

Originally Processed With FOIA(s):

S

FOIA Number:

S

# FOIA MARKER

**This is not a textual record. This is used as an administrative marker by the George Bush Presidential Library Staff.**

---

**Record Group/Collection:** George H.W. Bush Presidential Records  
**Collection/Office of Origin:** Speechwriting, White House Office of  
**Series:** Speech File Backup Files  
**Subseries:** Chron Files, 1989-1993

---

**OA/ID Number:** 13713  
**Folder ID Number:** 13713-007

---

**Folder Title:**

White House Conference on Global Change 4/17/90 [OA 6895] [1]

---

Stack:	Row:	Section:	Shelf:	Position:
<b>G</b>	<b>26</b>	<b>20</b>	<b>5</b>	<b>1</b>

---

## In the Ebb and Flow Of Ancient Glaciers, Clues to a New Ice Age

Greenhouse effect could delay the onset of the cold, glaciologists say.

By WILLIAM K. STEVENS

**T**HE climatic history of the last half-million years is largely a history of ice and cold, punctuated every 100,000 years or so by brief, glorious intervals of unusual warmth called interglacials. If nature takes its course, scientists say, the current interglacial — the one in which human civilization developed — should begin to end within the next 2,000 years or sooner.

But nature may not take an unaltered course.

Unprecedented concentrations of heat-trapping carbon dioxide in the atmosphere could extend the present interglacial by a millennium or more and transform it into a "super-interglacial" with average global temperatures higher than any seen in the last million years, say a number of scientists who study the advance and retreat of the great glaciers.

Putting off the next ice age might seem an attractive prospect; in the depths of the last one, 18,000 years ago, global temperatures averaged almost 10 degrees colder than today's and much of North America was buried under ice averaging a mile thick. Some experts say, however, that such a delay carries its own risks and uncertainties. There has never been more carbon dioxide in the air than now, they say, and since the burning of fossil fuels is causing the concentration to rise with no end to the increase in sight, there is no reliable guide to the climatic changes and disruptions it might cause.

"We're going outside what nature has experienced in the recent past," said Dr. Nicholas Shackleton of Cambridge University in England, who has long been in the forefront of research on the glacial periods. "It's scary."

In the last decade or so, scientists have made great strides in understanding the causes and workings of the great glacial cycles. But how much the globe will warm up is a matter of intense argument, and some glaciologists who believe that a super-interglacial is on the way say it may not last long enough to delay the world's turn to a new ice age. How all this will

**By one theory, changes in the Earth's orbit, tilt and rotation set off shifts in the oceans' atmosphere system.**

play out is one of the major questions faced by the interrelated sciences of glaciology and climatology.

The present interglacial is 10,000 to 13,000 years along, and scientists say that in at least the last half-million years, no interglacial has ever lasted longer than 13,000 years. Over the last few years, scientists have generally come to agree on what determines the timing of these warm cycles and of the long, uneven cold spells that culminate in full ice ages.

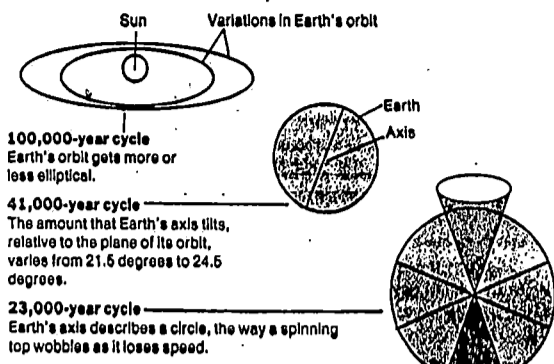
The glacial cycles are set in motion by periodic wobbles in the Earth's rotation and changes in the tilt of its axis and the shape of its orbit, occurring over tens of thousands of years. The three overlapping cycles control the timing of global warming and cooling, and the long-term advance and retreat of the glaciers, by altering the angles and distances from which the Sun's energy strikes the Earth.

The shortest cycle, which is repeated mainly in periods of 10,000 and 23,000 years, is that of the wobble in the Earth's rotation. The wobble, or precession, is much like that of a spinning top as it loses speed. In the second cycle, the tilt of the Earth's axis as it orbits the Sun varies from about 22 degrees to about 25 degrees over 41,000 years. In the longest cycle, the Earth's orbit stretches slightly from nearly circular to elliptical and back again every 100,000 years or so.

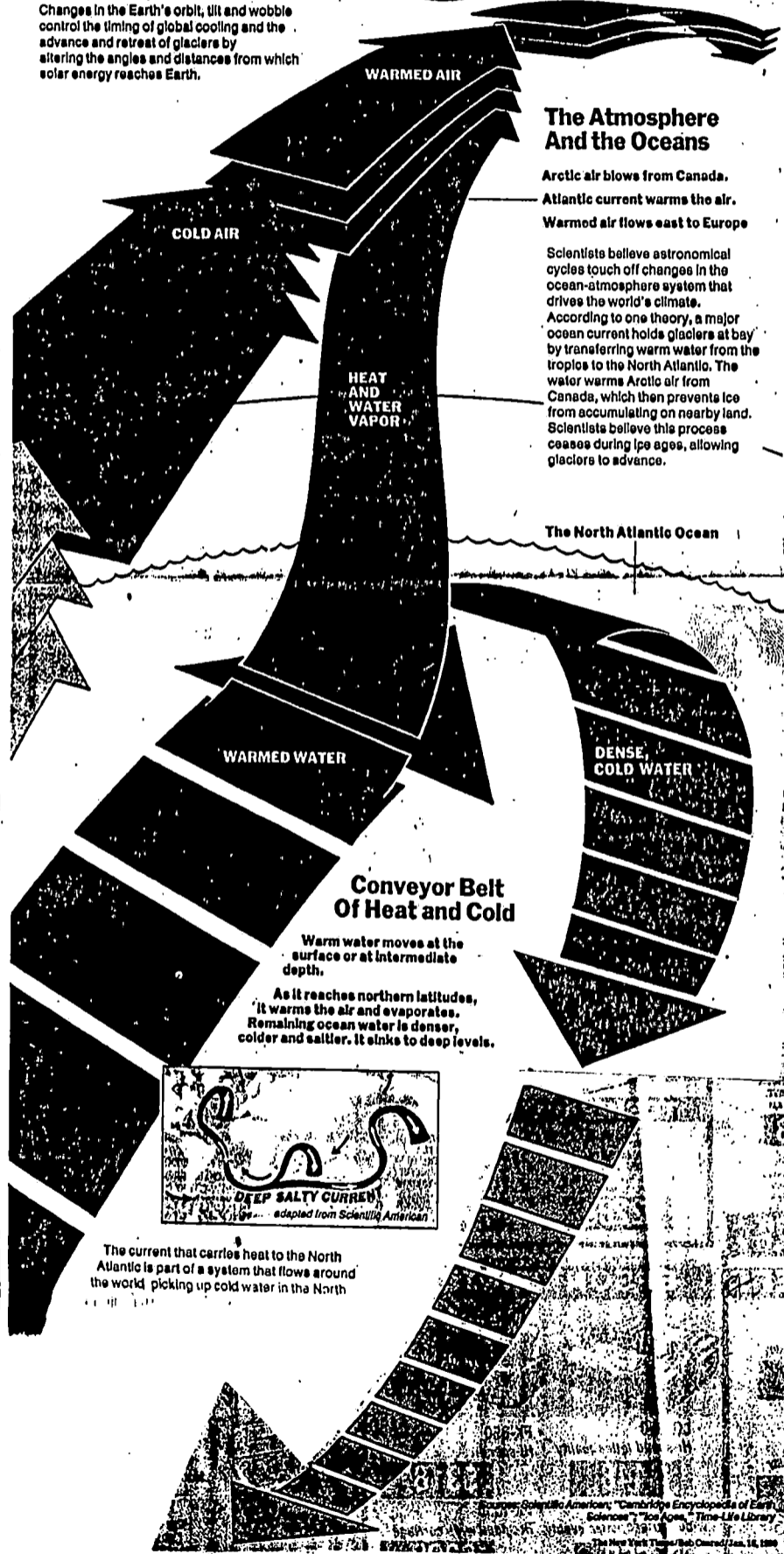
To some degree, said Dr. John Imbrie of Brown University, a leading glaciologist, the two shorter cycles appear to exert a direct force on the climate, much as the Earth's movement about the Sun exerts a direct influence on the change of seasons. By itself the 100,000-year cycle does not appear strong enough to bring about direct alterations in the Earth's climate. But scientists believe it sets off complex and far-reaching changes in the ocean-atmosphere system that drives the climate.

This astronomical theory of glacial cycles, it is called, was first set forth in the

Continued on Page C2



**Astronomical Cycles**  
Changes in the Earth's orbit, tilt and wobble control the timing of global cooling and the advance and retreat of glaciers by altering the angles and distances from which solar energy reaches Earth.



# In the Ebb and Flow of Ancient

Continued From Page C1

1920's by Milutin Milankovitch, a Yugoslav mathematician, but confirmed only in the 70's and 80's. Researchers did so by analyzing ocean sediment in which the glacial cycles were reflected in the remains of plankton-like animals that live at particular temperatures, and by studying the ancient distribution of isotopes of oxygen whose proportions vary with the temperature.

The focus of research now is on understanding how all three cycles affect the workings of the dauntingly complex ocean-atmosphere system and how they will be affected by rising concentrations of carbon dioxide and other greenhouse gases.

Ice ages and interglacials differ from each other in their duration and internal fluctuations, partly because the interaction of the three astronomical cycles is rarely the same. The ice ages cannot be forecast exactly.

## Coming: Global Cooling

Scientists calculate that in the normal course of the cycle, apart from any warming induced by humans, the present interglacial should give way within no more than 2,000 years to a gradual, uneven decline in global temperature that would bring moderate cold about 5,000 years from now and major ice ages about 23,000 and 60,000 years from now.

The interplay of the cycles means that each glacial period follows an uneven course, with relatively colder periods interspersed with relatively warmer ones, but none of them as warm as an interglacial. Average global temperatures in the past have reached about 60 degrees at the peak of an interglacial, and declined to about 50 degrees in the depths of an ice age. Nor does cooling or warming happen at the same time everywhere in the world. In the most recent climatic cycle, the coldest point in the Northern Hemisphere came about 18,000 years ago, after which the climate rapidly warmed.

Life persisted even in the depths of that last ice age. But ice buried much

of Europe and North America, and locked up so much water that the global sea level fell by 350 feet, exposing broad stretches of the continental shelf. A band of dry, windswept tundra bordered the southern fringes of the glaciers, and summers south of that were shorter and cooler than now. In the Southern Hemisphere, small ice sheets covered parts of Australia, New Zealand and Argentina.

Smaller fluctuations are superimposed on these grand swings of climate. In the present interglacial, for instance, a warming trend about 1,000 years ago, called the Medieval Maximum, enabled the Vikings to settle Greenland and vineyards to flourish in Britain. On the other hand, scientists say that about every 2,500 years, a "little ice age" cools the globe. In the most recent of these, lasting from the 15th century to the 19th, the average temperature in Europe was nearly 3 degrees lower than today and mountain glaciers advanced all over the world. Crops failed and villages starved in parts of Europe. The Hans Brinker story in Holland was set in this period, as was the ordeal of Washington's army at Valley Forge. In 1779-80, New York Harbor froze solid.

## Cold Times, Warm Intervals

The cause of these little ice ages, which have about one-tenth the impact of a full ice age, is uncertain, although some scientists believe they may be related to variations in the Sun's energy output. Smaller climatic oscillations also take place on scales of a century or less, and even smaller ones last a few years. There were warm intervals in the last little ice age, for instance; and in the United States, the relatively warm 1930's gave way to the colder 50's, 60's and 70's, to be followed again by the warmer 80's. Some climatologists say an overall warming trend can be detected over the last century, but others dispute this.

The causes of these shorter-term oscillations are poorly understood, said Dr. Imbrie. Scientists believe that among the factors involved are volcanic eruptions and the periodic

back-and-forth shifts in the surface temperature of the equatorial Pacific Ocean that have become known as the El Niño-La Niña cycle.

Climatologists and glaciologists are sure that both the oceans and atmospheric carbon dioxide figure strongly in the longer-term climatic shifts. One of the great discoveries of the last decade, said Dr. Imbrie, was the finding by French and Soviet scientists in 1987 that atmospheric carbon dioxide rose and fell in rough parallel with the ice-age cycle over the last 150,000 years, covering two interglacials. The scientists made

## Atmospheric carbon dioxide appears to figure strongly in climate shifts.

their findings by analyzing core samples of Antarctic ice.

Whether the carbon-dioxide fluctuation is a cause or an effect of warming and cooling is an unanswered question of the chicken-and-egg sort. "One of the really fundamental problems to be solved is why the carbon dioxide changes, because that clearly is involved in this ice-age change," said Dr. Imbrie. "Nature herself has been changing carbon dioxide substantially, and a Nobel Prize question is why that happens."

In one way or another, he and other scientists believe, the Milankovitch cycles probably influence the way the ocean circulates, setting in train a complex chain of climatic interactions, involving carbon dioxide, ice, air temperatures, clouds, vegetation patterns, dust, atmospheric methane and a host of other factors.

## Cycles and Currents

Studies of ocean sediment indicate that in glacial times, carbon dioxide is transferred from the upper waters of the ocean to the depths, said Edward A. Boyle, a planetary scientist at the Massachusetts Institute of Technology, in a paper at the American Geophysical Union in San Francisco last month. One consequence, he said in an interview, is that the ocean becomes more alkaline and draws more carbon dioxide from the atmosphere. Lower levels of carbon dioxide are associated with lower global temperatures. "There is probably something about the Milankovitch cycles that alters the chemical redistribution within the ocean," he said.

The Milankovitch cycles may also cause the pattern of ocean currents to change abruptly, altering the global distribution of heat, say Wallace S. Broecker, a geochemist at the La-

A  
GOOD  
SPORT

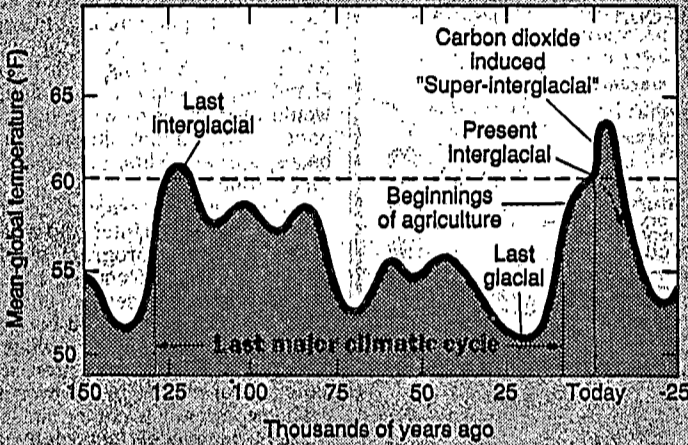
Pulitzer  
Prize  
winner  
Dave Anderson.

SPORTS OF THE TIMES  
The New York Times

# Glaciers, Clues to an Ice Age

## The Next Big Cold Spell

Some glaciologists believe that rising concentrations of atmospheric carbon dioxide may delay the onset of the next Ice Age and convert the current interglacial period into a "super-interglacial" with the highest average global temperatures in a million years.



The pattern of ice ages over the last half-million years is that the ice advances over periods of 100,000 years and then recedes more rapidly over 6,000 or 7,000 years. Dr. Broecker says the climate itself changes even more rapidly, and that the melting of the ice follows more slowly. "A lot of things occur abruptly and more or less together," said Dr. Imbrie.

The end of the interglacial and the beginning of the gradual decline into ice-age cold may also come with relative suddenness. Dr. Broecker says, "The way I would count this interglacial," he said, "it's already 13,000 years along," and the onset of the decline is overdue. "You can say we're approaching that precipice now," he added.

### A Major Uncertainty

The effect of the expected global warming from carbon dioxide produced by humans remains a major uncertainty. Dr. Shackleton, of Cambridge University, said carbon dioxide levels are now higher than they were at the height of the last interglacial, more than 100,000 years ago.

"There is clearly going to be more carbon dioxide in the atmosphere than there has been in any previous

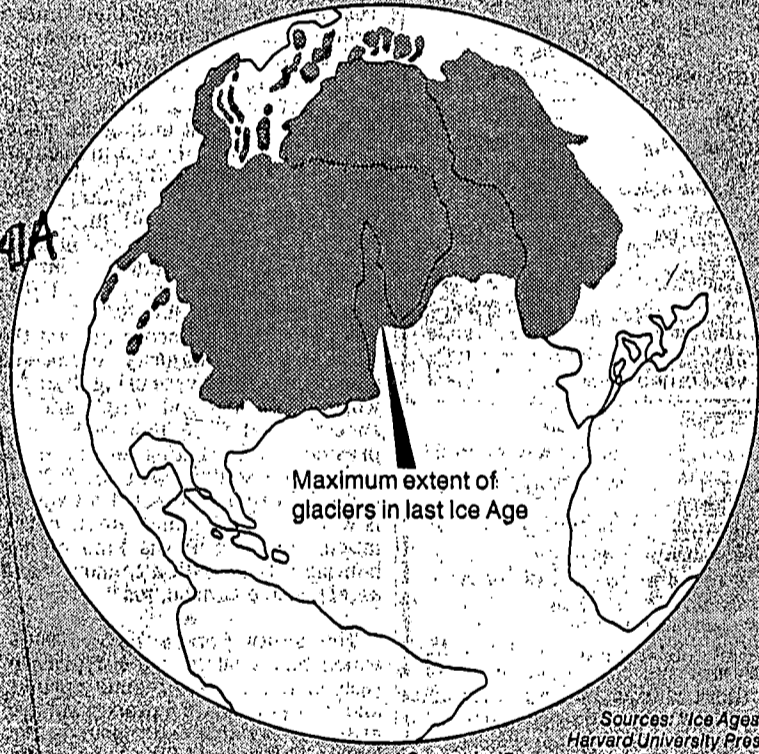
## Scientists say the global temperature could begin to slide within 2,000 years.

interglacial," he added. "It will soon be way above any previous natural level, and it will disappear into the oceans on a time scale of 1,000 or 2,000 years."

