING OF THE IPCC

WG 1

WG 2

WG 3

JAN

FEB

FULL MEETING OF THE IPCC IN THE UNITED STATES

**Workshop: Policy
options on coastal
states in tropical
zones; in Australia**

MARCH

**Steering Committee
and lead authors to
finalize report (IIASA)**

MAY

COMPLETION OF ALL IPCC DRAFT REPORTS

SEPTEMBER

FULL IPCC MEETING IN STOCKHOLM

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U.S. IPCC NEWS

Volume 5, October, 1989

NATIONS DEBATE ELEMENTS OF A FRAMEWORK CONVENTION ON CLIMATE

THIS ISSUE:

- Response Strategies Working Group meets in Geneva to discuss elements of framework convention
- Tokyo Conference on Global Environment/Sustainable Development
- Non-aligned Countries discuss climate change.
- Updated Schedule of IPCC Meetings
- Status Report on Working Group 2; Climate Impacts

U.S. IPCC NEWS is jointly prepared by the Office of International Activities, EPA, National Climate Program Office and the Department of State.

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ELEMENTS OF FRAMEWORK CONVENTION ON CLIMATE CHANGE DEFINED: Report of the IPCC Response Strategies Working Group.

As part of the work of the IPCC and at the invitation of President Bush, 163 representatives from 43 governments (and 29 observers) met on October 2-6 in Geneva, Switzerland, for a workshop on possible means of implementing response options to deal with potential climate change. A key element of the workshop was discussion on defining elements of a framework convention on climate change.

The meeting was chaired by Dr. Frederick M. Bernthal, (DOS) Chairman of the Response Strategies Working Group of the IPCC. Representatives of the following agencies participated in the topic groups defined below: Departments of State, Commerce, Interior, Energy, Treasury, EPA, CEQ, OSTP, Army Corps of Engineers, USTR, USDA, AID, NSF, and White House staff. Observers from the US Congress were also in attendance.

Topics considered for discussion included:

- legal measures and processes,
- technological development and transfer
- financial measures and assistance to developing countries
- public education and information
- economic and market measures

Each of these subject areas represent cross-cutting actions relevant to all other working groups of the IPCC. These reports are intended to provide means by which nations can adapt or limit man-induced climate change. The draft reports of all elements of this workshop are open for further comment until January, 1990. The reports will be finalized at the time of the next full IPCC meeting in February in the United States.

FRAMEWORK CONVENTION:

In addition to strengthening existing legal institutional mechanisms to address climate change, most nations supported the early development of a new framework convention on climate, fashioned on the existing Vienna Convention for the Protection of the Ozone Layer. A spectrum of opinion, however, was voiced on possible additional elements of the convention.

----General framework convention modeled after the Vienna Convention with additional emphasis on research and technology transfer and aid to developing countries. (e.g. US, PRC, Brazil, UK)

-----General framework convention but with specific incentives for developing countries (e.g. India)

-----General framework convention but requiring immediate or parallel development of protocols. Convention should be as specific as possible and include timetable for implementation (e.g. Switzerland, Australia)

-----General framework convention but with "ambitious" commitments. (e.g. France)

-----General framework convention but with more aggressive action, specific commitments and binding statements. Convention and protocols to be done in parallel. Proposed timetable for conclusion of convention, 1991; protocols by 1992. (e.g. Norway, Sweden, Finland, Netherlands.)

In addition, New Zealand proposed the establishment of a new UN organ--- "Environmental Protection Council," with authority to take binding actions on environmental areas. [Speech by Rt Hon Geoffrey Palmer, Prime Minister of New Zealand to the 44th Session of the UN General Assembly , October 2, 1989]

The draft final report of this workshop on legal instruments contains a long list of possible elements of the convention. As stated in the draft text, many countries will find elements of the list unacceptable at this stage of development:

"The inclusion of any particular element (in the draft text) does not imply consensus with respect to that element, or the agreement of any particular government to include that element in a framework convention. Some of the proposed elements are controversial and some were objected to but all have been included to stimulate discussion at the national and international level."

This workshop and the subsequent report provide a "universe" of possible actions for future debates. In one sense, this workshop signified the beginning of formal negotiations of a framework convention.

NGO AND INDUSTRY OBSERVERS ATTEND GENEVA WORKSHOP

A growing number of NGO's and industry observers are attending IPCC meetings. The following NGO's at the IPCC meeting in Geneva called for:

-----Commitment by industrialized countries to reduce their CO2 emissions by 20% by the year 2000,

-----Completion of a framework convention by the end of 1990.

Environmental Defense Fund (US), Natural Resources Defense Council (US), World Wide Fund for Nature International, Association for the Conservation of Energy (UK), the Climate Action Network (Europe), and the Woods Hole Research Center.

Industry attendees included Global Climate Coalition (US), Edison Electric Institute, International Chamber of Commerce, International Petroleum Institute, Leadership Council for Effective Climate Policies, and the National Coal Association.

REPORT OF FIRST SESSION OF THE IPCC SPECIAL COMMITTEE ON THE PARTICIPATION OF THE DEVELOPING COUNTRIES.

The IPCC has organized the above committee to respond to concerns from developing countries to increase their ability to participate in and implement activities of the IPCC. This committee met in Paris, September 28, 1989 to review a special report prepared by developing countries, and to make recommendations to the IPCC workshop on response strategies. The immediate goal of the subgroup is to increase the participation of developing countries in IPCC meetings and workshops. The US along with several other countries have pledged funds to assist developing countries in this regard. US funding will be \$100,000 in FY 1990.

Other measures recommended by the committee include:

-----crash seminars for opinion leaders in developing countries,

-----establishment of national climate committees to integrate climate change issues in national development policies,

-----programs to establish and improve capabilities of developing countries to analyze and deal with climate change.

The committee has requested developing countries to identify their specific needs for assistance. This recommendation was endorsed by the IPCC workshop in Geneva.

MEETING REPORTS

TOKYO CONFERENCE ON GLOBAL ENVIRONMENT AND HUMAN RESPONSE TOWARD SUSTAINABLE DEVELOPMENT, September 11-13, 1989, report by Dennis Tirpak

The opening session included talks by Prime Minister T. Kaifu, Barber Conable (World Bank), Pyotr Poletaev (Deputy Chairman of the U.S.S.R. State Committee for the Environment), S. Ramphal (Commonwealth Secretary General), and Gus Speth (World Resources Institute). Others in attendance included Y. Izrael (USSR), E. Salim (Indonesia), J. Zurek (Poland), B.C. Freezailah (ITTO), A. U. Quesada (Costa Rica), E. Chaudhury (Bangladesh), and T. Atkeson (US).

The conference provided a useful forum for the exchange of ideas about sustainable development, poverty, debt and global environmental change, particularly between developing countries and Japanese leaders. Only a few west European representatives were present. PRIME MINISTER KAIFU SAID THAT JAPAN WILL TAKE THE INITIATIVE TO DEVELOP NEW ENERGY TECHNOLOGIES TO COUNTER THE GLOBAL WARMING TREND. He also called for urgent measures to address tropical deforestation. The Japanese government affirmed their intent to spend \$2.0 Billion to support developing country environmental needs.

The final conference statement called for a new commitment by all nations to an "environmental ethic." Actions should be based on solid scientific grounds. Steps should be taken today to reduce risks to future generations. The conference also recommended expanding international efforts to monitor the earth's environment and to conduct interdisciplinary scientific research on environmental issues.

Nearly half of the final conference statement was devoted to suggested actions by both developed and developing countries.

Relative to the IPCC the conference statement recommends:

- As many countries as possible should be encouraged to participate in the activities of the IPCC. All countries are urged to support research, monitoring, assessment and impact study programs, and to engage in the identification of national response options and roles in global response to limit or delay climate change and adapt to unavoidable impacts on climate change.
- The IPCC should be encouraged to investigate the feasibility of low-emission scenarios which sustain the prospects for economic growth but limit global warming to less than the doubled CO₂ equivalent effects and to give particular attention to regional predictions.

- Increased assistance to developing countries should be provided so as to ensure their participation in the IPCC and its working groups.....

NON-ALIGNED COUNTRIES ISSUE STATEMENT ON GLOBAL ENVIRONMENT

At the recent meeting of the non-aligned nations in Belgrade, Yugoslavia, they produced for the first time an 11-point summary of their positions concerning future course of negotiations and work on global environmental issues.

"The participants noted with serious concern that changing global climate patterns threaten present and future generations with severe economic and social consequences and emphasized that necessary and timely action should be taken to deal with climate change and their consequences within a global framework.. In this context they called for preparation and adoption of an international convention on the protection and conservation of global climate on an urgent basis."

UPDATE OF IPCC AND RELATED MEETINGS

OCTOBER, 1989

- | | | |
|-----------|---|---|
| 2-6 | Geneva, Second session..... | IPCC WG 3 |
| 2-6 | Moscow, Climate change and world.....
Fisheries | IPCC WG 2 |
| 12-19 | Orlando Climate Scenarios | US-USSR Bilateral
..... IPCC WG 1/WG 2 |
| 12-13 | Bonn, Preparatory meeting for.....
Workshop on energy and environment. | FRG: Ministry of
Environment |
| 12-19 | Cambridge, Mass, Workshop on non-CO 2
contributors to climate change | WG 1 |
| 30-31 | Bonn, Workshop on Temperate Forests..... | WG 3 |
| 30-Nov. 1 | Geneva, Resource Use and Management.....
subgroup..... | WG 3 |

31-Nov 3 Geneva, Second Session.....WG 2

----- Oslo, Preparatory meeting: Conference on "Action for a Common Future"

----- Brazil, Workshop: Tropical Forests.....WG 3

NOVEMBER

2-3 Geneva, Agriculture and Forestry subgroup.....WG 3

6-7 Noordwijk, Ministerial Conference on Atmospheric Pollution and Climate Change

16-18 Maldives, Ministerial Meeting on "Small States Conference on Sea Level Rise"

20-21 Bath, U.K. Paleo-analogue forecasts.....WG 1

21-24 Geneva, Executive Body LRTAP Convention (ECE)

27-Dec 1 Miami, Coastal Zone Management Subgroup.....WG 3

29-Dec1 Bracknell, Climate Trends Sub group.....WG 1

DECEMBER

11-14 Bonn, Workshop: Energy and Environment

18-21 Cairo, World Conference on Preparing for Climate Change

11-15 Brisbane, Subgroup on model predictions.....WG 1

FEBRUARY 1990

5-7 Washington, Third Session.....IPCC

MAY

8-16 Bergen, Conference on "Action for our Future."

JUNE

25-26 Geneva, IPCC Bureau Meeting

AUGUST

27-31 Stockholm, 4th Session of IPCC

NOVEMBER

12-23 Geneva, Second World Climate Conference

STATUS REPORT ON WG 2

IMPACTS OF CLIMATE CHANGE

Agriculture and Forestry--Report by John Reilly

The agriculture and forests subgroup has been working through the summer to prepare a draft of their contribution to the WG 2 report. Principal authors of the chapter met at the OECD on 25-26 September to coordinate material.