Some say this means that the plunge into a new ice age could be delayed by a similar interval. The peak of the super-interglacial, Dr. Broecker said, would probably occur no later than the year 2200, after that would come a long, slow decline over centuries. But the timing is uncertain. James Hays, another leading glaciologist at Lamont-Doherty, said "we could go through the whole greenhouse episode and come back to normal" before the decline to the next ice age begins.

An unusually high level of atmospheric carbon dioxide, Dr. Broecker said, might cause the ocean-atmosphere system to flip into a new superwarm state as easily as it can flip to a glacial state, with unforeseen and unprecedented consequences.

"We're living in a system that can do strange things," he said. "Small forcings have produced large things, and to say a priori that this gas can't produce large changes is just bloody insanity."



Sources: "Ice Ages," Harvard University Press; "Cambridge Encyclopedia of Earth Sciences"

The New York Times/Bob Conrad/Jan. 10, 1980

mont-Doherty Laboratory, and George H. Denton, a geologist at the University of Maine. They believe this sudden "flip," in which the ocean-atmosphere system drastically reorganizes, sets off glacial periods and interglacials.

Dr. Broecker and Dr. Denton say a global "conveyor belt" of ocean currents now carries warm air to the

North Atlantic, warming the northern latitudes and preventing glaciers of ice-age scale from developing. Studies of the ancient climate seem to show that the conveyor belt ceases in glacial times, the scientists say. They believe that this is related to changes in the intensity of the seasons induced by the changes in the Earth's orbit and attitude.

WORLD CLIMATE PROGRAMME PUBLICATIONS SERIE

**WMO/UNEP INTERGOVERNMENTAL PANEL  
ON CLIMATE CHANGE**

**REPORT OF THE FIRST SESSION**

**OF THE**

**WMO/UNEP INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE (IPCC)**

**Geneva, 9 - 11 November 1988**

**IPCC - 1**

**TD - No. 267**



**World Meteorological  
Organization**



**United Nations Environment  
Programme**

© 1988, World Meteorological Organization

**NOTE**

The designations employed and the presentation of material in this publication do not imply the expression of any opinion whatsoever on the part of the Secretariat of the World Meteorological Organization concerning the legal status of any country, territory, city or area, or of its authorities, or concerning the delimitation of its frontiers or boundaries.

TABLE OF CONTENTS

	<u>Page</u>
1. ORGANIZATION OF THE SESSION .....	1
1.1 Opening of the Session .....	1
1.2 Approval of the agenda .....	3
1.3 Programme of work of the session .....	3
2. NATIONAL STATEMENTS .....	3
3. DISCUSSION OF THE PANEL'S PROGRAMME OF WORK .....	4
4. SCHEDULE OF WORK OF IPCC .....	7
5. THE SECOND WORLD CLIMATE CONFERENCE .....	8
6. FINANCIAL QUESTIONS .....	8
7. ELECTION OF THE CHAIRMAN, VICE-CHAIRMAN AND RAPPORTEUR OF THE PANEL .....	9
8. OTHER MATTERS .....	9
9. DATE AND PLACE OF THE NEXT SESSION OF IPCC .....	9
10. CLOSURE OF THE SESSION .....	9

Annex I: List of Participants

Annex II: Agenda

Annex III: Summaries of National and Organizational Statements

Annex IV: Terms of Reference for the Working Groups

Annex V: Core Membership of the Working Groups

Annex VI: Duties and Terms of Office of the Chairman,  
Vice-Chairman and Rapporteur of the Panel

List of Acronyms

1. ORGANIZATION OF THE SESSION (agenda item 1)

1.1 Opening of the Session (agenda item 1.1)

1.1.1 The first session of the Intergovernmental Panel on Climate Change was held at the Geneva International Conference Centre (CICG) from 9 to 11 November 1988. It was formally opened at 10.15 am on 9 November by Mr. J.P. Bruce, Acting Deputy Secretary-General of the World Meteorological Organization (WMO).

1.1.2 Professor G.O.P. Obasi, Secretary-General of WMO, in his opening address, welcomed the delegates and emphasized the great importance attached by WMO to the work of this new Intergovernmental Panel on Climate Change (IPCC). He welcomed and paid a warm tribute to Dr. Mostafa K. Tolba, Executive Director of the United Nations Environment Programme (UNEP), for his successful efforts with regard to the Vienna Convention on the Ozone Layer and its associated Montreal Protocol.

The Secretary-General stressed that the predicted global warming is one of the most important long-term challenges facing humanity. He referred to the enormous outburst of public concern over global warming and the related sea level rise, the discussions in the UN General Assembly on the draft resolution by Malta on climate change and the attention by heads of state and the media.

He emphasized the scientific nature of the Organization's work in assisting 160 Member countries in measuring, standardizing, collecting and disseminating climate and other atmospheric data. He pointed out that scientific investigations have been carried out under the World Climate Programme in its four components : data, applications, research and impact studies. The Programme is being carried out in a co-ordinated manner between WMO, UNEP, ICSU and UNESCO.

At the same time, WMO cannot be a bystander in considering the consequences of the scientific studies. It has, together with UNEP, formed IPCC and convened its first session.

Cautioning the Panel members that their task spans many disciplines and demands much iterative work between science and public policy, Prof. Obasi urged them to bring together their differing expertise and backgrounds in a co-operative, productive manner. He pointed out that there is the suggestion of an agenda for the Panel's work for the next year and a half in the draft resolution by Malta on climate change.

He noted that in our search for policy responses to global warming we must continue to support and strengthen the measurement and research programmes to reduce the uncertainties in scientific understanding. One especially important task is to strengthen work on climate and air quality in the developing countries of the world so that they become full partners in the search for appropriate solutions.

Finally, he pledged the full support of WMO to the efforts of the Panel.

1.1.3 Dr. Mostafa K. Tolba, the Executive Director of UNEP, welcoming participants to the first session of IPCC, thanked governments for designating eminent representatives to the Panel, pointing out that their calibre was evidence of the significance attached to the challenge of climate change by governments. He expressed pleasure at sharing the platform with Prof. Obasi, the Secretary General of WMO, whose personal effort in their joint endeavour to gear WMO and UNEP towards assisting the international community to deal with the challenge of climate change, he held in high esteem.

Hailing the formation and launching of IPCC as a milestone in global co-operation for environmental protection, Dr. Tolba expressed satisfaction at the extent of concern shown by political leaders and policy makers to the threat posed by climate change. Such concern, he continued, has been expressed in public statements by Heads of Government, and in various fora, including the UN General Assembly.

In giving the background information leading to the formation of IPCC, and the terms of reference for the Panel as suggested by the WMO Executive Council and the UNEP Governing Council, Dr. Tolba requested the Panel to address those knowledge gaps as they relate to the science, impacts and policy responses associated with the climate change problem. He stressed that the Panel should, as a first step, identify the agreed facts and projections, separate them from mere speculations and bravely inform the world what ought to be done. Dr. Tolba urged the Panel to take account of work which has already been carried out by governments and international organizations in the field of climate change.

Dr. Tolba informed IPCC that the work of the Panel should constitute a firm basis for the deliberations of the Second World Climate Conference. In this connection, he appealed to his colleague, Prof. Obasi, together with the WMO governing bodies, to consider postponing the Conference to the end of 1990.

Commenting on the most promising approach to the work of the Panel, Dr. Tolba suggested the establishment of three Working Groups to deal with scientific assessment, socio-economic impacts and policy responses. He also proposed the creation of a small Bureau to co-ordinate the work of the Panel.

Dr. Tolba concluded by reminding the delegates that there are about 4,000 days left in this century. He urged that the period between now and the end of the century be used for global co-operation to contain and cope with the profound evolution we are imposing on our environment.

1.1.4 The list of participants is contained in Annex I.

1.1.5 Prof. B. Bolin of Sweden was elected Chairman of the session by acclamation. Dr. Abdul Bar Bin Abdullah Algain of Saudi Arabia and Mr. K. R. Rufai of Nigeria were elected Vice-Chairman and Rapporteur of the session, respectively, also by acclamation.

1.1.6 The Panel established a Nominations Committee for the choice of the Chairman, Vice-Chairman and the Rapporteur of the Panel. The Nominations Committee consisted of the following :

Australia (Chairman)  
Malta  
Mexico  
Senegal  
USA  
USSR

and representatives of WMO and UNEP.

1.2 Approval of the agenda (agenda item 1.2)

1.2.1 The provisional agenda was adopted without any change. The agenda of the session is given in Annex II.

1.3 Programme of work of the session (agenda item 1.3)

1.3.1 The Panel agreed on the working hours of the meetings and decided that the various items would be considered in the order given in the agenda.

2. NATIONAL STATEMENTS (agenda item 2)

2.1 Statements concerning national views, policies and activities relating to the climate change issue were made by representatives of the following Member countries :

- Australia
- Canada
- China
- Finland
- India
- Japan
- Kenya
- Malta
- Mexico
- Netherlands
- Norway
- Senegal
- Sweden
- Switzerland
- USSR
- UK
- USA
- Zimbabwe.

In their statements, Members expressed support to the joint efforts of WMO and UNEP in establishing IPCC. The Commission of the European Communities expressed a similar sentiment.

Short summaries of the statements provided by the delegations are given in Annex III.

3. DISCUSSION OF THE PANEL'S PROGRAMME OF WORK (agenda item 3)

3.1 The Panel considered the organization of its work, from the viewpoint of both structure and schedule, to attain the objectives set up by the governing bodies of WMO and UNEP, summarized in the WMO Executive Council Resolution 4 (EC-XL) :

- "(i) Assessing the scientific information that is related to the various components of the climate change issue, such as emissions of major greenhouse gases and modification of the Earth's radiation balance resulting therefrom, and that needed to enable the environmental and socio-economic consequences of climate change to be evaluated;
- (ii) Formulating realistic response strategies for the management of the climate change issue."

3.2 The Panel agreed that its work included three main tasks :

- (i) Assessment of available scientific information on climate change;
- (ii) Assessment of environmental and socio-economic impacts of climate change;
- (iii) Formulation of response strategies.

3.3 The Panel decided to establish three Working Groups to accomplish these tasks in the most efficient and expeditious manner. Each Working Group should deal with its assigned task while close co-ordination of their activities should be ensured. It was specifically pointed out that the activity of the Working Group on response strategies would heavily depend on the results obtained by the other Working Groups. Nevertheless, the three Working Groups should start their work immediately. All three Working Groups should take into consideration, in their work, available assessment results obtained by relevant international and national bodies and programmes, including the World Climate Programme.

3.4 The Panel agreed upon the terms of reference for the Working Groups. These are appended as Annex IV to this report.

3.5 The Panel agreed that it would designate a Chairman, and Vice-chairmen, as needed, for each of the Working Groups. In doing so, the need for an equitable regional representation and balance of scientific and management expertise would be taken into account.

3.6 With regard to the membership of the Working Groups, the Panel considered that while participation by all countries interested in the activity of a Working Group would be essential to achieve a comprehensive and balanced outcome of its work, there is a need to provide for a manageable and effective group composition.

3.7 Therefore it was agreed that a core membership would be established for each Working Group. Working Groups I, II and III would have thirteen, thirteen and seventeen core members respectively. However, this would not imply that other interested countries would not be welcome to join in a Group's activity. The Panel suggested that, on the contrary, each Working Group should strive to obtain the best possible expertise, on a worldwide basis, particularly to cover the regional aspects adequately. The Panel further suggested that any country interested in the work of a particular Working Group should be invited to designate a focal point for purposes of communication and to attend sessions of the Working Group, if desired. The core members would be responsible for the completion of the tasks of the Working Groups in a timely manner.

3.8 The Panel emphasized that participation, as observers, of experts from relevant international organizations, such as ICSU, UNDP, UNESCO, FAO, CMEA, OECD/IEA, GCC and ECE, in the Working Groups and the Panel is essential and hence should be ensured in a timely fashion. The Panel recognized that IUCN and other non-governmental organizations (NGO's) can make important contributions to the work of IPCC and agreed to ensure their participation, as observers, in the work of the Panel and its Working Groups. The Panel also recognized that there are other organizations, particularly regional economic integration organizations, which are contracting parties to relevant international conventions, and that the participation of such organizations is essential for the work of the Panel and its Working Groups.

3.9 The Nominations Committee (see para 1.1.6 above) was requested by the Panel to recommend the core membership of the Working Groups. The Committee, as stated by its Chairman in his remarks, took into account geographical distribution and available expertise in arriving at the recommendations. With regard to Working Group I, the importance of scientific credibility was stressed and with regard to Working Group III, the large number of nominees and areas to be covered led to the need for five Vice-Chairmen. The other two Working Groups would have two Vice-Chairmen each.

3.10 After a few amendments, the core composition of the Working Groups, as appearing in Annex V, was approved by IPCC. It may be noted that Working Group II does not have its full complement of core members.

3.11 The Panel was aware of the need to co-ordinate the work of the three Working Groups and the activities of the Panel in the intersessional periods. For this purpose, it was decided to establish a Bureau of IPCC, consisting of fifteen persons :

- (i) Chairman of the Panel;
- (ii) Vice-Chairman and Rapporteur of the Panel;
- (iii) Chairmen of the three Working Groups; and

- (iv) Vice-Chairmen of the three Working Groups (two each for Working Groups I and II and five for Working Group III).

It was understood that, to provide for the best possible co-ordination, the Chairmen and Vice-Chairmen of the Working Groups should be, where possible, Principal Delegates of their respective countries in IPCC.

3.12 The Bureau will review the outlines of reports to be prepared by the Working Groups and will report to the next session of IPCC on the matter. On completion of the reports, the Bureau will integrate them into a single assessment statement which will include an executive summary, designed to facilitate the requirements of political analysts. This will include recommendations on co-ordinated international action(s). The Panel agreed that such a statement could also serve other useful purposes (see para 4.1 below).

3.13 The Working groups met at 2:00 pm on Friday, 11 November 1988. They decided to have their first full meetings as follows :

- (a) Working Group I, 24-26 January 1989 in the United Kingdom. The exact place will be notified later;
- (b) Working Group II, before the meeting of the Bureau (see para 4.3 below). The exact dates and place will be notified later.
- (c) Working Group III, tentatively, 30-31 January 1989 in Washington D.C. The dates and place will be confirmed.

3.14 In considering its own membership, the Panel recalled that at the beginning of 1988 all members of the UN were informed of the intended establishment, in accordance with the decisions of the WMO and UNEP governing bodies, of the Intergovernmental Panel on Climate Change. During the preparation for the first session of the Panel, it became evident that many countries were anxious to participate. The Panel viewed this as a very encouraging factor in accomplishing its tasks successfully. It was agreed that although only a select number of countries could take part in the first session, this should by no means suggest that other countries would be excluded from participation in the Panel's activities.

3.15 On a related matter, the Panel recommended that accurate ongoing climate monitoring under existing activities of the World Weather Watch (WWW), Integrated Global Oceans Services System (IGOSS) and the World Climate Data Programme (WCDF) should be given high priority by all members of the World Meteorological Organization and/or the Intergovernmental Oceanographic Commission, as the case may be.

3.16 Equally importantly, more research is needed in order to lay a good scientific foundation for future reference. Thus, IPCC recommended that nations continue and strengthen their support for such programmes as the World Climate Research Programme and the International Geosphere-Biosphere Programme.

4. SCHEDULE OF WORK OF IPCC (agenda item 4)

4.1 The Panel was informed of various international activities, including several high-level meetings, for which findings and recommendations of the Panel would be very valuable inputs. In particular, the Panel was informed of a draft resolution "Conservation of Climate as part of the Common Heritage of Mankind", submitted by Malta to the 43rd Session of the UN General Assembly. The draft resolution called for a report on the climate change issue to be prepared by the Secretary-General of WMO and the Executive Director of UNEP, together with IPCC, if possible within 18 months, for consideration at the 45th Session (1990) of the General Assembly. It was pointed out that such a report, if completed in time, could also be submitted to the 11th World Meteorological Congress in May 1991, the UNEP Governing Council in 1991 and the Second World Climate Conference (see para 4.2 below). The statement to be prepared by the Panel (see para 3.12 above), together with available reports of the Working Groups, could serve these purposes.

4.2 The Panel considered its work schedule in relation to the timetable for the Second World Climate Conference, scheduled to be held from 25 June-3 July 1990. The Panel recognized that these dates were set up by the WMO Executive Council after careful consideration of the recommendations of the Organizing Committee for the Conference. Several Members expressed the view that a postponement of the Second World Climate Conference by a few months (say, until October-November 1990) could allow, on the one hand, the Conference to benefit from the results of the Panel's work and, on the other hand, the Panel to present a well-prepared report to such an important forum. Some other Members were, however, of the view that the dates of the Conference established by the WMO Executive Council should be adhered to.