The Economic Research Service of USDA has been working with Chapter coordinator, Martin Parry, UK, to estimate global effects of climate change on agriculture production, prices and consumers. The work has used SWOPSIM, an ERS agricultural trade and production model. The work will focus on the sensitivity of prices and consumer welfare to crop yield changes.

In addition, Martin Parry requested each country to estimate yield effects from climate change in their country. Based on responses, production, price and welfare effects were simulated.

John Reilly (ERTS) has been leading the effort with major contributions from Sally Kane and Rhoda Bucklin (ETS). Basil Acock and Steve Rawlins (ARS/USDA) have contributed material on U.S. yield effects and on plant response to carbon dioxide fertilization.

Hydrology and Water Resources. report by Harry Lins

This subgroup is beginning to assemble the various international contributions to its chapters. Materials have been received from Australia, New Zealand and the United Kingdom. Nearly all materials comprising the U.S. contribution are complete and these materials are now being revised and assembled into a coherent text. The subgroup will meet in Geneva in October 26-27, immediately prior to the full WG 2 assembly, to integrate the contributions from each nation into a systematic document according to the outline agreed upon in Moscow in May.

Current plans to are to submit this chapter for international review in November and to revise the chapter in December, 1989.

Ocean and Fisheries

From October 2-6 the USSR will host a conference in Moscow on climate impact on fisheries. US participants to this meeting are: John T. Everett and James Meehan of the National Marine Fisheries Service (NOAA), Edward LaRoe and Robert Stewart of the Fish and Wildlife Service (DOI), Michael Glantz, NCAR, and Dr. Stephan Zeeman, University of New England.

Workshop on Climate Impacts Response Functions. report by Garth Paltridge.

A Workshop on Impact Response Functions, organized by the National Climate Program Office, OMB, and Economic Research Service, USDA, was held at Coolfont, West Virginia from September 11-14, 1989. The object was to derive "best guess" quantitative estimates for societal impact as a function of climate change on four basic climate-sensitive sectors (agriculture and animal production, forestry, water resources and coastal infrastructure) in each of six countries of diverse economies. Of major concern was an analysis of the methodology and assumptions inherent in such studies. The nineteen participants were drawn from various federal, state and non-government organizations and were supplied with specific scenarios of climate change as well as large amount of background data on the sectors within each country. The workshop resulted in a set of criteria and issues as well as initial estimates of overall economic impacts. Report of the workshop will be available in October as a study paper for IPCC working groups.

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U.S. IPCC NEWS:

Volume 3, June 1989

NATIONS MOVE TOWARD FRAMEWORK CLIMATE CONVENTION:

Response Strategies Working Group (WG 3) meeting in Geneva (May 10-12) has agreed to begin the process of defining elements of a framework convention. For this meeting, President Bush issued a statement endorsing actions leading to a fall workshop to discuss the full range of financial, economic, technical and legal issues related to global climate change. Full text of the President's statement on the next page.

RECOMMENDATIONS OF THE UNEP GOVERNING COUNCIL

The UNEP Governing Council passed a resolution (May 24, 1989) requesting that the Executive Director of UNEP in cooperation with the Secretary General of WMO begin preparation for negotiations for a framework convention on climate. The resolution recommends that such negotiations **should be initiated as soon as possible after the adoption of the interim report of the IPCC (Fall, 1990).**

COMPILED AND EDITED BY THE NATIONAL CLIMATE PROGRAM OFFICE IN
COOPERATION WITH THE DEPARTMENT OF STATE. NEXT ISSUE- AUGUST

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WHITE HOUSE STATEMENT

The United States Delegation to the Steering Group of the Response Strategies Working Group on Climate Change carried instructions to move the international community forward in establishing a process for considering how to respond to climate change. I am pleased to note that the nations meeting in Geneva have agreed to a workshop this fall looking at the range of financial, economic, technical and legal issues for responding to climate change.

The United States looks forward to playing a significant role in efforts to assess and respond to global climate change. I expect that these efforts will lead to formal negotiations on the establishment of a framework convention on global climate. It is important that this process lead to international scientific consensus on the seriousness of the issue for the environment and for the world economy. At the same time, we should ensure that the interests of developing countries are taken into account in this process.

The United States will host a meeting under the auspices of the Response Strategies Working Group this fall that is intended to advance our understanding and promote consensus. I look forward personally to reviewing its results.

NATIONAL SECURITY COUNCIL ESTABLISHES POLICY COORDINATING COMMITTEE ON OCEANS, ENVIRONMENT AND SCIENCE

This committee has overall responsibility for the development of US foreign policy with respect to environmental issues. Under this body, the DOS has created a **Working Group on Global Climate Change** to develop and coordinate foreign policy issues related to climate change. Initial focus of this Working Group will be preparations for the October meeting of Working Group 3 on elements of a framework convention. Mr. William Nitze, DOS, will chair this working group. Other coordinating mechanisms in place are the **Committee of Earth Sciences (CES)** for overall science policy, and the **National Climate Program Office** for coordination of all activities of IPCC.

U.S. TO HOST OCTOBER MEETING

The U.S. will host a WG-3 conference in October to consider what elements might be included under a framework climate convention. Members of the IPCC and other members of the WMO and UNEP will be invited to participate. International organizations that submit papers to WG 3 and other relevant international organizations will be invited to participate as observers. The DOS chairs the interagency committee organizing this conference.

In preparation for this meeting, interested countries and international organizations are invited to submit papers by August 15 on the following topics. Countries designated below are coordinators for each topic.

1. Legal measures and processes: Canada, Malta, UK
2. Technology transfer and development measures: India, Japan
3. Financial measures: France, Netherlands (in consultation with Egypt)
4. Public education and information: China, U.S.
5. Economic (market) measures: Australia, New Zealand.

By 15 September 1989 the papers will be summarized and made available to IPCC members and other countries expressing interest in attending the October meeting.

SCHEDULE OF IPCC AND RELATED MEETINGS

(FULL MEETING OF THE IPCC WILL BE IN NAIROBI, JUNE 28-30)

	WG 1	WG 2	WG 3
AUG	UK / IAMAP Conference		
SEPT	FRG/ IAMAP Conference		Workshop on Problems of Boreal Forests, Finland
OCT			Resource Use and Management subgroup workshops in Geneva Oct. 30-Nov. 3
			U.S. to host workshop on elements of a framework climate convention
NOV	First draft of chapters to WG Chairman		Workshop: Policy options on coastal states in temperate regions; in US
			Meeting of subgroup on agriculture, forestry, Geneva, Nov 2-3.
DEC	Lead authors meeting England		
JAN			
FEB			Workshop: Policy options on coastal states in tropical zones; in Australia
MARCH	Steering Committee and lead authors to finalize report (IIASA)		

MEETING SUMMARIES

Climate and Emissions Scenarios: Working Group 3- May 8-10: Questions for Working Group 1

The U.S. (EPA) and Netherlands have collaborated on the development of carbon dioxide emission scenarios for use by all Working Groups. The hypothetical scenarios consider a doubling of CO₂ in the years 2030, 2060 and 2090. An analysis of the projected emissions and their economic implications was presented by Y.Kaya of Japan at the recent WG 3 meeting in Geneva, May 8-10. Subsequent discussion of these papers by the IPCC Steering Committee led to formulation of six questions referred to WG 1 for analysis. These questions are:

1. Would the carbon system behave differently in a very high or very low CO₂ world or if sudden changes occurred?
2. What additional information is needed about gases such as NO₂, CO and hydrocarbons by WG 1 in order to estimate future changes in troposphere ozone concentrations. Can WG 1 estimate changes in troposphere ozone?
3. What range of temperature and sea level rise can be expected from these scenarios using the most sophisticated climate models and how will these compare to simple radiative models? What range of uncertainties can be associated with these estimates?
4. What would be the effect of a methane strategy versus CO₂ strategy on global temperatures.?
5. What will be the contributions of biogenic emission in the future? 2020/2050/2075?
6. What uncertainties are involved in carbon cycle models used in construction of the initial scenarios?

Workshop on Greenhouse Gas Induced Climatic Change: A critical appraisal of simulations and observations: May 8-12 1989. University of Massachusetts, Amherst.

A combined meeting was held of the National Climate Program Office's Climate Trends Panel, and the DOE sponsored workshop on climate modeling and observations. The meeting focused on comparing observational evidence for climate change with model projections. Members of WG 1 met following the workshop to prepare input to chapters 4 and 7 of the Science report. Workshop participants issued the attached press statement following the meeting.

Coastal Zone Management Subgroup (WG 3), Geneva, May 8-10

This subgroup will undertake to organize two workshops:

Workshop 1 to be held in the United States on adaptive options and policy implications for coastal states in temperate zones. Contact is John Carey, NOAA.

Workshop 2 to be held in Australia for adaptive options and policy implications for coastal states in tropical regions, including island nations. Contact is John Gilbert, New Zealand.

Energy and Industry Subgroup (WG 3), Geneva, May 8-9

The meeting was chaired by Mr. Keiichi Yokobori of Japan and Mr. Xie Shao - Xiong of the PRC. Representatives of 16 countries discussed the relationships of energy, economy and greenhouse gas emissions. While the Energy and Industry subgroup includes representatives from many developed and developing nations, representation from nations with a centrally planned economy is absent.

While the nature of the energy-climate problem varies significantly from country to country, two important conclusions were reached: Reductions in greenhouse gases can co-exist with economic growth and that policies and technologies can make a significant contribution to limiting greenhouse gas emissions.

PRESS RELEASE

Workshop On Greenhouse-Gas-Induced Climatic Change: A Critical Appraisal Of Simulations And Observations 8-12 May 1989, University of Massachusetts, Amherst

It is certain that increasing the concentrations of carbon dioxide, methane, chlorofluorocarbons and other trace gases will enhance the greenhouse effect. The concentration of these gases has increased substantially during the last 100 years as a result of human activities. Over the same period the average global surface air temperature has risen by about 0.5 degree Celsius, although this increase has not been constant in time or uniform over the globe. It is tempting to attribute this warming to the increase in greenhouse gases. Because of the natural variation of temperature, however, such an attribution cannot now be made with any degree of confidence. For the same reason, a temporary cooling should not be taken as evidence that greenhouse-gas-induced warming in the next century is unlikely.

To increase our understanding of the long-term natural variations of climate requires detailed global information extending back over several centuries. Estimates of natural variability can be obtained from observations in the historic past and from simulations of climate with mathematical climate models on supercomputers.

Climate models are our best tool for estimating future changes in climate. These models project a global warming of a few degrees by the middle of the next century due to the continuing and projected increases of greenhouse gases. Such a change is several times larger than the warming of the past century. Changes in precipitation and other climate quantities are also projected. However, climate models give differing pictures of the regional features of climate change, including the frequency of droughts and storms.

Progress to improve our ability to project future climate will best be achieved by the further development, analysis, and verification of climate models, by the acquisition, assembly and analysis of climate data, by observational studies of climatic processes, and by providing the human and computer resources required for these tasks.

We, the participants in the international Workshop on Greenhouse-Gas-Induced Climatic Changes, conclude that the need to reduce the current uncertainties about the magnitude, timing and regional detail of future climatic changes is an urgent international priority.