4.3 On the basis of the above considerations, the Panel adopted the following work schedule :

- (i) Immediate activation of its Working Groups (see also agenda item 3, particularly para 3.13); each Working Group should make its plans for its meetings, keeping in mind the work schedule of the Panel and the Bureau;
- (ii) The first meeting of the Bureau, 6-7 February 1989, in Geneva, Switzerland, for the purposes of reviewing and approving the outline submissions of the Working Groups (see Annex IV);
- (iii) The Second Session of the Panel, 28-30 June 1989 in Nairobi, Kenya, to be hosted by UNEP;
- (iv) A meeting of the Bureau, possibly in late 1989 or early 1990;
- (v) A Session of the Panel in September-October 1990, to consider the reports of its Working Groups and prepare an assessment statement (see para 3.12 above) for submission to WMO and UNEP.

5. THE SECOND WORLD CLIMATE CONFERENCE (agenda item 5)

The Panel was informed of the suggestion of the Organizing Committee for SWCC that it should be requested to advise in the identification of experts who could contribute to the conference by arranging for extensive presentations of national policies and programmes related to climate change and the application of knowledge of climate and its impacts in various socio-economic sectors. The Panel referred this matter to its corresponding Working Groups to make proposals with a view to meeting the above request (see also paras 4.1 and 4.2 above).

6. FINANCIAL QUESTIONS (agenda item 6)

6.1 The WMO representative, Mr. J.P. Bruce, in introducing the subject matter, stated that the two sponsoring organizations, WMO and UNEP, had no provision within their current regular budgets for supporting the activities of the Panel. He suggested the establishment of a Trust Fund for the purpose, to which he invited contributions from the Members.

6.2 A number of delegations supported the idea of a Trust Fund. However, many felt that this should be an interim measure and that the work of the Panel should begin to be financed from the regular budgets of both WMO and UNEP at the time of their next budgetary considerations.

6.3 To assist the work of the Panel, several countries generously offered financial contributions to the Trust Fund, some stating that their contributions could be used to support the participation of representatives and experts from the developing countries in the Panel and the Working Groups. Other countries pledged support and indicated that they would communicate the actual figures later. The Panel also welcomed indications that countries and international and regional organizations intend to provide support in kind, in particular by supporting the participation of their experts in the Working Group's activities. The Panel agreed that the participation of developing countries in all its activities was vital and appealed for further support for such participation.

6.4 On staffing, one delegate suggested that the Secretariat of IPCC be strengthened by the addition of a staff member with expertise in policy issues.

6.5 The Panel particularly noted that UNDP, with its financial resources and its global network of offices, plays a vital role in the environmental issues of concern to the Panel. Noting also the unique and important co-ordinating and financing role that UNDP plays in the context of country and regional programming, the Panel urged UNDP and the technical agencies concerned to support increasingly efforts that will address the urgent environmental aspects of such programmes at the design and approval stage. The Panel also recognized the vital role that could be played by the World Bank and other multilateral development financing institutions, particularly as far as preventive and adaptive responses to climate change were concerned.

7. ELECTION OF THE CHAIRMAN, VICE-CHAIRMAN AND RAPPORTEUR OF THE PANEL (agenda item 7)

7.1 It was understood that should the Chairman leave office for any reason, IPCC will elect a new Chairman.

7.2 On the recommendation of the Nominations Committee, IPCC unanimously elected Prof. B. Bolin, Dr. Abdul Bar Bin Abdullah Algain and Mr. K.R. Rufai as Chairman, Vice-Chairman and Rapporteur of the Panel, respectively.

7.3 The Committee approved the duties and terms of office of the Chairman, Vice-Chairman and Rapporteur as given in Annex VI.

8. OTHER MATTERS (agenda item 8)

No issue was raised under this item.

9. DATE AND PLACE OF THE NEXT SESSION OF IPCC (agenda item 9)

IPCC agreed that its second session would be held in Nairobi, Kenya, from 28-30 June 1989. UNEP will host this session.

10. CLOSURE OF THE SESSION (agenda item 10)

The first session of IPCC closed at 4.20 pm on Friday, 11 November 1988.

LIST OF PARTICIPANTS1. OFFICERS OF THE SESSION

B. Bolin	chairman
A. Algain	vice-chairman
K. Rufai	rapporteur

2. REPRESENTATIVES OF MEMBER STATES

<u>Member State</u>	<u>Name</u>	<u>Capacity</u>
Algeria	M.K. Mostefa-Kara	principal delegate
Argentina	Ms A. Moglia	principal delegate
Australia	W.J. McGregor Tegart J.W. Zillman M.P.F. Smith A. Garran	principal delegate alternate adviser adviser
Brazil	W.P. Moreira	delegate
Canada	H.L. Ferguson B. Emmett G. McBean J.D. McTaggart-Gowan J.G. Côté A.C. de Hoog A. Kessel J.C. Sloan	principal delegate delegate delegate delegate adviser adviser adviser adviser
China	Luo Jibin	principal delegate
Denmark	L.P. Prahm	principal delegate
Finland	E. Jatila K.O. Kouriletho Ms A. Vuorinen	principal delegate delegate delegate
France	J.C. Oppeneau D. Cariolle Ms D. Martin-Ferrari H. Ladsous	principal delegate delegate delegate delegate

ANNEX I, p. 2

German Democratic Republic	R. Fretter	principal delegate
Germany, Federal Republic of	H. Grassl M. Fernau	principal delegate delegate
India	A.C. Ray S.A. Subbaiah	principal delegate delegate
Israel	S. Jaffe	principal delegate
Italy	M. Conte	principal delegate
Japan	Y. Hatano K. Hasegawa M. Komabayashi M. Hyodo M. Watanabe H. Tsujimoto M. Uwasawa H. Kobayashi K. Kobayashi M. Shiota K. Fukuyama	principal delegate alternate delegate delegate delegate delegate delegate delegate delegate delegate delegate
Kenya	S.J.M. Njoroge M.O. Kinyanjui	principal delegate delegate
Malta	D. Attard H. Taylor-East	principal delegate delegate
Mexico	J. Adem T. Adem	principal delegate alternate
Netherlands	C.J.E. Schuurmans W. Kakebeeke P. Vellinga T. Schneider	principal delegate alternate delegate adviser
New Zealand	R. Smith	principal delegate
Nigeria	K. Rufai	principal delegate

Norway	P. Bakken A. Grammeltvedt O. Hov	principal delegate delegate delegate
Saudi Arabia	A. Algain	principal delegate
Senegal	A. Sene M. Seck	principal delegate alternate
Sweden	B. Bolin	principal delegate
Switzerland	H. Oeschger A. Clerc Ms P. Francis-Morand	principal delegate delegate adviser
Union of Soviet Socialist Republics	A.P. Metalnikov S.S. Hodkin E. Konigin V. Blatov B. Smirnov	principal delegate delegate delegate adviser adviser
United Kingdom	J.T. Houghton D. Fisk M. Dalton Ms S. Mann	principal delegate alternate adviser adviser
United States of America	F.M. Bernthal J. Clarke Ms L. Fisher E.W. Friday W. Nitze E Bierly E. Black G. Cartwright I. Goklany A. Hecht M. Kelly R. Morgernstern Ms A. Patterson R. Watson E. Williams	principal delegate alternate alternate alternate alternate adviser adviser adviser adviser adviser adviser adviser adviser adviser adviser
Zimbabwe	Ms R.P. Karimanzira P. Chali	principal delegate

3. REPRESENTATIVES OF THE WORLD METEOROLOGICAL ORGANIZATION

G.O.P. Obasi	Secretary-General
J.P. Bruce	
V. Boldirev	
I. Tolgyesi	

4. REPRESENTATIVES OF THE UNITED NATIONS ENVIRONMENT PROGRAMME

M.K. Tolba	Executive Director
P. Usher	
A. Diamantidis	
B. Ekblom	

5. EXPERTS

J.C.I. Dooge	WMO/UNEP Adviser
W. Degefu	President, WMO Regional Association I (Africa)
J. Kastelein	President, WMO Commission for Aeronautical Meteorology (CAEM)
A. Kassar	President, WMO Commission for Agricultural Meteorology (CAGM)
F. Mesinger	President, WMO Commission for Atmospheric Sciences (CAS)
A.A. Vasiliev	President, WMO Commission for Basic Systems (CBS)
J.L. Rasmussen	President, WMO Commission for Climatology (CCL)
S.P. Huovila	President, WMO Commission for Instruments and Methods of Observation (CIMO)

6. REPRESENTATIVES OF INTERNATIONAL ORGANIZATIONS

E. Ciszak	Economic Commission for Europe (ECE)
E. Youkel	United Nations Development Programme (UNDP)
L. Hyttinen	
D. Norse	Food and Agriculture Organization of the United Nations (FAO)
M. Ruivo	United Nations Educational, Scientific and Cultural Organization (Unesco)

M. Ruivo	Intergovernmental Oceanographic Commission (IOC)
P.J. Waight	World Health Organization (WHO)
Ms A. Hagen Ms M.S. Opelz	International Atomic Energy Agency (IAEA)
Ph. Bourdeau R. Fantechi S. Johnson P. Staif-Tauch	Commission of the European Communities (CEC)
P. Arjoon	Commonwealth Secretariat
F.W.G. Baker	International Council of Scientific Unions (ICSU)
R. Shaw	International Institute for Applied Systems Analysis (IIASA)
S. Hope	International Petroleum Industry Environmental Conservation Association (IPIECA)
G. Dorin Ms C. Smyser	Organization for Economic Co-operation and Development (OECD)
J. Shiller	Organisation internationale des constructeurs d'automobiles (OICA)
Ms G.K. Ramothwa	Southern African Development Coordination Conference (SADCC)
R. Pomerance	World Resources Institute (WRI)
	<b>7. <u>IPCC SECRETARIAT</u></b>
N. Sundararaman	Secretary, IPCC
S. Tewungwa	UNEP member

10.	CLOSURE OF THE SESSION
9.	DATE AND PLACE OF THE NEXT SESSION OF IPCC
8.	OTHER MATTERS
7.1	Approval of the duties and terms of office of the Chairman, Vice-Chairman and Rapporteur.
7.2	Election of Chairman, Vice-Chairman and Rapporteur.
7.	ELECTION OF CHAIRMAN, VICE-CHAIRMAN AND RAPPORTEUR OF IPCC
6.	FINANCIAL QUESTIONS
5.	THE SECOND WORLD CLIMATE CONFERENCE
4.	SCHEDULE OF WORK OF IPCC
3.1	Assessment of available scientific information on climate warming.
3.2	Assessment of environmental and socio-economic impacts of climate warming.
3.3	Formulation of response strategies.
3.	DISCUSSION OF THE PANEL'S PROGRAMME OF WORK
2.	NATIONAL STATEMENTS
1.1	Opening of the Session
1.2	Approval of the Agenda
1.3	Programme of Work of the Session
1.	ORGANIZATION OF THE SESSION

AGENDA

INTERGOVERNMENTAL PANEL  
ON CLIMATE CHANGE  
FIRST SESSION  
GENEVA, 9-11 NOVEMBER 1988

Distr.: Restricted  
IPCC-I/Doc. 1  
(1.X.1988)  
Item: 1.2  
Original: ENGLISH

World Meteorological Organization  
Organisation météorologique mondiale  
Case postale no 5  
1211 - GENEVA 20  
SWITZERLAND



United Nations  
Environment Programme  
Programme des Nations Unies  
pour l'Environnement  
PO Box 30552 - Nairobi, Kenya



SUMMARY OF NATIONAL AND ORGANIZATIONAL STATEMENTS

AUSTRALIA

The Australian Government is conscious of the global significance of the climate change issue and is particularly concerned with the implications of climate change on a regional basis within Australia and on its near neighbours in Asia and the Pacific and Indian Oceans. Australia welcomes the WMO/UNEP Intergovernmental Panel on Climate Change as an appropriate mechanism to take the lead within the UN system in addressing the complex scientific and environmental issues and likely impacts involved. Australia wishes to particularly stress the urgency of co-ordinated international assessment of possible greenhouse-induced variations of climate on a regional basis as an essential pre-requisite for the national impact analysis and planning that will become urgent if major changes in climate are predicted. Thus, while recognizing the essentiality of a wide range of scientific studies at the national level in individual countries, Australia wishes to emphasize the important role of international programmes, such as the World Climate Research Programme, in ensuring that the total scientific resources brought to bear on this problem are used in the most effective way possible. They will provide an international frame of reference for national and regional efforts and facilitate development of international policy responses.

CANADA

In stressing the importance of IPCC, Canada described the domestic importance of climate change. Canada raised three main issues :

1. The need to focus attention on what is known about climate change. Canada urged IPCC to separate scientific facts from hypotheses, predictions and speculations. It should concentrate on developing precautionary policy options;
2. IPCC should not behave as a new autonomous organization. It should report through the Executive Council of WMO and the UNEP Governing Council. Canada urges IPCC to build upon the framework of the World Climate Programme; and
3. Concerning the organization of work, Canada proposes a working group to assess scientific knowledge, another to review and assess existing work on socio-economic impacts and a third to address policy options. The latter would include questions of limitation, adaptation and further development of international legal principles.

Finally, Canada believes that the Second World Climate Conference (SWCC) is a timely initiative which should be given a high priority. The work of IPCC should constitute a major input to the SWCC.

CHINA

Climate is a global problem. The efforts of several countries are far from sufficient for the prevention of the deterioration of climatic conditions. Therefore, we support the joint efforts of governments of various countries, the United Nations, its specialized agencies and other organizations in the exploration of the problem and of the response strategy. We hold that the Panel should and can play an important and substantial role in this respect. The economic and technological gap between developed and developing countries is a reality which must be taken into account in formulating a response strategy. The Chinese government would like to take an active part in this exploration and try its best to make its due contribution.

FINLAND

The Government of Finland highly appreciates the establishment of IPCC and is willing to support actively its work.

To make a meaningful assessment of climate change, reliable data sets are to be created. This would require increasing observing activities and establishing common data sets to be used in the related research. In order to improve the data coverage, Finland has, during the past few years, donated about US\$ 20 million to the developing countries. Finland has also recently started stratospheric ozone soundings in Finland and before the end of 1988 similar soundings will be commenced in Antarctica as a joint Finnish-Argentine project.

INDIA

India shares with the world community the concern and the alarm about the possibilities of accelerated build-up of carbon dioxide and other greenhouse gases in the atmosphere. Wide-ranging changes in climate would mean changes in monsoon, in economic activities in the entire country, and would have long-ranging effects in the coastal area.

The Intergovernmental Panel on Climate Change should work towards broad global agreements to reduce the threat. Such agreements should contain positive and enforceable clauses in order to ensure that there is a free exchange of scientific and technical information, and technical collaboration between the developed countries and the developing world.

In India, it is the Ministry of Environment and Forests which performs the nodal function and is co-ordinating the efforts to combat such regional or global environmental problems and is eager to collaborate with such institution or committee as would undertake international co-ordination.

India has already launched a big environmental protection programme with afforestation, pollution control and impact assessment of all human activities. India reiterates her commitment to co-operation with all countries in the world to meet the projected environmental crisis resulting from global climatic change.

ISRAEL \*

We had some apocalyptic prophecies concerning the planet Earth, due to the global warming. It might have been influenced by recent summer events of the droughts and furious hurricanes in America, by the extraordinary heatwave in the eastern Mediterranean, etc. But, before we cry "Wolf, wolf", we should have some scientific basis for the cry. Carbon dioxide increased considerably during the last thirty years but our comparison of 1920-50 normals with those of 1950-80 show some cooling and increase of precipitation, which is not in accordance with the global predictions for sub-tropical regions.

We would strongly suggest that the Panel issues an urgent call to all Member State Governments asking them to encourage and support measurements of CO<sub>2</sub>, ozone and ultraviolet radiation and of course temperature, precipitation and evaporation (mainly in the developing countries) and that they initiate research and studies of climate change in the various regions, so that our working groups will have a sound basis of data and studies for their deliberations.

\* This statement was made during the discussion on agenda item 3.

JAPAN

Global environmental problems are the highest priority question confronting the international community, and it is important to unite in taking positive and effective measures. While scientific research on the mechanism of global warming should be intensified, it is essential to begin implementing concrete measures before it is too late. The Japanese Delegation proposes the following directions on global warming :

1. To strengthen and expand the existing monitoring system and to promote international research;
2. To promote the various types of technological development for preventing global warming and for minimizing damages;
3. To take, at the same time, measures on a step-by-step basis.

For such a direction, Japan is prepared to contribute in various fields. Furthermore, Japan will co-operate in every way possible to ensure the effectiveness of the Panel's work.

#### KENYA

Kenya welcomes the establishment of the Intergovernmental Panel on Climate Change (IPCC). It is only through the collective collaboration by the International Community that we can understand our changing climate and formulate appropriate response and adaptive policies. Kenya's economy relies heavily on rain-fed agriculture which is extremely sensitive to climate changes. The delay in the onset of rains, failure of rains or even excessive rain can have adverse effects on food production. In our region, the climate is so harsh that in a short period we get extremes, e.g. a country can suffer the fury of drought in one year while the following year the same country suffers the fury of floods with loss of lives and property. This is now happening in Sudan. We appreciate the quick response by the International Community, by way of food relief, but this Panel should formulate a system of an appropriate early warning system to delay, limit and mitigate the impact of climate changes.

We believe it is the responsibility of this Panel to look into the serious data gaps in Africa and the telecommunications systems. This will help in improving the World Data Base and timely transmission of information. The issue of alternative sources of energy, together with social economic aspects, need attention as they contribute to climate change. Kenya looks to this Panel as a focal point of activities in climate change.

#### MALTA

Prof. D. Attard referred to the Malta initiative on climate at the 43rd Session of the UN General Assembly. At his country's request, an item entitled "The Conservation of Climate as part of the Common Heritage of Mankind" was inscribed in the Assembly's agenda and discussed at a special plenary meeting of the Assembly as well as in the Second Committee.

The Maltese representative outlined Malta's proposals for an immediate and comprehensive global strategy to deal with climate change, particularly global warming. These proposals had been incorporated in a draft resolution (A/C.2/43/L.17, 26 October 1988), which is being considered at the UN and which had been circulated to the Intergovernmental Panel on Climate Change by the Secretary as an annex to IPCC-I/Doc.3 (9.XI.1988). It was, he stressed, paramount that the Panel become the focal point of all international, interdisciplinary efforts on climate change.

The formulation of a framework Convention on the Conservation of Climate was proposed by Prof. Attard. He suggested that the Convention would enunciate general principles and provide a general infra-structure within which national, regional and international measures to conserve climate can be harmonised and co-ordinated. The Convention could be subsequently complemented by a series of protocols which regulate the implementation of specific effective measures.

Whilst Malta foresaw the conclusion of the Convention by the time of the World Climate Conference, which should be held at the end of 1990, the development of the protocols would be a more lengthy process which should evolve on a stage-by-stage basis to ensure widespread and general support.

Prof. Attard proposed the establishment of a Legal Experts Working Group which would be responsible for preparing a report on the international legal principles relating to the conservation of climate and subsequently to make proposals on the constitutive elements of the Convention on the Conservation of Climate.

Malta urged the global community to work together to avoid disturbing the fragile environmental balance upon which life depends. Climate change was a common concern of mankind and required a solidarity of response from all states.

#### MEXICO

The government of Mexico has much interest in participating in the work of the Intergovernmental Panel on Climate Change.

The country I represent has recognized the importance of climatic studies by creating ten years ago the Centre for Atmospheric Sciences at the National Autonomous University of Mexico, where climatic research is carried out. Particularly noteworthy are the numerical experiments using the hemispherical, thermodynamic model of climate, in which a more realistic parameterization of radiation was incorporated recently to adapt it for calculating the greenhouse effect. This model has a different focus from conventional models of the general circulation of the atmosphere in that it simulates and predicts climatic variations.

Experiments are currently being carried out on the greenhouse effect in relation to CO<sub>2</sub>, as well as on the application of the thermodynamic model to forecasting anomalies of temperature and precipitation for one-month periods.

To conclude, I wish to repeat that we hope to participate actively in the work of this Intergovernmental Panel on Climate Change.

THE NETHERLANDS

The Government of the Netherlands welcomes the establishment of the Intergovernmental Panel on Climate Change as a body for global co-ordination of international and national activities in this field. At the time of the First World Climate Conference in 1979, the Netherlands had already installed a Special Committee on the CO<sub>2</sub> issue, to advise the Government on possible consequences. As a result of the Committee's reports, Parliament was informed about the problem and special research funding for CO<sub>2</sub>-related projects was started, especially in regard to a CO<sub>2</sub>-related sea level rise and its societal impact. A model for the assessment of this impact, developed in the Netherlands, has been the subject of a Memorandum of Understanding with UNEP for use in other parts of the world.

Recent developments include the following three major initiatives :

1. The installation of a Climate Committee at the Royal Academy of Arts and Sciences to advise the Government on climate issues, especially in regard to the research needed;
2. The co-ordination and increase of climate research, in a broad sense, among the various institutes, stimulated by the request of the Minister of the Environment on how to accelerate the research; and
3. The organization and hosting of international meetings on ozone depletion and global warming and its impacts. The most important of these is a Ministerial Conference on Atmospheric Pollution and Climate Change, to be held in the Netherlands in the fall of 1989.

The preparations of this Conference, which has been announced by the Minister of the Environment at the Toronto Meeting this summer, are in progress and both UNEP and WMO are participating in the preparations. It is our intention to closely associate the Ministerial Conference with the activities initiated by the Intergovernmental Panel on Climate Change.

NORWAY

Norway is willing to play an active role in IPCC and supports in general the structure of work outlined by Dr. Tolba. Norway will from next year have a national programme of research on climatic change and stratospheric ozone, and a new atmospheric research station on Svalbard will start its operations in 1989. We will also put forward the following elements of an international plan for action on climatic change presented by our prime minister Gro Harlem Brundtland in Toronto in July 1988 :

1. Launching immediate discussions on the feasibility of adopting regional strategies for stabilizing and reducing energy consumption and use, before the end of the century;

2. Establishment of a comprehensive international research and information programme on renewable energy;
3. Establishment of technology transfer, with emphasis on the needs of developing countries.
4. Increased scientific research.
5. Possible establishment of a global convention on climate.

#### SENEGAL

Senegal, which had the honour and pleasure of hosting the GARP Atlantic Tropical Experiment (GATE) in the summer of 1974, still favours the principle of such research, as can be seen from its participation today in the first session of the Intergovernmental Panel on Climate Change.

Senegal's concern is for the historic continuity of peoples and nations, as well as the prosperity and social well-being of mankind. The attainment of these objectives depends on scientific and technical progress, respect of human rights, international co-operation for development and the maintenance of peace and security throughout the world. All of these are, in turn, linked with the conservation of the environment within the global village which our planet has become.

Faced with the threat of climate change with catastrophic impacts, Senegal, as a Sahelian country already suffering from a series of droughts which have hindered its development, is ceaselessly searching for the causes and consequences of such change.

Our delegation associates itself with the concerns and suggestions of the delegation of Malta, namely :

- Technical co-ordination;
- Protective measures;
- Juridical provisions;
- Appropriate means.

We will spare no efforts to show our international solidarity in taking up this challenge to the survival of humanity.

#### SWEDEN

The Swedish Government considers the possibility of a future climatic change induced by human activities as a serious threat to the sustainable development for all countries on Earth. It welcomes the initiative of WMO and UNEP to create this Intergovernmental Panel on Climate Change. Sweden is

anxious to contribute to the work of the Panel and to consider seriously proposed actions to prevent and mitigate such a development.

Although further research on relevant environmental problems is most essential, increased understanding of the climate system will only come gradually, as will our capability to make more precise predictions of the geographical and temporal features of future climatic changes. Decisions about limiting emissions of greenhouse gases into the atmosphere may have to be taken under considerable uncertainty. Sweden therefore considers it most important to start now with evaluation of socio-economic impacts in broad terms and to analyse in depth alternative response strategies, because the problem is most complex and will take time. It is most important to realize early that major shifts in global environmental policies may well be necessary and particularly the future energy policy in the world needs careful reconsideration. It should be recognized that about 85% of all energy used by man today is produced from fossil fuels and this causes emissions of carbon dioxide. The problems confronting the world community are not simple. Collaboration north-south and east-west is a necessity.

#### SWITZERLAND

Switzerland supports the implementation of IPCC.

Earlier Swiss contributions in the subject area of reconstructing pre-industrial CO<sub>2</sub> and CH<sub>4</sub> concentrations in ice cores continue within the framework of EEC and ESF programmes.

The Swiss Academy of Natural Sciences is planning and conducting a climate programme (PROCLIM) with the following elements :

1. Data, models and process analysis for predictive simulation of complex natural systems;
2. Alpine transect programme to study responses of sensitive boundary environments to climate change;
3. Collaboration with human sciences to address questions of socio-economic impacts of climate changes;

In the frame of the Panel's programme, we stress the need for the following actions :

1. Evaluation of temperature increase of the last hundred years in terms of climate evolution of the last thousand years;
2. Attempts to interpret climate anomalies, such as the heavy rains in the Alps in 1987. Are they forerunners of anticipated climatic change?
3. Statement of most urgent measures in response to the climate issue. Immediate measures, based on existing technology, besides new technologies.

FIRST SESSION, Geneva, NOV '88

ANNEX III, p. 10

UNITED KINGDOM

United Kingdom welcomes this initiative as an important step towards international consensus. The United Kingdom government has long expressed its concern about the increase in greenhouse gases. We are committed to action based on sound scientific evidence but the UK believes some action is already justified. In particular we urge wide ratification and strengthening of the Montreal Protocol, economic pricing of energy sources to promote development of energy alternatives and energy efficiency and better land use practices to reduce deforestation. We look to the Panel to scrutinise closely the wide uncertainties in the science, to assess the tolerable limits to climate change, and to look for policy responsibilities consistent with the principle of sustainable development.

UNITED STATES OF AMERICA

The Representative of the United States expressed his country's strong support for the establishment of the Intergovernmental Panel on Climate Change (IPCC) as an autonomous, policy-level intergovernmental body open to all countries. The Panel is designed to assess, in parallel activities of these working groups, the science, impacts, and the potential response strategies relating to global climate change. He stressed the global nature of the climate change issue, the importance of international co-operation, and the need for strong, interactive peer review, as part of the working group process. He outlined some of the questions that need to be addressed in order to increase scientific understanding of climate change and related socio-economic and environmental impacts, while at the same time identifying and analyzing options to limit possible climate change or adapt to it. The United States believes that the Panel should provide the central international forum, in co-ordination with other competent bodies, for addressing the climate change issue. He noted his government's commitment to support and to participate actively in the work of the Panel. A number of specific suggestions are included in the opening US statement.

UNION OF SOVIET SOCIALIST REPUBLICS

The extreme topicality of the problem of global climate change and its consequences is impelling the world community to define and adopt adequate counter-measures, since the expected change may have considerable impact on the world economy and various aspects of human activity.

This situation is causing great concern, calling for the united efforts of all, or a majority of countries to solve the different problems connected with assessing the possible climate changes and their consequences. The USSR is in favour of developing such co-operation on both a multilateral and a bilateral basis, making extensive use of the experience and work of

various international organizations, and particularly that of WMO, which is the UN specialized agency responsible for co-ordinating and organizing such work. WMO's work in this field is focused in the World Climate Programme (WCP), which covers practically all aspects of the problem of climate change, including the effectiveness of applying knowledge of climate in the economy of individual countries as well as of the world community.

Considering that the scientific consensus on the role of greenhouse gases in climate change has laid the foundation for the development of political analysis, the objective being to determine possible social and economic measures to adapt climate change and limit the negative consequences, Soviet specialists in this field consider it essential to endeavour to achieve the following :

1. Increase in our knowledge of climate and in the effectiveness of its application in the socio-economic development of society, as well as improvement of methods for forecasting climate changes and the development of scenarios;
2. Assessment of the cost, risk and side effects of the recommended measures; and
3. Determination of juridical procedures to provide a framework for international efforts.

However, we are convinced that, before supporting any particular measures, an in-depth study must be made of them, involving consultations with all those concerned. Extreme care must be taken to avoid precipitated, unbalanced or unco-ordinated decisions whose outcome, because of their global scope, may be undesirable and unforeseeable.

We support the establishment of the Intergovernmental Panel on Climate Change, which should work under the direction of, and be accountable to, the WMO Executive Council and Governing Council of UNEP.

I would also like to mention the need to avoid duplication in the proposed work with efforts being made under the WCP and other programmes, which should not be replaced by new ones, but should be harmoniously developed and intensified.

#### ZIMBABWE

The Government of Zimbabwe would like to thank the Secretary-General of WMO and the Executive Director of UNEP for convening the First Session of the Intergovernmental Panel on Climate Change. Zimbabwe believes that a lot could be achieved from joint efforts by a number of governments to try and understand the cause and impacts of climate change on the environment, water resources, food production and health. The response strategies drawn up by this Panel should therefore be taken in the context of sustainable development.

CEC

The representative of the Commission of the European Community expressed the Community's interest in the joint initiative of WMO and UNEP in setting up the Intergovernmental Panel on Climate Change (IPCC). The European Community has responsibilities in several sectors which impinged to a greater or lesser extent on the climate change issue. These include environmental and energy policies, trade, the development of the internal market and development aid as well as policies in the field of research and development.

The Community had ratified the Vienna Convention on the Protection of the Ozone Layer and would shortly ratify the Montreal Protocol to that Convention. Community energy policy aimed at increasing energy efficiency and the development of renewable sources of energy. The nuclear option might need to be revisited in the light of the global warming effect. As far as the contribution of the Community in the field of development co-operation was concerned, the representative of the Commission stressed the importance of the need to prevent the destruction of tropical forests and for major donors to co-ordinate their actions in the context of the main multilateral financing agencies, particularly the World Bank. The Community's research programmes should help ensure an effective co-ordination of European research projects in areas relevant to climate change and the work of the Panel.

The representative of the Commission indicated that the Community was likely to launch an extensive "policy options" exercise on the greenhouse gas issue. He welcomed the work programme of IPCC and stressed that the Community was ready to support the work programme in appropriate ways and to participate fully in the working groups, particularly those on scientific assessment and policy development.

TERMS OF REFERENCE FOR THE WORKING GROUPS

The Working Groups I, II and III are responsible for the timely production of reports on the assessment of available scientific information on climate change, assessment of the environmental and socio-economic impacts of climate change and formulation of response strategies, respectively. They should build on the past international and national assessments and draw fully on the expertise of existing international scientific bodies. They should co-ordinate their work as far as practicable.

Each Working Group will submit to the Bureau within 60-90 days of its establishment an outline of no more than 10 pages of the topics and issues it proposes to address, its schedule and method of work.

The reports of Working Groups should be written in such a way as to address the needs of policy-makers and non-specialists.

Working Group I should consider, inter alia, factors affecting climate change, including greenhouse gases, responses to these factors of the atmosphere-ocean-land-ice system, assessment of current capabilities of modeling global and regional climate change and their predictability, past climate record and presently observed climate anomalies, projections of future climate and sea level and the timing of changes. The reports should identify the range of projections and their regional variations, gaps and uncertainties. The Working Group should consider including strategies to fill the knowledge gaps and reduce the uncertainties. A peer review process should be incorporated in the preparation of the reports.

Working Group II should view the environmental and socio-economic impacts of climate change in an integrated manner. It should emphasize, inter alia, evaluation of the impacts on a regional/national scale of climate warming and sea level rise, the latter especially in the coastal and island areas, on agriculture, forestry, health, water resources and floods, droughts and desertification, energy and other sectors. The Working Group should include consideration of the impacts of a range of continuously changing climates. The reports should be peer-reviewed.

Working Group III should consider, inter alia, forecasting and assessment of future emissions of greenhouse gases, impacts of changing technology, sources and sinks, adaptation to climate change, strategies to control or reduce emissions and other human activities that may have an impact on climate (e.g. deforestation, changing land-use) and their social and economic implications, and legal matters.

CORE MEMBERSHIP OF WORKING GROUPS

	<u>WORKING GROUP I *</u>	<u>WORKING GROUP II *</u>	<u>WORKING GROUP III *</u>
CHAIR	UK (Dr. Houghton)	USSR (Prof. Izrael)	USA
V/CHAIR	BRAZIL SENEGAL	AUSTRALIA JAPAN	CANADA CHINA MALTA NETHERLANDS ZIMBABWE
MEMBERS	CHINA FRG ITALY JAPAN DENMARK SWITZERLAND TANZANIA USA USSR KENYA	ALGERIA CANADA FINLAND INDIA ISRAEL MEXICO NEW ZEALAND NIGERIA <sup>1</sup> INDONESIA	AUSTRALIA BRAZIL GDR INDIA JAPAN SWEDEN UK USSR NORWAY FRANCE SAUDI ARABIA
EX OFFICIO	CHAIRMAN JSC <sup>2</sup> REP IGBP <sup>3</sup>	SAC <sup>4</sup>	

1) NIGERIA or another country from Africa

2) JSC - WMO/ICSU Joint Scientific Committee for the World Climate Research Programme

3) IGBP - ICSU International Geosphere-Biosphere Programme

4) SAC - Scientific Advisory Committee for the UNEP World Climate Impact Studies Programme

\* The tasks assigned to Working Groups I, II and III are, respectively, assessment of available scientific information on climate change, assessment of environmental and socio-economic impacts of climate change and formulation of response strategies.

DUTIES AND TERMS OF OFFICE OF THE CHAIRMAN, VICE-CHAIRMAN AND RAPPORTEUR  
OF THE PANEL

DUTIES OF THE CHAIRMAN

1. Convene and preside over sessions of IPCC and its Bureau;
2. Set the agenda for the sessions, with the advice and concurrence of the Secretary-General of the World Meteorological Organization and the Executive Director of the United Nations Environment Programme;
3. With support of IPCC Secretariat, take decisions concerning conduct of the sessions before, during and after the sessions;
4. Report on IPCC activities to the appropriate governing bodies of WMO and UNEP.

DUTIES OF THE VICE-CHAIRMAN

1. Perform the duties of the Chairman in the absence of the Chairman;
2. Perform other duties as agreed to between the Chairman and the Vice-Chairman.

DUTIES OF THE RAPPORTEUR

1. Present reports, such as reports of sessions, to IPCC for adoption;
2. Clarify such questions as may arise in connection with such reports.

TERMS OF OFFICE OF CHAIRMAN, VICE-CHAIRMAN AND RAPPORTEUR OF THE PANEL

It is decided that the terms of office of the Chairman, Vice-Chairman and Rapporteur of the Panel last until the end of the 43rd session of the Executive Council of WMO (circa June 1991) or the end of the 16th session of the Governing Council of UNEP (circa June 1991), whichever is later.