Amherst, Massachusetts

12 May 1989

National presentations revealed a degree of consensus on technology and policy options. With respect to technologies, presentations emphasized that there was no single quick fix; that improvements in utilization efficiency for fossil fuels should be a priority; that technological solutions must be cost effective; and that non-economic barriers to diffusion of attractive technologies were a fruitful area for further analysis. Technology research was widely regarded as a prime area for international cooperation.

The outline of Working Sub-Group Report is as follows:

Chapter 1: Introduction and terms of reference

Chapter 2: Role of energy and industry in the production of greenhouse gases, by gas, by energy source, and by activity. This chapter would include forecasts of future emissions under plausible assumptions.

Chapter 3: Analysis of policy options to reduce greenhouse gas emissions.

Chapter 4: Implementation strategies for reducing emissions.

Chapter 5: Overall conclusions.

Resource and Management Suboroup (WG 3).Geneva, May 8-10

Topics to be included in report of this subgroup were expanded and now include:

Water Resources.....Nepal, U.S.

Forestry.....Brazil, India, Japan, UK, U.S.

Agriculture.....Brazil, China, France, India, U.S.

Fisheries.....Canada, China, U.S.

Animal Husbandry.....Australia

Salinization, Desertification.....Australia, Brazil, Netherlands, U.S.

Land Use Managament.....U.S.

A workshop is planned for the week of October 30 in Geneva to discuss the above eight topics and three broad themes, water resources, food security and biodiversity, which are common to all subject areas.

Agriculture, Forestry and Other Human Activity Subgroup, Geneva, May 8-9.

The subgroup has agreed to undertake the following studies:

Forestry:

A) Data collection. FAO will lead the development of a section of the report which describes all types of forests and their present environmental state (e.g. deforestation, forest decline, reforestation.) [Brazil, UK, U.S.]

B) Forestry Response Strategies. The FRG will lead in developing a section to describe possible strategies and costs for forest development and reforestation. [UK, U.S., Zimbabwe, FAO, WRI].

C) Special Problems. Finland will lead in discussion of special damage to boreal forests resulting from air pollution and climate stress. [Canada, Norway, U.S.]

Agriculture:

Detailed studies of methane and other gas emissions from (A) livestock (Canada, U.S., FAO, Netherlands), (B) Rice Paddies (Australia, China, Japan and FAO and (C) Fertilizers (U.S., Canada, FAO, Norway and Zimbabwe) will be prepared.

Other Human Activities:

The FRG will prepare a paper on methane emissions from waste disposals including among other things, the technical possibilities for reducing such emissions.

Proposed future Workshops: The US and Brazil offered to jointly sponsor a workshop on tropical forests in the U.S. or Brazil, (October 1989.) Finland announced a workshop on problems of boreal forests, September 1989. FRG will consider convening a workshop on problems of temperate forests, October 1989.

Working Group 2, Moscow, May 18-19.

The steering committee and lead authors met to finalize the methodology and outline for climate impact analysis report. Considering possible future climate and social changes, WG 2 subgroups agreed to examine possible impacts in three ways:

[1] Climate effects on current social and environmental systems. This analysis answers questions of how modern society is impacted by a range of climate changes without internal social and economic adjustments. This analysis helps define how current society would be affected by climate changes in a simple but measurable fashion.

[2] The effect of climate change on society including likely socio-economic changes. This analysis attempts to measure the interrelationship between climate and trends in economic growth, population, and agricultural practices. Of particular concern is the combined effect of population growth and climate change in developing countries. This analysis helps define whether these combined changes enhance or diminish possible overall environmental effects.

[3] Evaluate possible societal adjustments to climate change. Given any particular change in climate and subsequent changes in social practices there will be concurrent within-society changes independent of any specific government action. For example, agriculture is constantly adjusting to climate events through changes in cropping patterns, irrigation and agricultural management. Such changes can raise or lower food supplies. This analysis defines the limits of potential within-society adaptations beyond which additional policies would be required.

FORTHCOMING MEETINGS

GENEVA, JUNE 1-2, 1989

The steering committee for the Second World Climate Conference will meet to finalize the agenda for this meeting.

GENEVA, JUNE 4-10, 1989

Executive Committee meeting of the WMO. The EC will consider the recommendations of the Governing Council of WMO with respect to formalizing the IPCC and with respect to a framework climate convention.

BELGIUM, JUNE 5, 1989

The Government of Belgium has announced a one-day conference on "The World's Environment" to be held in Brussels on June 5, 1989. The major theme of this event will be global climate warming.

PARIS, JUNE 12-13, 1989

The French government has organized a conference called "Planet Earth," three half-day sessions focussed on scientific and technical issues of global change. This conference may be followed by a second meeting in July at which President Mitterand will speak.

TOKYO, SEPTEMBER 11-13, 1989

The objectives of the conference are to expand man's knowledge base relating to global environmental issues, to identify priority areas for international cooperation and to agree on an agenda for action. This is the first major conference of its kind in Asia. Conference will be chaired by Dr. Saburo Okita, former Foreign Minister of Japan, Chairman, Institute for Domestic and International Policy Studies.

HAGUE, NOVEMBER 6-7, 1989

International conference of Ministers hosted by the Netherlands to review possible response strategies to climate change.

ITALY, NOVEMBER 1-3, 1989

The President of the Italian League for the Environment has announced a conference on "Global Management of the Environment and New Limits on Development". The Conference is hosted by the League and the University of Siena and will cover issues such as ozone depletion, desertification, deforestation, acid rain, atmospheric and ocean pollution and the greenhouse effect.

CAIRO, DECEMBER, December 17-21, 1989

The Climate Institute (U.S.) is organizing a World Conference on Preparing for Climate Change. Mrs. Suzanne Mubarak will serve as honorary chairperson and keynote speaker. The focus of the conference, with attendees from the UN and other international organizations, will be on international and geographically specific responses to climate change. Discussions will also explore the vulnerability of the antiquities and cultural assets of the world to the combined effects of climate change, sea level rise and pollution, especially with respect to sites in Egypt.

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WMO



UNEP

INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE

IPCC WORKING GROUP III

LEGAL & INSTITUTIONAL MEASURES

POSSIBLE ELEMENTS OF A
FRAMEWORK CONVENTION
ON CLIMATE CHANGE

AUGUST 1990

IPCC: RESPONSE STRATEGIES WORKING GROUP
LEGAL MEASURES: REPORT OF TOPIC CO-ORDINATORS
(Canada, Malta and the UK)

Executive Summary

1. The co-ordinators' report has as its primary objective the compilation of elements that might be included in a future framework Convention on Climate Change, and a discussion of the issues that are likely to arise in the context of developing these elements.
2. There is a general view that while existing legal instruments and institutions with a bearing on climate should be fully utilized and further strengthened, they are insufficient alone to meet the challenge. A very broad international consensus has therefore emerged in the IPCC, confirmed notably at the 44th United Nations General Assembly, on the need for a framework Convention on Climate Change. Such a Convention should generally follow the format of the Vienna Convention for the Protection of the Ozone Layer, in laying down, as a minimum, general principles and obligations. It should further be framed in such a way as to gain the adherence of the largest possible number and most suitably balanced spread of countries while permitting timely action to be taken; it should contain provision for separate annexes/protocols to deal with specific obligations. As part of the commitment of the parties to action on greenhouse gas emissions and the adverse effects of global warming, the Convention would also address the particular financial needs of the developing countries, the question of the access to and transfer of technology, and institutional requirements.
3. The paper points out a number of issues to be decided in the negotiation of a Convention. In general these are:
 - the political imperative of striking the correct balances: on the one hand, between the arguments for a far-reaching, action-oriented Convention and the need for urgent adoption of such a Convention so as to begin tackling the problem of climate change; and, on the other hand, between the cost of inaction and the lack of scientific certainty;
 - the extent to which specific obligations, particularly on the control of emissions of carbon dioxide and other greenhouse gases, should be included in the Convention itself or be the subject of separate protocol(s);
 - the timing of negotiation of such protocol(s) in relation to the negotiations on the Convention.

4. In particular, within the Convention the following specific issues will need to be addressed:

- a) Financial needs of developing countries: The need for additional resources for developing countries and the manner in which this should be addressed, particularly in terms of the nature, size and conditions of the funding, even if detailed arrangements form the subject of a separate protocol, will have to be considered by the negotiating parties.
- b) Development and transfer of technology: The basis on which the promotion of the development and transfer of technology and provision of technical assistance to developing countries should take place will need to be elaborated, taking into account considerations such as terms of transfer, assured access, intellectual property rights and the environmental soundness of such technology.
- c) Institutions: Views differ substantially on the role and powers of the institutions to be created by the Convention, particularly in exercising supervision and control over the obligations undertaken.

5. The inclusion of any particular element in the paper does not imply consensus with respect to that element, or the agreement of any particular government to include that element in a Convention.

6. The co-ordinators have not sought to make a value judgement in listing and summarising in the attached paper the elements proposed for inclusion in a framework Convention: their task seeks merely to assist the future negotiators in their task. They note however that a readiness to address the foregoing fundamental problems in a realistic manner will be a prerequisite for ensuring the success of the negotiations and the support of a sufficiently wide and representative spread of nations.

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POSSIBLE ELEMENTS FOR INCLUSION
IN A FRAMEWORK CONVENTION ON CLIMATE CHANGE

PREAMBLE

In keeping with common treaty practice including the format of the Vienna Convention, the Climate Change Convention would contain a preamble which might seek to address some or all of the following items:

- a description of the problem and reasons for action (need for timely and effective response without awaiting absolute scientific certainty);
- reference to relevant international legal instruments (such as the Vienna Convention and Montreal Protocol) and declarations (such as UNGA Resolution 43/53 and Principle 21 of the Stockholm Declaration);
- recognition that climate change is a common concern of mankind, affects humanity as a whole and should be approached within a global framework, without prejudice to the sovereignty of states over the airspace superadjacent to their territory as recognized under international law;
- recognition of the need for an environment of a quality that permits a life of dignity and well-being for present and future generations;
- reference to the balance between the sovereign right of states to exploit natural resources and the concomitant duty to protect and conserve climate for the benefit of mankind, in a manner not to diminish either;
- endorsement and elaboration of the concept of sustainable development;
- recognition of the need to improve scientific knowledge (e.g. through systematic observation) and to study the social and economic impacts of climate change, respecting national sovereignty;
- recognition of the importance of the development and transfer of technology and of the circumstances and needs, particularly financial, of developing countries; need for regulatory, supportive and adjustment measures to take into account different levels of development and thus differing needs of countries;
- recognition of the responsibility of all countries to make efforts at the national, regional and global levels to limit or reduce greenhouse gas emissions and prevent activities which could adversely affect climate, while bearing in mind that:
 - most emissions affecting the atmosphere at present originate in industrialized countries where the scope for change is greatest;

9 implementation may take place in different time frames for different categories of countries and may be qualified by the means at the disposal of individual countries and their scientific and technical capabilities;

0 emissions from developing countries are growing and may to grow in order to meet their development requirements and thus, over time, are likely to represent an increasingly significant percentage of global emissions;

- recognition of the need to develop strategies to absorb greenhouse gases, i.e. protect and increase greenhouse gas sinks; to limit or reduce anthropogenic greenhouse gas emissions; and to adapt human activities to the impacts of climate change.