However, if the term should end during the intersessional period of the Intergovernmental Panel on Climate Change, the Officers shall continue until the election of new Officers.

LIST OF ACRONYMS

CICG	Geneva International Conference Centre
CMEA	Council for Mutual Economic Assistance
ECE	Economic Commission for Europe
ESF	European Science Foundation
FAO	Food and Agriculture Organisation of the United Nations
GCC	Gulf Co-operation Council
IAEA	International Atomic Energy Agency
ICSU	International Council of Scientific Unions
IGBP	International Geosphere-Biosphere Programme (ICSU)
IGOSS	Integrated Global Oceans Services System (WMO/IOC)
IOC	Intergovernmental Oceanographic Commission (UNESCO)
IPCC	Intergovernmental Panel on Climate Change
JSC	Joint Scientific Committee for the World Climate Research Programme (WMO/ICSU)
NGO	Non-Governmental Organization
OECD	Organization for Economic Co-operation and Development
SAC	Scientific Advisory Committee for the World Climate Impact Studies Programme (UNEP)
SADCC	Southern African Development Co-ordination Conference
UNDP	United Nations Development Programme
UNEP	United Nations Environment Programme
UNESCO	United Nations Educational, Scientific and Cultural Organization
WCDF	World Climate Data Programme (WMO)
WMO	World Meteorological Organization
WWW	World Weather Watch (WMO)

DECEMBER 18, 1989  
\$2.00

THE BLOC: Out of control?

Agenda for the '90s  
**EARTH**  
**ENDANGERED**

# MONEY LAUNDERING

The trillion-dollar  
shell game





ENDANGERED EARTH UPDATE

# THE FIGHT TO SAVE THE PLANET

*As concern for the environment grows, and some promising international initiatives take shape, the U.S. must do its share*

BY THOMAS A. SANCTON

**“W**hen a man knows he is to be hanged in a fortnight,” Samuel Johnson once wrote, “it concentrates his mind wonderfully.” The threat of impending ecological doom seems to be having the same effect on public opinion. If historians remember 1989 as the year the Iron Curtain collapsed, it has also been the year that concern for the environment reached a new peak.

No single incident did more to raise that consciousness than the *Exxon Valdez* disaster, which last March disgorged nearly 262,000 bbl. of crude oil into the pristine waters of Alaska’s Prince William Sound. The images of dead birds and sea otters and miles of tar-smearred beaches graphically illustrated mankind’s capacity to foul its environment. Coming in the wake of 1988, with its devastating droughts, mega-forest fires and record high temperatures, the *Valdez* spill convinced all but the most skeptical observers that humanity was courting ecological disaster.

Yet the *Valdez* spill was only a trivial occurrence compared with the far-reaching, perhaps irreversible processes that were unfolding around the world. The earth’s population, now 5.2 billion, rose in 1989 an esti-

mated 87.5 million, maintaining a growth rate that could double the number of human beings by the year 2025. Deforestation and burning of fossil fuels spewed at least 19 billion tons of carbon dioxide into the atmosphere, aggravating the global warming process that could cause the average worldwide temperature to rise as much as 4.5° C (8° F) within the next 60 years. Another 11.3 million hectares (28 million acres) of tropical forest were destroyed. The ozone hole over Antarctica remained alarmingly large, and scientists reported evidence that a second hole was developing over the Arctic. Whether or not all of the dire predictions come to pass, they underscore a chilling message: the planet is in grave trouble. If nations do not take drastic action, it could one day be unfit as a human habitat.

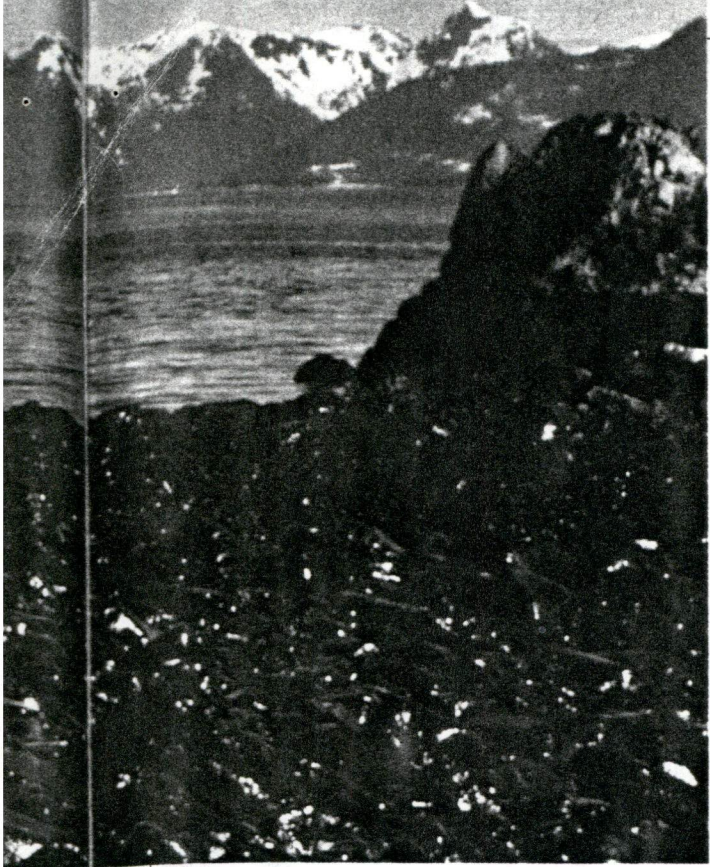
**A**ll around the world, there were signs that people were beginning to heed that message. In the U.S. a Gallup poll indicated that 3 of every 4 Americans consider themselves environmentalists. The level of public concern is so high, says Republican Senator John Chafee of Rhode Island, that pro-environmental bills now get “a tidal wave” of support in Congress. In elections to the European Parliament, Green parties scored impressive gains. In Hungary



As a follow-up to our Jan. 2, 1989, Planet of the Year issue, TIME invited 14 environment experts and policymakers to Alexandria, Va., for a one-day conference. Its aim was twofold: to take stock of the environmental progress that had been made around the world during the year, and to develop an agenda for the future. This special report sums up our conclusions—and some proposals for action.

*This is Time magazine for Christ's sake...*

pro  
me  
dro  
but  
ting  
ty i  
said  
Gr  
sup  
  
sor  
Ma  
cur  
Me  
cou  
pro  
car  
ing  
ski  
ma  
rec  
(U  
bef  
the  
tha  
and  
  
on  
sel  
dio  
the  
poi  
tor  
for  
atn  
Afr  
mo  
gra  
gro



**Consciousness raiser: an oil-smeared beach on Alaska's Prince William Sound after the Exxon Valdez disgorged nearly 262,000 bbl. of crude into the once pristine waters**

WRONG

not succeed unless the Third World goes along with them. The irony is that the laissez-faire, free-market rules that allowed the industrial world to prosper must now be suspended. "If the developing nations, home to 8 out of 10 people, repeat the pattern of development of the North," warns UNEP's Tolba, "if they

reach the North's levels of consumer goods and fuel consumption, and if they continue to clear the forests, then our mutual destruction is assured."

The industrialized nations must therefore persuade the Third World to embrace the goal of sustainable development—economic growth that relies only on renewable resources and does not permanently damage the environment. But the debt-burdened developing nations cannot be expected to do so without an enormous influx of funds and technology from the North. According to Kenneth Piddington, director of the World Bank's Environment Department, the crucial question is, "Are the rich countries of a mind to organize the transfer of resources in such a way that the Thailand and Indonesias of this world are actually going to benefit materially from the way they have dealt with their environmental agenda?" Arranging such a transfusion is perhaps the central challenge facing all the nations of the world today.

As humanity moves into the final decade of the 20th century, many experts believe the next few years will be the turning point. In order to avert the catastrophes that threaten the earth, immediate action must be taken in several key areas. Among the international initiatives currently under way:

**Climate Change.** This month <sup>(Dec.)</sup> UNEP, the Climate Institute and the government of Egypt will sponsor a World Climate Conference in Cairo. Its aim: to begin laying the groundwork for a global convention to limit the emission of greenhouse gases and stabilize the world's climate.

**Ozone Depletion.** Next April, representatives from scores of countries will meet in London to complete the agreement to phase out CFC production by the year 2000. But unless all major nations accept the ban, efforts to halt ozone depletion may prove fruitless.

**Biodiversity.** UNEP is drafting an international biodiversity-conservation treaty. Among other things, it could provide financial incentives to protect tropical forests, whose destruction threatens thousands of life-forms with extinction.

In these and other areas, America must play a leading role. Not only is the U.S., as a wealthy, technologically advanced nation, in a position to help others achieve sustainable development; the country also has a moral responsibility to do so. After all, the U.S. consumes a disproportionate amount of the world's resources and has inflicted more than its share of environmental damage. But perhaps the strongest argument for American leadership on the environment is an idealistic one. Ronald Reagan loved to sing paeans to America's unique role as "a city on a hill"—an inspiring model of democracy and free enterprise. Now that much of the world seems to be moving in a democratic direction, the U.S. should set its sights on an even loftier, more urgent mission: saving the planet. ■



Long the world's largest consumer of elephant tusks, Japan went along with a global ban on the ivory trade.



Brazil suspended several government subsidies that had encouraged speculators and ranchers to clear large tracts of the Amazon rain forest.



Australia and several other Pacific nations backed a U.N. resolution calling for a ban on fishermen's drift nets, huge expanses of nylon mesh that kill marine animals indiscriminately.



The European Community committed itself to reducing use of ozone-destroying chlorofluorocarbons by 85% as soon as possible.

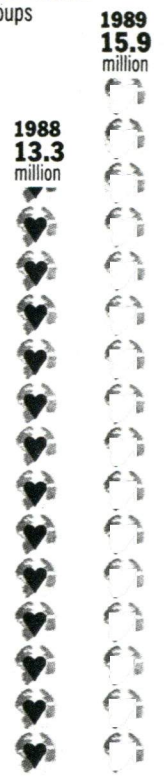
protests from local environmentalists led the government to cancel a controversial multibillion-dollar hydroelectric-dam project. And in the Soviet Union the budding Green movement showed its muscle by shutting down a new chemical-weapons dismantling facility in the Siberian town of Chapayevsk. "In the future," said Soviet People's Deputy Alexei Yablokov, "the Green movement may be so strong that without its support, no government can do anything sound."

Such grass-roots pressure gave added impetus to some major international initiatives. In Basel last March, 105 nations tentatively agreed to place strict curbs on international shipments of hazardous waste. Meeting in Helsinki in May, representatives of 86 countries declared their intention to phase out their production and use of ozone-destroying chlorofluorocarbons (CFCs) by the year 2000. All this is encouraging. But make no mistake: these are only the opening skirmishes in what may prove to be mankind's ultimate battle for survival. Mostafa Tolba, executive director of the United Nations Environment Program (UNEP), put the matter starkly in his keynote speech before TIME's Alexandria conference: "Addressing the global environmental crisis requires nothing less than a radical change in the conduct of world policy and the world economy."

Most of all, it requires international cooperation on an unprecedented scale. No nation can cordon itself off from the effects of its neighbors' pollution. Radioactive fallout from Chernobyl swept across most of the European continent. Canadian lakes are being poisoned by the belchings of U.S. smokestacks. The torching of Brazil's tropical forests each year accounts for some 6% of all the CO<sub>2</sub> that is pumped into the atmosphere. Deforestation in Haiti and drought in Africa have prompted large cross-border refugee movements—just a foretaste, perhaps, of the mass migrations that could result if runaway population growth outstrips world food and energy resources.

International efforts to preserve the biosphere will

World Membership in Environmental Groups



at ear red 10-hat ise An-ical ica e-vi-rc-: to sin , it  
 eo- . In very ists. can nvi- t in ent, gary

**U.S. AGENDA  
GOVERNMENT**

# GET GOING, MR. BUSH

*Rich and profligate, America can spur conservation in countless ways*

BY EUGENE LINDEN

**A** new American role in world affairs, that of bystander, has been defined by the Bush Administration's reaction to two epochal events. But while it may be wise for the U.S. to refrain from meddling too much in Eastern Europe's current upheaval, the global environmental crisis cries out for presidential leadership. Michael Deland, chairman of the White House Council on Environmental Quality, admits that "this country is the most wasteful on the face of this earth."

Candidate Bush produced fine environmental rhetoric, but this commitment has gradually given way to mixed signals and throat clearing. Lack of federal leadership has led to regulatory chaos as states and municipalities, going it alone, have passed scores of differing environmental statutes. Other nations now find it easy to dismiss American calls for action. If the Bush Administration is to assert its promised international leadership, it must take action to reassure the world that it is serious about dealing with environmental threats.

A small but symbolically important first step would be to halt deforestation of ancient forests in the Pacific Northwest and Alaska. Incredibly, the Government spends \$40 million yearly building logging roads and subsidizing the destruction of virgin forests on public lands. If the U.S. protected its last old-growth woodlands, American officials would have more credibility when asking tropical nations to stop the relentless cutting of their rain forests.

Another simple but vitally important move would be to reinvigorate the U.S. commitment to family planning at home and abroad. Peter Raven, director of the Missouri Botanical Garden, points out that humanity consumes or wastes 40% of the total amount of energy stored by photosynthesis in terrestrial vegetation. No one knows how much more people can devour before they begin to exhaust resources and crowd out vital ecosystems. Lester Brown of the Worldwatch Institute argues that global annual food production already falls

short of human consumption and that environmental degradation reduces yields 1% annually at a time when world population is growing 2%.

Despite this trend, the Reagan Administration slashed aid to international family-planning programs, and President Bush has not restored it. He recently vetoed a \$15 billion foreign aid package because he feared that a tiny \$15 million targeted for the U.N. Population Fund might help support abortion services in China. Getting birth-control information and devices to the 2.5 billion people beyond the present reach of family-planning programs will require \$8 billion an-

nually, a \$5 billion rise from current levels. In 1989 the U.S. contributed \$245 million to such programs, less in real terms than in 1979. Unless America reverses its present policy, it sends a message to the world that the U.S. considers mass starvation preferable to the termination of unwanted pregnancies.

Similarly, the U.S. needs to revamp its technical assistance to poorer nations. In the past, development agencies have tended to promote pell-mell progress, leading many nations to conclude that environmental destruction is an integral part of economic advance. Senator Albert Gore, a Tennessee Democrat, advocates that assistance be refocused on "leapfrogging" technologies, like low-emission power plants, so that nations may better the lives of their people without repeating the mistakes of the industrial world. But to develop better technologies, says Harvard atmospheric scientist Michael McElroy, the U.S. will have to bolster its faltering science education.

Because of its prestige, the U.S. has the potential to do enormous good in promoting international treaties to heal the planet. Agreements like the 1987 Montreal Protocol, governing the release of ozone-damaging gases, serve the important function of reassuring nations that protecting the environment will not put them at a competitive disadvantage. So far, though, the Bush Administration has squandered the momentum generated by the Montreal agreement. Administration negotiators outraged nations in Africa, a prime dumping ground for hazardous wastes, by opposing important safety provisions in an international agreement on the shipment of toxic refuse.

**S**uch precedents are not encouraging if the U.S. is to grapple with global warming, the climate change that might follow from overloading the atmosphere with gases like carbon dioxide. To date the Administration has been slow to react to the greenhouse threat because scientists are still debating how serious the problem is and because taking strong steps against it could cause severe economic dislocations. The U.N. is sponsoring a major study that could provide the basis for a coordinated international approach to global warming. American leadership is critical to this effort, just as it was to the Montreal Protocol.

In the meantime, the U.S. should begin to take unilateral action. The centerpiece of such a policy should be a comprehensive drive to cut gaseous emissions by conserving energy. Whether or not global warming is an imminent threat, curbing energy use would produce a more breathable atmosphere and reduce American dependence on unreliable foreign sources of fossil fuels.

The best way to do this is to raise energy prices and let free-market forces do the job of stimulating conservation. First, the federal gasoline tax should be increased substantially—to at least 60¢ per gal., from the current 9¢ per gal., over the next four years. At the same time, the Government could begin setting up a program to tax the use of all fossil fuels. The size of the tax should vary according to how much carbon is released into the atmosphere when a particular fuel is



## WHAT CAN BE DONE

1. Push for worldwide family planning.
2. Aid the transfer of nonpolluting technologies to poor nations.
3. Follow through on pledges to support the U.N.'s effort to forge an international accord on climate change.
4. Create tax incentives to encourage efficiency and discourage pollution.
5. Promote "resource accounting," so that economic yardsticks include the costs of pollution and the depletion of resources.

Source: TIME

but pat cle for tion rity ron of l wo: der sun if tl wh:

eva anc at i the dar the ly f 10% of wor ing, suri dus

Elhamel? tive nize inh pro thei req The pro with erg mu den poli Gov

## UNCLE SAM AGAINST THE WORLD



The U.S. has **5%** of the earth's population, but ...

... uses **26%** of the world's oil



... releases **26%** of the world's nitrogen oxides

... disposes of **290 million tons** of toxic waste



... produces **22%** of the world's carbon dioxide emissions\*



Source: Worldwatch Institute  
TIME Chart by Nigel Holmes

\*from fossil fuel combustion

**4** This country is the most wasteful on the face of this earth. **7**

MICHAEL DELAND  
COUNCIL ON ENVIRONMENTAL QUALITY

burned. That would encourage a shift in consumption patterns away from high-pollution fuels like coal to cleaner ones like natural gas.

Such tax penalties could be broadly applied to all forms of pollution. Senator Gore suggests that pollution fees could be collected in an Environmental Security Trust Fund, which would be used to reward environmentally responsible behavior like the insulation of homes. At the moment, most economic incentives work in a perverse direction. J. Gustave Speth, president of the World Resources Institute, notes that consumers have to pay extra for additional pollution gear if they want a cleaner vehicle—exactly the opposite of what should be the case.

Ultimately, the U.S. needs a whole new way of evaluating economic growth. Gross national product and other standard measures of progress merely look at increases in output. They do not take into account the loss of irreplaceable natural resources and the damage that pollution from higher production does to the environment. For instance, ozone pollution, largely from auto emissions, reduces crop yields 5% to 10%, in effect making farmers subsidizers of commuters. The U.S. should lead the world in promoting "resource accounting," a process that adjusts economic measures to reflect environmental costs of industrial activity.

To meet environmental threats effectively, the Government will have to reorganize its efforts. The Bush Administration inherited a structure designed to deal with problems in a fragmentary manner, but by their very nature environmental problems require an integrated, holistic approach. The Environmental Protection Agency proposed revisions of the Clean Air Act without input from the departments of Energy or Transportation. Such lack of communication will continue until the President designates one agency to coordinate policy on the environment throughout the Government. Kathryn Fuller, president of

the World Wildlife Fund, goes further and argues that the environment should be at the foundation of policy review in all departments.

Finally, there is the question of who will pay for cleaning up the environment, particularly with the budget deficit looming large. Increased penalties for polluters could help raise money, but the Government will still have to reallocate its scarce resources. In view of the reduced tension between East and West, there is a growing consensus that the defense budget can be cut. While it would be naive to think that much of the military-industrial complex can be quickly dismantled or that there will not be fierce competition for any savings, protecting the environment certainly has a strong claim to a larger share of the budget.

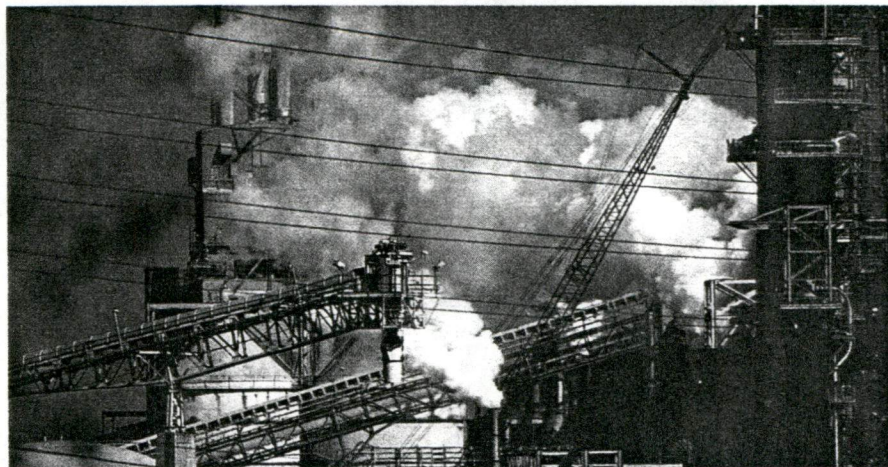
This is a timely idea. The West has spent trillions over the years in anticipation of a threatened invasion of Western Europe. When it came, it involved East German day trippers and shoppers rather than armies. It is time to recognize that environmental degradation has become perhaps a greater threat to security than the possibility of military conflict. ■

## TARGET: WASHINGTON WASTE

**I**f George Bush wants to be an environmentalist, he should look first to his own domain: the U.S. Government. Each year the 3 million civilian federal workers discard some 273,750 tons of paper. The 1.8 quadrillion BTUs of energy used to run U.S. facilities and operations in 1988 could heat and light every American home for about 40 days.

Though some federal offices have recycled paper and conserved energy for years, much more could be done. Recycling all the stationery and other high-grade white paper the Government throws out could, in a year, save about 4.7 million trees. By installing sensors that turn off lights in unoccupied rooms, the Interior Department expects to cut electric bills at least 30%. That program should be expanded to all federal buildings. The Government could do more to encourage its workers to use mass transit, perhaps by eliminating most parking spaces. Finally, it should reduce its toxic trash. Routine maintenance of military trucks, ships and aircraft annually yields more than 400,000 tons of toxic sludge, solvents, acids and heavy metals.

**U.S. AGENDA  
BUSINESSES**







WILLIAM CAMPBELL

**Union Camp Paper Co.'s group of four plants in Savannah was cited as one of the nation's worst producers of toxic emissions in a recent National Wildlife Federation report based on Environmental Protection Agency data. A \$375 million renovation of the pulp-and-paper mill should reduce methanol and acetone emissions 90% by 1991.**

# SCRUB THAT SMOKESTACK

*Clean, efficient companies can put a shine on their bottom line*

**IN A YEAR:**

-  An average paper mill consumes 180,000 tons of wood;
-  uses enough energy to light Las Vegas for a week;
-  discharges 31 billion liters (8.2 billion gal.) of liquid waste;
-  discharges an average 62 g (2 oz.) of dioxin\*

\*One of the most potent animal carcinogens, only emitted from mills that bleach paper

**BY MICHAEL D. LEMONICK**

**F**or far too long, many U.S. companies have looked upon the ecology movement as bad for business. Putting scrubbers on smokestacks is expensive, they lament, and drafting all those environmental-impact statements can consume an enormous amount of time and resources. But while cleanup efforts cost money in the short run, they can eventually pay hefty dividends. As more and more firms are discovering, many environmentally sound practices can build up goodwill, win customers and produce a healthier bottom line.

Among the most important steps that any company can take is to launch an all-out campaign to conserve energy. Such a drive can cut fuel bills sharply and at the same time reduce the pollution that contributes to smog, acid rain and the greenhouse effect. Most companies may think they use energy wisely, but few have invested in the most energy-efficient equipment and lighting systems. Contends Amory Lovins, director of research at the Colorado-based Rocky Mountain Institute: "The technology exists today to save 75% of the electricity and 80% of the oil used in the U.S. without lowering our standard of living at all." Several electric utilities are leading the way in making companies more conservation-conscious. Southern California Edison runs 50 different energy-management programs, which helped hold the growth in demand for the utility's electricity to 2.1% over the past decade, in contrast to 4.1% from 1970 to 1980.

Along with curbing energy use, companies can take a hard look at the amount of waste they generate. Increasingly stringent environmental regulations have made it ever more expensive to clean up smokestacks and reduce releases of toxic chemicals. Thus, limiting factory waste can save money

while it helps preserve the surrounding environment. Since 1975, the 3M company has cut its waste discharges in half by redesigning equipment, streamlining manufacturing processes and selling or reusing materials that used to be discarded. By not having to deal with that waste, 3M has so far saved \$300 million.

Companies can also reduce costs by cutting back on elaborate packaging for their products. Paper, glass, metal and plastic packaging constitute 50% of U.S. garbage by volume and 30% by weight. To help shrink the mountains of wasted material, manufacturers should concentrate on using recyclable packaging. Procter & Gamble is test-marketing the use of recycled plastics in detergent and fabric-softener bottles. The firm says 70% of its packaging is made from recycled paper. Also, grocers could market more foods in bulk, requiring customers to supply their own reusable containers.

**W**hatever actions a company takes to help the environment should apply to foreign operations as well as those in the U.S. In too many cases, corporations have complied with antipollution measures at home but ignored them abroad, especially in Third World countries that are too desperate for foreign investment to complain.

Companies that refuse to clean up their acts could be forced to do so, either by increased government regulation or public pressure. In September an alliance of environmental groups, bankers and investment-fund managers, known as the Coalition for Environmentally Responsible Economies, unveiled a set of guidelines for corporate conduct called the Valdez Principles (a name taken from the *Exxon Valdez*, the tanker responsible for the Alaskan oil spill). Firms that agree to the guidelines must pledge, among other things, to conserve energy, reduce waste and market environmentally safe products.

Coalition members plan to monitor which companies abide by the Valdez Principles and to publicize the findings. In that way, environmentally conscious citizens would be able to decide which firms are best to buy products from, invest in and work for. If this strategy succeeds, companies will find that protecting the environment will be the best way to protect profits. ■

## WHAT CAN BE DONE

- 1. Conserve energy by modernizing equipment and lighting systems.**
- 2. Reduce waste at the source by changing manufacturing techniques and recycling materials now discarded.**
- 3. Cut back on excessive packaging.**
- 4. Adopt the same antipollution and safety measures in foreign operations as at home.**

# IT'S NOT EASY BEING GREEN

"Waste Not, Want Not" should become the slogan for the age

BY GLENN GARELIK

"Think Globally, Act Locally" was the watchword of environmental activism from its beginning in the '60s. That advice is as appropriate now as it was then. Just as the Green movement started more than two decades ago not with governments but at the grass roots, so today it is individuals who must occupy the front lines in protecting the environment. Over the years, droughts, energy crunches and garbage strikes have stimulated common-sense approaches to conserving resources and minimizing waste. It is time to begin applying these lessons in ordinary times as well as in emergencies.

The easiest, most direct way for people to make a difference is to watch what they throw away. Every year more than 220 million trees are cut down just to make



U.S. newspapers, the majority of which are tossed into the trash. Americans discard enough aluminum cans each year to rebuild the entire U.S. commercial airline fleet four times over. Quite obviously, says Earth Day 1990 chairman Denis Hayes, "the answer to the solid-waste problem is not figuring out some way to compact it or to incinerate it; the answer is to reduce it."

Environmentalists can suggest a multitude of ways to do that: recycle paper, aluminum, tin, glass, motor oil and car batteries. Reuse bottles, containers and shopping bags, or at least choose paper bags over plastic at the supermarket. And do not be fooled by the BIODEGRADABLE label on some new plastic products. They may not in fact break down, and those that do may take as long as 500 years. When something tears, wears or breaks, repair it instead of replacing it.

While the contents of the trash can are easy to see, the all-but-invisible fumes that pour out of automobile tail pipes are just as damaging to the environment. Every time Americans climb behind the wheel, they make their own personal contribution to the global-warming threat. Here again, a gradual modification of life-style can make a dramatic difference. When possible, use mass transit and support its development and expansion. For short distances, consider using a bicy-

cle; it is excellent aerobic exercise. And, as in the energy-short 1970s, buy more fuel-efficient autos and carpool to work.

People also put carbon into the air when they heat homes with oil or natural gas, or use electricity that comes from burning fossil fuels. Household conservation tips should be familiar: close off unused rooms, seal up cracks and openings, and insulate roofs. Look at the energy-efficiency rating when buying appliances. And one more idea that few people know about: replace ordinary incandescent light bulbs with "compact-fluorescent" models sold by major light-bulb manufacturers. They can give off the light of a 60-watt bulb while using only 15 watts of electricity. These fluorescent bulbs cost at least \$10, but they last ten times as long as conventional models and will pay for themselves by lowering electricity bills.

**The typical American discards 590 kg (1,300 lbs.) of garbage a year, rapidly clogging U.S. landfills**

Conserving water is just as important as saving energy. Only 3% of the world's water is fresh, and 75% of that is locked away in glaciers and the polar ice caps. The scramble

for what is left is growing ever more intense, as the water table falls and toxic chemicals make some supplies undrinkable. Saving the precious liquid can be simple: use a water-conserving shower head, which can reduce consumption by more than half. For older-model toilets, put a brick or two in the tank, since they use 7 gal. of water per flush. Better yet, install a new ultra-low-flush toilet that can cut water use as much as 80%.





And do not think that the toxic-waste mess is all the work of big bad industry. The average homeowner uses more pesticide and chemical fertilizer per acre of lawn than farmers do on the same amount of land. Cut back on these potent pollutants as well as nonbiodegradable detergents, cleansers and solvents. An attractive alternative to buying chemical fertilizer is to compost fallen leaves and lawn clippings, which now constitute 18% of all municipal solid waste.

People may think they can change only their own life-styles, but their influence extends far beyond their homes, cars and offices. Americans can put their money where their ideals are by investing in companies that respect Mother Nature. Several mutual funds have been set up to buy shares only in corporations judged to follow the Valdez Principles, a set of guidelines for environmentally sound practices. Most important of all, Americans, like the citizens of all democracies, have the ultimate political power to enforce their will. If they are anxious to have a cleaner, safer, healthier environment for themselves and their children, they can vote for political candidates who seem to share that sense of urgency. ■

U.S. AGENDA

CONSUMERS

## IN A YEAR:

-  An average American discards 38 kg (84 lbs.) of plastic.
-  uses 140,000 liters (37,000 gal.) of water.
-  eats more than 50 kg (110 lbs.) of meat.
-  uses 1,125 liters (300 gal.) of gasoline.

## WHAT CAN BE DONE

1. Cut energy consumption by insulating homes, buying efficient appliances and switching to fluorescent lighting.
2. Conserve gasoline by picking fuel-efficient autos, joining car pools and using mass transit.
3. Make every drop of water count.
4. Recycle and repair, rather than dispose and replace.
5. Invest in companies that follow the Valdez Principles.

# NOW WAIT JUST A MINUTE

*Naysayers dispute the forecasts of doom and gloom*

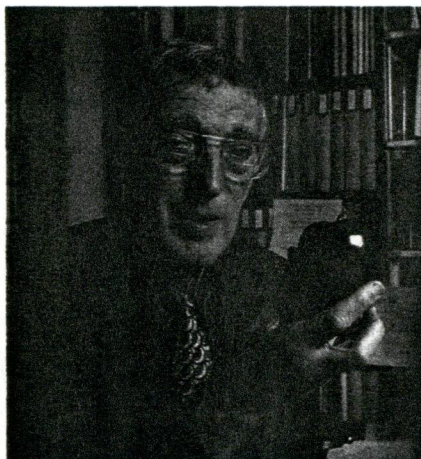
BY EUGENE LINDEN

Since the dawn of the Green movement, critics have argued that environmentalists exaggerate the dangers that humans pose to planet earth and understate the resilience of nature. Historically, the naysayers have had a key influence on policy: they weakened the original Clean Air and Clean Water acts, and Reagan officials James Watt and Anne Burford nearly destroyed the Environmental Protection Agency. But a worsening environment has put the naysayers on the defensive as they struggle to explain ever dirtier air, moribund forests and lakes, oil spills, desertification and the ozone holes over the poles.

Still, while the critics may be down, they are not out. The public may think such issues as the imminence of global warming and the danger of toxic wastes are settled, but scientists do not. Their disagreements about ecological threats make life uncomfortable for the activists, who fear that any apparent uncertainty will give policymakers an excuse for inaction. Critics respond that environmental false alarms have produced bad policy. While some naysayers are economists, industrialists and bureaucrats who view environmentalism as an irrelevant disruption of the real business of the world, others are sophisticated scientists who maintain that the U.S. should not risk its economic security to prepare for ecocatastrophes that might never come to pass.

One formidable contrarian is Bruce Ames, a biochemist at the University of California, Berkeley. He contends that obsessive concern with cancer-causing chemicals in foods, pesticides and toxic wastes has produced a regulatory tangle at EPA and a superfluous Superfund to clean dump sites. Government restrictions on man-made chemicals are absurdly stringent in proportion to their risk, says Ames. He notes that while the public panicked last spring because of trace amounts of the synthetic growth regulator Alar found on apples, many fruits contain natural carcinogens in concentrations 1,000 times as great. Observes Ames: "Eating vegetables and lowering fat intake will do more to reduce cancer than eliminating pollutants."

Ames is a tough target for environmentalists because he devised the test that is used to determine whether chemicals are carcinogenic. Nonetheless, Janet Hathaway of the Natural Resources Defense Council



CINDY CHARLES

argues that talk about natural carcinogens deflects attention from industry's responsibility for environmental risks. Ames, she says, exaggerates levels of natural toxins and understates the exposure to and effect of synthetic chemicals.

Another area of contention is global warming, which scientists fear could cause disruptive changes, such as a rise in sea levels. NASA official James Hansen told Congress last year that he believed the greenhouse effect had already arrived. Since then, that assertion has been widely challenged.

Among the most respected critics is Andrew Solow, a statistician at the Woods Hole Oceanographic Institution's Marine Policy Center in Massachusetts. Solow asserts that the computer models used to predict the greenhouse effect are so weak that they cannot even account for the modest 0.5° C warming that has occurred over the past 100 years. "We all believe in the physics of the greenhouse effect," says Solow, "but to say almost anything about timing, the magnitude of change or its geographic distribution is more than we can do."

The scientist believes lack of computing power—as well as ignorance about such critical factors as the interactions between the oceans and the atmosphere, and the impact of clouds on surface temperatures—limits the ability to predict the greenhouse effect. "It's possible that Washington will see 96 days of temperatures over 100° F in the year 2010," he says, "but it's also possible that the U.S. will be economically impoverished because it unilaterally imposed draconian measures in anticipation of a greenhouse warming that never arrived."

Stephen Schneider of the National Center for Atmospheric Research responds that waiting for absolute certainty about global warming will produce many years of policy paralysis. Thomas Lovejoy of the Smithsonian Institution agrees, noting that societies may pay a price for doing nothing that outweighs the expense of prudent preparation. While the world hailed the 1987 Montreal Protocol, designed to reduce chlorofluorocarbon output, the destruction of the ozone layer continued to accelerate because of CFCs already in use. Atmospheric chemist Sherwood Rowland of the University of California at Irvine is worried that similar delays in dealing with global warming will produce a treaty that is "a perfect autopsy."