Other key issues which will have to be addressed during the development of the preambular language include:

- should mankind's interest in a viable environment be characterized as a fundamental right?

- is there an entitlement not to be subjected, directly or indirectly, to the adverse effects of climate change?

- should there be a reference to the precautionary principle?

- in view of the inter-relationship among all greenhouse gases, their sources and sinks, should they be treated collectively?

- should countries be permitted to meet their aggregate global climate objectives through joint arrangements?

- should reference be made to weather modification agreements such as the Moscow treaty as relevant legal instruments?

- is there a common interest of mankind in the development and application of technologies to protect and preserve climate?

- does the concept of sustainable development exclude or include the imposition of new conditionality in the provision of financial assistance to developing countries, and does it imply a link between the protection and preservation of the environment, including climate change, and economic development so that both are to be secured in a coherent and consistent manner?

- should the preamble address the particular problems of countries with an agricultural system vulnerable to climate change and with limited access to capital and technologies, recognizing the link with sustainable development?

is there a minimum standard of living which is a prerequisite to adopting response strategies to address climate change?

DEFINITIONS

As is the practice, definitions will need to be elaborated in a specific article on definitions. The terms which will need to be defined will depend on the purpose of the Convention and thus the language used by the negotiating parties.

GENERAL OBLIGATIONS

Following the format of such treaties as the Vienna Convention, an article would set out the general obligations agreed to by the parties to the Convention. Such obligations may relate to, for example:

- the adoption of appropriate measures to protect against the adverse effects of climate change, to limit, reduce, adapt to and, as far as possible, prevent climate change in accordance with the means at the disposal of individual countries and their scientific and technical capabilities; and to avoid creating other environmental problems in taking such measures;
- the protection, stabilization and improvement of the composition of the atmosphere in order to conserve climate for the benefit of present and future generations;
- taking steps having the effect of limiting climate change but which are already justified on other grounds;
- the use of climate for peaceful purposes only, in a spirit of good neighbourliness;
- co-operation by means of research, systematic observation and information exchange in order to understand better and assess the effects of human activities on the climate and the potential adverse environmental and socio-economic impacts that could result from climate change, respecting national sovereignty;
- the encouragement of the development and transfer of relevant technologies, as well as the provision of technical and financial assistance, taking into account the particular needs of developing countries to enable them to fulfil their obligations;
- co-operation in the formulation and harmonization of policies and strategies directed at limiting, reducing, adapting to and, as far as possible, preventing climate change;
- co-operation in the adoption of appropriate legal or administrative measures to address climate change;

provision for bilateral, multilateral and regional agreements or arrangements not incompatible with the Convention and any annex/protocol, including opportunities for groups of countries to fulfil the requirements on a regional or sub-regional basis;

co-operation with competent international organisations effectively to meet the objectives of the Convention;

the encouragement of and co-operation in the promotion of public education and awareness of the environmental and socio-economic impacts of greenhouse gas emissions and of climate change;

the strengthening or modification if necessary of existing legal institutional instruments and arrangements relating to climate change;

a provision on funding mechanisms.

Other key issues which will have to be addressed, in the process of elaborating this article include the following:

should there be a provision setting any specific goals with respect to levels of emissions (global or national) or atmospheric concentration of greenhouse gases while ensuring stable development of the world economy, particularly stabilization by industrialized countries, as a first step, and later reduction of CO₂ emissions and emissions of other greenhouse gases not controlled by the Montreal Protocol? Such provision would not exclude the application of more stringent national or regional emission goals than those which may be provided for in the Convention and/or any annex/protocol.

in light of the preamble language, should there be a provision recognizing that implementation of obligations may take place in different time frames for different categories of country and/or may be qualified by the means at the disposal of individual countries and their scientific and technical capabilities?

should there be a commitment to formulate appropriate measures such as annexes, protocols or other legal instruments and, if so, should such formulation be on a sound scientific basis or on the basis of the best available scientific knowledge?

in addressing the transfer of technology particularly to developing countries, what should be the terms of such transfers (i.e. commercial vs. non-commercial, preferential vs. non-preferential, the relationship between transfers and the protection of intellectual property rights)?

should funding mechanisms be limited to making full use of existing mechanisms or also entail new and additional resources and mechanisms?

should provision be made for environmental impact assessments of planned activities that are likely to cause significant climate change as well as for prior notice of such activities?

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- what should be the basis of emission goals e.g., total emission levels, per capita emissions, emissions per GNP, emissions per energy use, climatic conditions, past performance, geographic characteristics, fossil fuel resource base, carbon intensity per unit of energy, energy intensity per GNP, socio-economic costs and benefits, or other equitable considerations?
- should the particular problem of sea-level rise be specifically addressed?
- is there a link between nuclear stockpiles and climate change?

INSTITUTIONS

It has been the general practice under international environmental agreements to establish various institutional mechanisms. The parties to a Climate Change Convention might, therefore, wish to make provision for a Conference of the Parties, an Executive Organ and a Secretariat.

The Conference of the Parties may, among other things: keep under continuous review the implementation of the Convention and take appropriate decisions to this end; review current scientific information; and promote harmonization of policies and strategies directed at limiting, reducing, adapting to and, as far as possible, preventing climate change.

Questions that will arise in developing provisions for appropriate institutional mechanisms include:

- should any of the Convention's institutions (e.g. the Conference of the Parties and/or the Executive Organ) have the ability to take decisions inter alia on response strategies or functions in respect of surveillance, verification and compliance that would be binding on all the parties and, if so, should such an institution represent all of the parties or be composed of a limited number of parties e.g. based on equitable geographic representation?
- what should be the role of the Secretariat?
- what should be the decision-making procedures, including voting requirements (e.g. consensus, majority)?
- if a trust fund or other financial mechanism were established under the Convention, how should it be administered?
- should scientific and/or other bodies be established on a permanent or ad hoc basis, to provide advice and make recommendations to the Conference of the Parties concerning research activities and measures to deal with climate change?
- should the composition of the above bodies reflect equitable climatic or geographic representation?

- should there be a provision for working groups, e.g. on scientific matters as well as on socio-economic impacts and response strategies?
- is there a need for innovative approaches to institutional mechanisms in the light of the nature of the climate change issue?
- what should be the role of non-governmental organizations?

RESEARCH, SYSTEMATIC OBSERVATIONS AND ANALYSIS

It would appear to follow general practice to include provision for co-operation in research and systematic monitoring. In terms of research, each party might be called upon to undertake, initiate, and/or co-operate in, directly or through international bodies, the conduct of research on and analysis of:

- physical and chemical processes that may affect climate;
- substances, practices, processes and activities that could modify the climate;
- techniques for monitoring and measuring greenhouse gas emission rates and their uptake by sinks;
- improved climate models, particularly for regional climates;
- environmental, social and economic effects that could result from modifications of climate;
- alternative substances, technologies and practices;
- environmental, social and economic effects of response strategies;
- human activities affecting climate;
- coastal areas with particular reference to sea-level rise;
- water resources; and
- energy efficiency.

The parties might also be called upon to co-operate in establishing and improving, directly or through competent international bodies, and taking fully into account national legislation and relevant on-going activities at the national, regional and international levels, joint or complementary programmes for systematic monitoring and analysis of climate, including a possible worldwide system; and co-operate in ensuring the collection, validation and transmission of research, observational data and analysis through appropriate data centres.

Other issues that will arise in developing this provision include:

- should consideration be given to the establishment of panels of experts or of an independent scientific board responsible for the co-ordination of data collection from the above areas of research and analysis and for periodic assessment of the data?
- should provision be made for on-site inspection?
- should there be provision for open and non-discriminatory access to meteorological data developed by all countries?
- should a specific research fund be established?

INFORMATION EXCHANGE AND REPORTING

Precedents would suggest the inclusion of a provision for the transmission of information through the Secretariat to the Conference of the Parties on measures adopted by them in implementation of the Convention and of protocols to which they are party. In an annex to the Vienna Convention, the types of information exchanged are specified and include scientific, technical, socio-economic, commercial and legal information.

For the purposes of elaborating this provision, issues having to be addressed by the negotiating parties include the following:

- is there a need for the elaboration of a comprehensive international research programme in order to facilitate co-operation in the exchange of scientific, technological and other information on climate change?
- should parties be obliged to report on measures they have adopted for the implementation of the Convention, with the possible inclusion of regular reporting on a comparable basis of their emissions of greenhouse gases?
- should each party additionally be called upon to develop a national inventory of emissions, strategies and available technologies for addressing climate change? If so, the Convention might also call for the exchange of information on such inventories, strategies and technologies.

DEVELOPMENT AND TRANSFER OF TECHNOLOGY

While the issue of technology has been addressed in the section on General Obligations, it might be considered desirable to include separate provisions on technology transfer and technical co-operation. Such provisions could call upon the parties to promote the development and transfer of technology and technical co-operation, taking into account particularly the needs of developing countries, to enable them to take measures to protect against the adverse effects of climate change, to limit, reduce and, as far as possible, prevent climate change, or to adapt to it.

Another issue which will arise is: should special terms be attached to climate-related transfers of technology (such as a preferential and/or non-commercial basis and assured access to, and transfer of, environmentally sound technologies on favourable terms to developing countries), taking into consideration the protection of intellectual property rights?

SETTLEMENT OF DISPUTES

It would be usual international practice to include a provision on the settlement of disputes that may arise concerning the interpretation or application of the Convention and/or any annex/protocol. Provisions similar to those in the Vienna Convention for the Protection of the Ozone Layer might be employed, i.e. voluntary resort to arbitration or the International Court of Justice (with a binding award) or, if neither of those options is elected, mandatory resort to conciliation (with a recommendatory award).

OTHER PROVISIONS

It would be the usual international practice to include clauses on the following topics:

- amendment of the Convention;
- status, adoption and amendment of annexes;
- adoption and entry into force of, and amendments to, protocols;
- signature;
- ratification;
- accession;
- right to vote;
- relationship between the Convention and any protocol(s);
- entry into force;
- reservations;
- withdrawal;
- depositary;
- authentic texts.

ANNEXES AND PROTOCOLS

The negotiating parties may wish the Convention to provide for the possibility of annexes and/or protocols. Annexes might be concluded as integral parts of the Convention, while protocols might be concluded subsequently (as in the case of the Montreal Protocol to the Vienna Convention on Protection of the Ozone Layer). While it is recognized that the Convention is to be all-encompassing, the negotiating parties will have to decide whether greenhouse gases, their sources and sinks, are to be dealt with individually, in groups or comprehensively; in annexes or protocols to the Convention. The following, among others, might also be considered as possible subjects for annexes or protocols to the Convention:

- agricultural practices;
- forest management;
- funding mechanisms;
- research and systematic observations;
- energy conservation and alternative sources of energy;
- liability and compensation;
- international emissions trading;
- international taxation system;
- development and transfer of climate change-related technologies.

Issues that will arise in connection with the development of annexes and protocols include:

- timing, i.e. negotiating parties advocating a more action-oriented Convention may seek to include specific obligations in annexes as opposed to subsequent protocols and/or negotiate one or more protocols in parallel with the Convention negotiations;
- sequence, i.e. if there is to be a series of protocols, in what order should they be taken up?