STEVE LIS

Lowering fat intake will do more to reduce cancer than eliminating pollutants.

BRUCE AMES  
UNIVERSITY OF CALIFORNIA,  
BERKELEY

It's also possible that the U.S. will be economically impoverished . . . in anticipation of a greenhouse warming that never arrived.

ANDREW SOLOW  
WOODS HOLE OCEANOGRAPHIC INSTITUTE

# LET EARTH HAVE ITS DAY

*But the biggest demonstration in history should be only the beginning*

BY JEANNE MCDOWELL

It will begin at sunrise on April 22, with church bells pealing for the health of the planet. In tiny chapels and grand cathedrals, Sunday sermons will stress the moral responsibility of environmental awareness. And in thousands of communities around the world, citizens will stage a cacophony of events: parades, proclamations, protests, teach-ins, trash-ins and eco-fairs. In Seattle, residents will demonstrate against pollution in Puget Sound. Environmentalists in West Bengal, India, are planning a bicycle procession. Schoolchildren on Mauritius, a tiny island in the Indian Ocean, will plant trees. And a team of climbers from the U.S., the Soviet Union and China intends to reach the summit of Mount Everest and clean up debris left by previous expeditions. If all goes as planned, at least 100 million people will take part in the largest global demonstration in history: Earth Day 1990.

The April 22 date has special meaning for environmentalists: it marks the 20th anniversary of the first Earth Day. In that memorable 1970 mobilization, which evolved from an idea by Senator Gaylord Nelson, more than 20 million Americans, many of them students, rallied under the banner of Mother Nature. Their plea for action helped lead to the passage of the Clean Air Act and the creation of the U.S. Environmental Protection Agency.

The organizers of Earth Day 1990 hope it will have a similar galvanizing effect, that it will change individual behavior and launch a decade of environmental activism. This time the event will be international, reflecting the recognition that all the major environmental threats are global in scope. More than 100 countries, including Hungary and Uganda, have started to form committees and plan activities. Says Denis Hayes, a San Francisco lawyer and chairman of Earth Day 1990, an international umbrella organization: "The whole thrust of Earth Day as we go into the '90s is an environment that is much brighter, a far more diversified movement and, hopefully, a working agenda for the next ten years."

If Earth Day 1970 was almost spontaneous, next year's sequel has become a strategic operation. Hayes, who was a 25-year-old Harvard law student when he temporarily dropped out of school to help organize the first Earth Day, is the driving force behind the current campaign. With principal funding from foundations and individuals, Earth Day 1990 has a 115-member American board of directors that includes prominent environmentalists, politicians, business executives, religious leaders, celebrities, labor officials and journalists, among others. There is an international arm with representatives from 33 countries.

At Earth Day 1990 headquarters in Palo Alto, Calif., 20 staff members are plotting strategy as if the event were a political campaign. "We're organizing neighborhoods, regions and special constituencies," says communications director Diana Aldridge. The group has taken a few marketing cues from Madison Avenue as well. As part of a drive to raise \$3 million, Earth Day 1990 is licensing its logo, which will be plastered on everything from coffee mugs to windbreakers. Posters and ads will soon appear carrying the slogan EARTH DAY 1990: WHO SAYS YOU CAN'T CHANGE THE WORLD?

But Hayes' group is not trying to run the whole show. It will organize nationally and regionally and offer support for local groups, making suggestions for setting up events. Several smaller organizations are extremely active. Earth Day 20, a group based in Seattle, is planning a week-long exposition in a natural amphitheater in the Columbia River Gorge during the seven days leading up to Earth Day. The events, which will combine exhibits, musical performances and speeches, will be broadcast live by satellite to screens in shopping malls and on college campuses around the U.S. Earth Day 20 is also co-sponsoring grass-roots action by the National Toxics Campaign to urge companies that release excessive amounts of pollution to sign good neighbor agreements on reducing toxic emissions.

One of the main goals of Earth Day 1990 is to help broaden the environmental movement far beyond its upper-class, bird-watcher base. Six national labor unions have already endorsed the event, and in February a group from Earth Day 1990 will embark on a nationwide tour to urge minority-group members to get involved. Observes Gerry Stover, executive director of the Environmental Consortium for Minority Outreach: "In this country 4 out of 5 toxic-waste dumps are in or near minority communities. These people have as much stake in what happens as mainstream America, maybe more."

Above all, the organizers hope to have political impact. Says Christina Desser, a lawyer and executive director of Earth Day 1990: "Whereas 1970 awakened people to the issues, 1990 needs to make the environment the screen through which all other decisions are made. I want to see millions of people metaphorically standing in the same direction and yelling the same thing to policymakers: 'Hey, get it, you guys? We mean it. If you don't respond, we'll find someone who will.'"

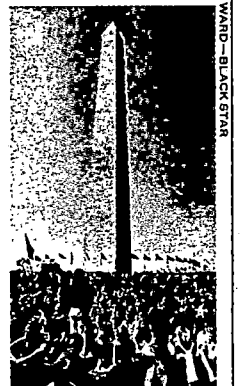
Earth Day 1990 will show how much people care about their planet. The challenge of the next decade will be to channel that concern into strong and sustained action to save endangered earth.



The symbol in 1970



The first rally: a gas



Two decades ago, thousands converged on the Mall in Washington



PHOTOGRAPH BY ULF SNOGSRBERGH; GLOBE COURTESY OF NASA

CHRIS SPRINGMAN

WARD-BLACK STAR

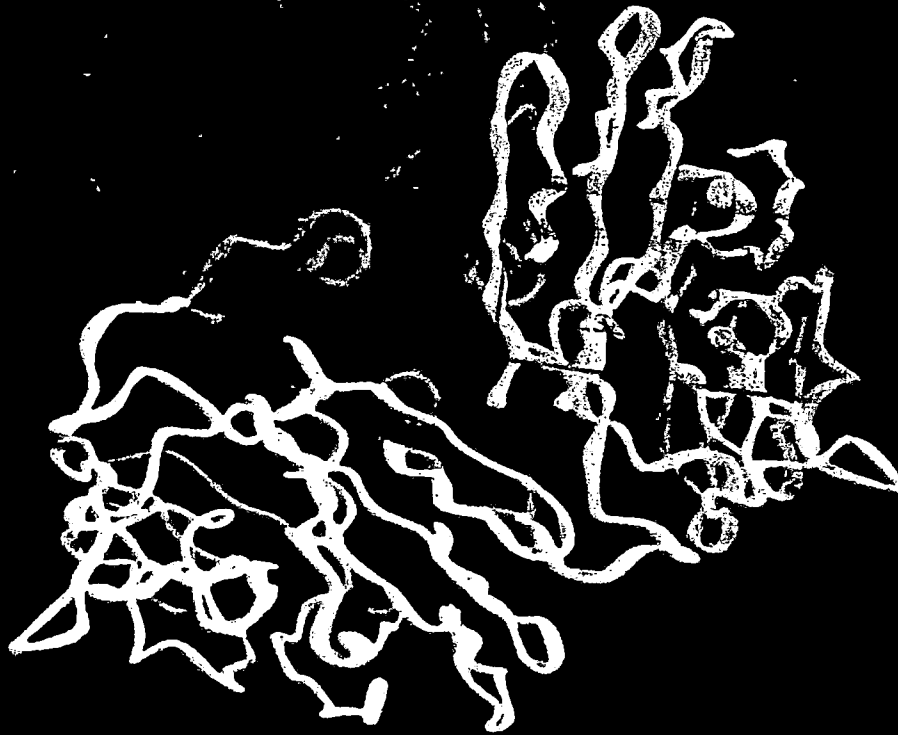


1990: broader scope

The Weekly Newsmagazine of Science

# SCIENCE NEWS

September 23, 1989  
Vol. 136, No. 13  
Pages 193-208



*Mutant Menace*

#238F \*\*\*\*\* 3-DIGIT 205  
#IFO11T725L019038# 0825  
SN JAN 2090 1 01  
LIBRARY & INFO SERS DIV  
EOPW RM G220 NEOB-FAX  
725 17TH ST NW  
WASHINGTON, DC 20503

# Colliding Clusters Hint at New Fusion Rou

Slamming salvos of minuscule heavy-water cannonballs into a thumbnail-sized target containing heavy hydrogen produces micro-thermonuclear reactions in which some of the colliding atoms fuse, report scientists at the Brookhaven National Laboratory in Upton, N.Y. Though the fusing atoms release only a tiny fraction of the energy used to run the reaction, the scientists say their work opens "a possible new path to fusion power."

Fusion occurs readily in such places as the sun, stars and thermonuclear bombs, where high pressures and temperatures force hydrogen, deuterium (an isotope of hydrogen containing one proton and one

neutron) or other nuclei to fuse with an accompanying release of energy, mostly in the form of fast-moving particles. Physicists have tried to duplicate these fusion-friendly conditions on Earth, largely by using magnetic fields to confine many nuclei in a small volume of space or powerful lasers to compress and heat a stationary fuel target.

Earlier this year, two independent research teams appeared to outshine those attempts by claiming they had achieved "cold fusion" at room temperature by forcing deuterium nuclei together between the atoms of palladium or titanium metal specimens. Though hundreds of others have tried to duplicate the results,

the claims remain largely unconfi and controversial, especially tho B. Stanley Pons of the University of in Salt Lake City and his British worker, Martin Fleischmann.

In the new approach, Brook physical chemists Robert J. Beuhle Lewis Friedman and nuclear ch Gerhart Friedlander use electric fie accelerate charged clusters of 1 water in a vacuum chamber. So far, ters of up to 1,300 heavy-water mole — each of which contains a pair o terium atoms instead of two hyd atoms as in regular water — have sped up to several hundred tho miles per hour. At the other end chamber rests a thin titanium loaded with deuterium atoms.

As the clusters slam into the t surface, the tiny underlying regio compressed to a calculated 80 n atmospheres of pressure and hea temperatures estimated in the ra hundreds of thousands of degrees. sub-trillionths of a second durat each cluster impact, some deut nuclei are forced close enough to Friedman says. The chemists repor work in the Sept. 18 PHYSICAL F LETTERS.

"We really don't know the det what is going on in the collisions," man notes. But the researchers t the evidence they have harvested to deuterium-deuterium fusion. A near the target has consistently de the signature of such fusions - moving hydrogen atoms and triti isotope of hydrogen containing o ton and two neutrons — emergin characteristic energies. Replaci deuterium with hydrogen in eith clusters or the target results in col that do not produce fusion produc the faster the clusters go, the more they seem to cause. "I don't know the limitations are, but there is no tion that the [upward] trend of en leveling off," Friedlander says.

Harold P. Furth, director of Pri (N.J.) University's Plasma Physic: ratory, says he is "astonished" t clusters, which carry far less ener; most fusion researchers have bec customed to thinking about, seem evoke fusion. "It's a real fascinatir tery to be looked at," he says. Tl step, the Brookhaven researche will be to use more powerful accel that should produce harder co and yield more data about the mechanism. Furth suggests als stituting tritium for the deuteriur target because this too would booc tion output energy. — I

## Warmer clouds could keep Earth cooler

Having refined the way computers simulate clouds, a team of British scientists reports that the greenhouse world of tomorrow may not produce temperatures as warm as predicted.

The new work, detailed in the Sept. 14 NATURE, illustrates one of the special problems that currently limit the credibility of long-term climate predictions (SN: 8/12/89, p.106). "There is still major uncertainty about the magnitude of greenhouse warming, and a lot of the uncertainty comes from uncertainty about how to include the clouds," says David A. Randall, an atmospheric scientist at Colorado State University in Fort Collins.

Climate experts rely on complex computer models of the atmosphere and oceans, called global circulation models, to forecast how accumulating greenhouse gases such as carbon dioxide will affect the planet. Representing clouds in the standard way, the model at the British Meteorological Office in Bracknell predicts the world will warm 5.7°C by the time carbon dioxide concentrations double, which scientists expect in the middle of the next century. When J.F.B. Mitchell and his colleagues altered the cloud portion of this model, the predicted warming dropped to 2.7°C.

The difference stems from the ways in which the model predicts cloud properties. The revised cloud treatment requires the model to simulate the amount of liquid water inside a cloud. This technique is more detailed than the standard one, which bypasses a calculation of the cloud's liquid water.

The new simulations show that water in clouds — either ice or liquid water — could play an important role in limiting

global warming because clouds reflect solar radiation that would otherwise warm Earth's surface. Ice particles fall out of clouds more quickly than do water droplets, which tend to be smaller, says Mitchell. When a cloud loses its water in either form, it thins and eventually disappears.

Many clouds in the world's mid-latitudes form at temperatures just below freezing, so even a slight global warming could change ice clouds into ones that contain liquid water. Because the water clouds last longer, a warmer world would reflect away more sunlight than today's planet — an effect that would check rising temperatures, according to the new forecast.

Though more sophisticated than the conventional cloud treatment, Mitchell's method does not necessarily yield a truer picture of the feedback clouds will exert on climate change, says Randall. A recent study of 14 different general circulation models shows wide variation in their predictions of future temperatures, precisely because they disagree on cloud feedback. In a commentary accompanying Mitchell's report, Anthony Slingo of the National Center for Atmospheric Research in Boulder, Colo., says that both the new simulations and the comparative study of models demonstrate the need to understand cloud feedback before models can make reliable predictions.

Earlier this month, the President's Office of Science and Technology Policy highlighted the importance of cloud studies when it offered its plan for U.S. research on global change for fiscal year 1990. The report lists understanding the role of clouds as the top scientific priority.

— R. Monastersky



A nat  
indiv  
Ame  
Ame

**EAST GERMANY ON THE BOIL**  
The Challenge of People Power

# Newsweek

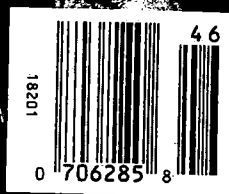
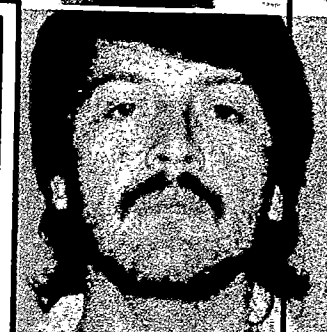
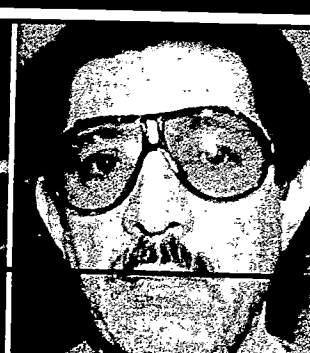


## THE DIRTY 300

Nov 13 1989

How Colombia's Drug Rings  
Operate in America

WHITE HOUSE LIBRARY  
AND  
RESEARCH CENTER



# Disasters on the High Seas

## The Navy's 'bad week'

From the Gulf of Mexico to the Indian Ocean, the U.S. Navy was awash in trouble last week. Five separate accidents in four days left seven people dead and at least 28 injured, and caused more than \$5 million in damage. While acknowledging that "it's been a bad week," Navy spokesman Rear Adm. Brent Baker insisted there was no pattern of negligence. But coming six and a half months after an explosion aboard the USS Iowa claimed 47 lives, the series of mishaps prompted new concern about the Navy's safety record. "Accidents like these happen," says retired Rear Adm. Eugene Carroll, deputy director of the Center for Defense Information, a Washington research group frequently critical of the Navy. "But they don't normally occur like bunches of bananas."

The first and most serious of last week's disasters took place aboard the carrier USS Lexington, a veteran of World War II now used for training exercises. The Lexington was 30 miles from Pensacola, Fla., when, in an attempt to make his first solo landing, Ensign Steven E. Pontell, 23, came in at the wrong angle and crashed his plane into the ship; Pontell and four others died. The next day an F/A-18 jet pilot mistakenly dropped a 500-pound bomb on the bow of the guided-missile cruiser USS Reeves, some five miles



PICTURE GROUP

New concerns about safety: Crash on the Lexington

from his practice target in the Indian Ocean. Nature then contributed to the Navy's misfortune. A "rogue wave" swept three sailors into the Atlantic as they moved nonnuclear missiles from one deck to another; one man is presumed dead and \$4.3 million worth of missiles were lost. On the same day a sailor was swept overboard and is still missing in the Pacific. And a fire broke out in the boiler room of the fleet oiler Monongahela, in the east-

ern Atlantic, injuring nine. On the defensive, military officials argued that war preparedness is inherently dangerous. "There's no way, if you are going to maintain a ready force, that you are going to avoid these kinds of accidents altogether," said Defense Secretary Dick Cheney. The Navy claims that its overall safety record has improved steadily. In 1984 there were 118 training-related accidents that resulted in fatality or damage exceeding \$1 million. So far this year the number is 64. Critics argue that cuts in the Navy's operation and maintenance budget may lead to increased accidents in the future.

The admiralty's current difficulties come at an embarrassing moment. The Navy had blamed a distraught seaman for causing the Iowa tragedy. But the FBI recently questioned the report's key finding, saying it found no evidence that the explosion was deliberately

set off. The Navy has now ordered investigations into last week's disasters. But morale may get a boost from one unlikely source—Mikhail Gorbachev, whose meeting with President Bush will take place next month in the Mediterranean. "If Gorbachev is willing to go aboard a U.S. warship, he must really be committed to improving relations," says Carroll.

ELOISE SALHOLZ with DANIEL GLICK in Washington

# A White House Chill on Global Warming

What Ronald Reagan was to acid rain George Bush may be to global warming. For eight years Reagan blocked significant action against acid rain because he claimed there wasn't enough scientific evidence to warrant government intervention. Now Bush is putting the brakes on efforts to curb the greenhouse effect, a high priority for many scientists and some state legislatures (page 70). He has not made good on his campaign promise to hold an international conference on global warming this year. And when Environ-

mental Protection Agency head William Reilly attends a meeting of environmental ministers in Holland this week, he is unlikely to present any concrete U.S. proposals. Democrats blame chief of staff John Sununu for Bush's change of heart. "We sent [Reilly] with a gag in his mouth, and Governor Sununu's fingerprints are all over it," says Ohio Rep. Dennis Eckart, a member of the Energy and Commerce Committee. "He's giving Bush an environmental black eye."

Many scientists believe the government should aggressively

restrict industries that burn fossil fuels because they emit carbon dioxide—one of the main culprits in global warming. An MIT-trained engineer, Sununu questions their scientific data and opposes formulating a policy without more research. "We're going to do the right thing," says Sununu. "We want to know what the right thing is." But many environmentalists think the chief of staff is hiding behind the lack of definitive data to avoid the issue's political and economic price tag. Because America accounts for nearly a quarter

of CO<sub>2</sub> emissions, any serious solution would inevitably cause enormous disruption in key industries. The administration "[doesn't] want to run the risk of dampening the economy before the 1992 election," says Democratic Sen. Albert Gore Jr. of Tennessee.

Even though Bush wants to be the "environmental president," his actions suggest he's just as concerned about the political atmosphere. A June poll showed that Americans are less concerned about global warming than other environmental problems. But Bush's critics worry that if politicians wait for the public's temperature to rise, it may be too late for the planet.

Global Change

Page 1

FOR RELEASE:

September 18, 1989

ADDRESS BY:

D. ALLAN BROMLEY

DIRECTOR, OFFICE OF SCIENCE AND TECHNOLOGY POLICY

EXECUTIVE OFFICE OF THE PRESIDENT

National Press Club

Washington, D.C.

September 18, 1989

The global environment has been changing throughout human history, and indeed throughout the earth's history. At the peak of the last ice age 18,000 years ago--just a few thousand years before the first human civilizations began forming in the river valleys of the Middle and Far East--a glacier over a mile high covered much of the northern Midwest, New York State, and New England. Sea level was perhaps 300 feet lower, so that the future location of Washington, D.C., was perched on the edge of a deep valley, with the Potomac cascading down a series of waterfalls toward the sea. More recently, during the so-called little Ice Age of the 17th century, the northern United States and Europe had snow throughout the summer, and glaciers in Europe extended so far down valleys that they destroyed villages. These natural changes in the earth's environment have occurred throughout its history, and they will continue to occur in the future.

During the last few centuries, human society has entered into a new and momentous relationship with the global environment. For the first time in history, we have become a geological agent comparable to some of the other forces influencing our planet. We have altered the face of the earth by clearing forests, building cities, and converting wild lands to agriculture. During the past century, industrial production has

gone up by a factor of more than 100, and the use of energy has risen by a factor of about 80. We have changed the composition of the earth's hydrosphere and atmosphere through the use of fossil fuels, the expansion of agriculture, and the production and release of industrial compounds. Almost without recognizing it, we have embarked on an enormous, unplanned, planetary experiment that poses unprecedented challenges to our wisdom, our foresight, and our scientific capability.

Human-induced effects on the global environment have been combined under the blanket term global change, but this term has many dimensions, including ozone depletion, global warming, changes in sea level, drought, deforestation, desertification, and reduction in biodiversity. Many of these changes are interrelated, reflecting their common dependence on the underlying physical, chemical, geological, biological, and social processes that control the Earth's environment. For instance, we currently release about a million tons of chlorofluorocarbons into the atmosphere each year. When broken down in the upper atmosphere, the chlorine in these compounds catalyzes the destruction of ozone, which increases the amount of ultraviolet light reaching the ground. But these chlorofluorocarbons are also potent greenhouse gases that contribute to global warming. Thus, by limiting the release of chlorofluorocarbons to protect the ozone layer, we also will reduce potential impacts on the global climate.

Deforestation is another example of the interconnectedness of earth systems. Forests, and particularly tropical forests, are being lost at a prodigious rate as they are cleared to make way for agriculture. The burning of this biomass and the consequent decomposition of humus on the forest floor are responsible for as much as a quarter of the carbon dioxide that human beings are adding to the atmosphere. At the same time, the destruction of these tropical forests greatly reduces the biological diversity of the earth by exterminating species and their irreplaceable genetic heritage. This genetic heritage is one of our greatest treasures--a treasure that we have only begun to appreciate--in that these organisms could provide new crop plants, new medicinals, and other products with many important uses.

During the 1980s, a number of warmer than average years have focused attention on global warming caused by human activities. It is too early to identify these anomalously warm years with the greenhouse effect, as opposed to a natural fluctuation in global climate. But the trend has made available for the first time the resources that can lead to a much fuller understanding of this complex phenomenon.

It bears emphasis that the greenhouse effect is nothing new. Without carbon dioxide in the atmosphere early in the earth's history, the planet would have been so cold that it would have frozen solid, and the earth would have remained lifeless. On the

other hand, if virtually all of the earth's carbon were in the atmosphere, as is the case on Venus, the surface temperature of the earth would be about 750 degrees Fahrenheit, a temperature at which lead is molten.

Nevertheless, it is indisputable that human activities are changing the earth's atmosphere. Over the past 300 years, the level of carbon dioxide in the atmosphere has gone up 25 percent, and the level of atmospheric methane--another important greenhouse gas--has doubled. Each year human beings release about 8 billion tons of carbon in the form of carbon dioxide into the atmosphere by burning fossil fuels, cutting down forests, and other industrial activities--an average of over a ton for every person on the planet. By a large margin, this release of carbon is the largest effect that human beings have had on this planet.

We do not yet know with any precision the consequences of altering the atmosphere--neither when nor how much the climate might change. Computer models indicate that greenhouse warming could raise average global temperatures by 4 to 7 degrees Fahrenheit by sometime in the next century. Warming of this magnitude, were it to occur, would have dramatic consequences, including changes in weather patterns, in agricultural productivity, in terrestrial and marine ecosystems, and in sea level. Even from the present crude models, it has become clear that these changes need not take place uniformly either in space

or in time. It is already clear that there can be quite rapid fluctuations on regional or local scales.

Yet there remain many uncertainties in the models used to calculate potential greenhouse warming--notably the effects of clouds and ocean currents in moderating or accelerating climate change. Atmospheric modelers also have just begun to look at the effects of greenhouse warming on regional and local scales, and as yet it is very difficult to forecast what the results of a warming would be in any particular location.

The grid sizes on current models tend to be about 300 miles with calculations for ten levels in the atmosphere, which averages out the effects of mountains and the gulf stream, for instance. But to reduce the size of each grid by a factor of two, to 150 miles, and increase vertical resolution to 20 levels requires 16 times as much computer power, and reducing the grid size to 60 miles would increase computer demands and costs by a factor of 500. To ease such constraints on computer capabilities, my office has just released a report entitled The Federal High Performance Computing Program, which lays out a broad plan for R&D on high-performance computing. The plan calls for federally coordinated collaboration among government, industry, and university to accelerate the development of high-speed computer networks and to increase the rate at which high performance computing technologies, including both hardware and software, can be developed, commercialized, and applied to

national problems. Such advances in high-performance computing would be a tremendous boon to researchers attempting to model the dynamics of the atmosphere.

But, in addition to advances in computing, much more needs to be learned about the intertwined earth systems that influence our environment. A number of federal agencies have been involved in investigating global change, but until recently these efforts were largely independent. Several weeks ago the Executive Office of the President released a report detailing the Bush Administration's U.S. global change research program for the next fiscal year. The report is an initial plan to back up the President's commitment to understanding and responding to concerns about global change. It represents a coordinated U.S. contribution to the international effort to provide the sound scientific basis needed for national and international decision making.

The report details how various government agencies will expand and establish research programs for global change issues, particularly climate change. It was developed by a federal interagency group, the Committee on Earth Sciences, chaired by Dallas Peck of the U.S. Geological Society, under the Federal Coordinating Council for Science, Engineering, and Technology, of which I am the chairman. The goal of the program is to provide a sound scientific basis for national and international decision making on global change issues. Robert Corell will be up here in

a moment to describe some of the report's important conclusions and recommendations.

Let me say that I am particularly pleased that this plan is the first report issued during my watch as Presidential science adviser. Though this effort was overseen largely by my predecessor, William Graham, I see it as an excellent model for interagency coordination and cooperation in other areas. I believe that the CES has done an excellent job of bringing together all the diverse research interests important to global change into one coherent national research program. At a more personal level, I believe that this report embodies the most important objective of the President's science adviser--to provide the President with the best available advice on scientific and technological issues that affect national policy and to coordinate the federal effort so that we can put resources where they are most needed. In fact, the FY 1990 budget proposes a 43 percent increase for the programs targeted by the report.

A number of other governmental and nongovernmental bodies are considering the problem of global change, including several committees at the National Research Council, the World Climate Research Program of the World Meteorological Organization, and the International Geosphere-Biosphere Program of the International Council of Scientific Unions. I would like to emphasize the importance of an international perspective, because greenhouse warming is a truly global problem and can be

successfully solved only through global efforts. Unilateral action by a single country, however laudable, will not by itself reduce emissions of greenhouse gases by a significant fraction of the total. The major industrial companies, including the United States, the European Economic Community, the Soviet Union, and Japan, are of course major emitters of carbon dioxide, largely from combustion of fossil fuels. But many developing countries are also significant sources of these gases--carbon dioxide from burning forests and from fuel use, methane from rice paddies and cattle herds. We must therefore make common cause with all nations in this effort.

And yet the developing nations can rightfully claim special consideration. They have legitimate needs for energy to build their industrial economies, or for coolants used in refrigeration and air conditioning. They understandably want to use the natural resources that they have. It is unreasonable for the United States to turn to the Third World and demand that it eschew the use of convenient fossil fuels in its development after we have used such a prodigal share in ours. Any workable global solution must address such issues; it must build on the common stake of all peoples in maintaining a liveable world.

It is too early, in my view, to know what the complete solution will look like--because we do not yet fully understand all the dimensions of the problem. But there are a number of

things that will be discussed at this conference that we can and should do now:

One, of course, is to vigorously pursue research aimed at better understanding of the Earth and its interrelated systems. The Bush administration is not only committed to such research but is doing it, as I have mentioned and as Dr. Corell will discuss in more detail later.

A second area of high-priority R&D, in my view, is the development of nonfossil energy sources. The human race will eventually need such sources anyway--because fossil fuel is all too finite and will ultimately be more valuable as a source of organic molecules than as fuel. Future generations may well see our burning of these materials as a tragic squandering of a precious resource.

Thus, I think we should pursue efforts to develop advanced forms of nuclear energy--those that incorporate additional safety measures as an inherent feature of their design, such as the reactor design that is the subject of a recent contract between the Department of Energy and the Westinghouse Corporation. We should also pursue vigorously the rapidly developing potential of solar photovoltaic cells and other alternative energy sources.

In addition to research efforts, I think we can move forward now with programs that have a double benefit--they make sense on their own merits and they will help to limit any greenhouse warming. These include:

1. Energy conservation. We must seek more efficient use of energy resources--in industry, in automobiles, in our homes. For developed and developing countries alike, higher efficiency has obvious economic benefits and may well be the most significant means of limiting carbon dioxide emissions.

2. Halting tropical deforestation. Quite apart from the climatic effect of clearing and burning, the tropical forests contain a large fraction of Earth's species of plants and animals. Anything we can do to slow or halt the destruction of these forests is worthwhile.

3. Reforestation. Tree planting programs make enormous sense in many parts of the world to help contain the erosion that strips the land of topsoil and to provide local sources of firewood. Attention to these and similar biomass resources will have the additional benefit of sequestering carbon dioxide from the atmosphere.

In considering the challenge of understanding global change, it is easy to sympathize with the remark of the medieval king Alfonso X of Castile, who said, "If the Lord Almighty had consulted me before embarking on the Creation, I would have recommended something simpler." We are just beginning to understand this marvelously complex planet that we live on and

the ways in which we are changing it, and we need to devote our best efforts to the task. There is no time to waste.

---

# Sununu Blocked Plan to Seek Convention on Global Warming

## *EPA Chief Led Group Proposing Diplomatic Initiative*

By Michael Weisskopf  
Washington Post Staff Writer

Top Bush administration officials led by Environmental Protection Agency Administrator William K. Reilly pressed for a U.S. diplomatic initiative on global warming at an international meeting next week in Geneva, but White House chief of staff John H. Sununu rejected the move as premature, according to U.S. officials.

Proponents of the move had recommended that U.S. representatives to a 30-nation meeting sponsored by the United Nations support plans for an international convention identifying global warming as a world environmental threat.

Environmentalists have pressed for a convention that would lead to treaty negotiations to limit the man-made gases known to trap solar heat like a greenhouse and increase the Earth's temperature.

But officials said Sununu has blocked such an initiative by U.S. delegates to the Intragovernmental Panel on Climate Change on the grounds that President Bush does not know enough about the economic costs of such a treaty.

A top aide to Sununu said he "hasn't touched this thing one way or the other" and said the chief of staff did not know anything about it.

A spokesman for Reilly, who met with Sununu on the issue Thursday, said Sununu has been generally "supportive" of an international convention but raised "reasonable questions that deserve answers before the administration commits itself."

The administration's position at the meeting that starts Monday has been debated by domestic policy advisers for weeks. Some officials have argued that Geneva presents a perfect opportunity for Bush to seize the leadership role on international environmental issues that he pledged to take in campaign speeches and his budget statement.

Some Bush advisers believe the president missed a chance to claim that mantle by allowing the European Community to beat him by a day in announcing support recently for a phaseout of chlorofluorocarbons (CFCs) by the year 2000.

The treaty to halve CFCs in the next decade could serve as a model for the global warming issue. Industrial nations formed a convention in Vienna in 1985 that identified the popular chemical as a threat to the stratospheric ozone layer. Negotiations to cut back CFC use began a year later and ended in an agreement in 1987.

Sources said that Reilly, Frederick M. Bernthal, assistant secretary of state for

oceans and international environmental and scientific affairs, and White House Counsel C. Boyden Gray favored an aggressive U.S. stance in Geneva.

Office of Management and Budget officials argued for a more deliberate pace, however, arguing that no one has calculated the costs of curbing "greenhouse" gases, chiefly carbon dioxide from the burning of coal and other fossil fuels.

The meeting scheduled for five days next week is part of a process initiated last year by the U.N. Environmental Programme and the World Meteorological Organization after a consensus developed among scientists that greenhouse gases will heat up the Earth about five degrees by the middle of the next century.

Several working groups were set up by the interagency panel, including one led by the United States to consider "response strategies" for combatting the warming trend.

The Geneva meeting will be chaired by the United States to discuss its findings. According to administration officials, the U.S. delegation, which will be led by Bernthal, has been instructed to discuss the possibility of a convention and support further study but not to endorse it.

"We were told not to cross that line," said one official.

The instructions "frustrated" Reilly and other proponents of a convention, according to a knowledgeable source. They fear that Washington will lose the initiative to other nations, even though the EPA has done the cutting-edge work on the causes and effects of global warming and is more advanced in developing solutions for dealing with it.

In a major speech in the presidential campaign, Bush promised to convene a global conference on the environment to discuss global warming and other problems. But when Reilly and other administration officials sought to begin planning for such a conference, Sununu responded that Bush has not decided the best timing, venue and agenda for it, according to a source.

*Staff writer David Hoffman contributed to this report.*

Mik.

mtg  $\bar{c}$  Sonunu  
& Roger +  
CW at 5:50p  
on Friday.

10 min before  
they meet  $\bar{c}$

Dan, P<sub>2</sub> + CW  
for State of  
Union.

See Chuss  
Kim



World Meteorological Organization  
Organisation météorologique mondiale

Case postale N° 2300  
1211 - GENEVA 2  
SWITZERLAND

United Nations  
Environment Programme  
Programme des Nations Unies  
pour l'Environnement  
P.O. Box 30552 - Nairobi, Kenya



A copy of this report with final editorial corrections has been sent to print/translation.

This version does not contain these editorial corrections. However, the version will undergo no further changes otherwise and has been approved by the IPCC chairman for release.

N. Sundararaman  
IPCC Secretary

REPORT OF THE SECOND SESSION OF THE  
INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE (IPCC)

1. ORGANIZATION OF THE SESSION (agenda item 1)

1.1 Opening of the session (agenda item 1.1)

1.1.1 Prof. Bert Bolin, the Chairman of IPCC, called the meeting to order at 10 10 hours on Wednesday, 28 June 1989, in the UNEP Headquarters building in Nairobi, Kenya.

1.1.2 The list of participants is given in Annex I to this report.

1.1.3 In welcoming the delegates to the UNEP Headquarters, to Nairobi and to Kenya, Dr. M.K. Tolba, the Executive Director of UNEP, hailed the fruitful alliance between WMO and UNEP. The firm commitment of Prof. Obasi, the Secretary-General of WMO, coupled with the determination of UNEP leadership has resulted in a partnership which is helping to unify the scientific and policy-making communities of the world to lay the foundation for effective, realistic and equitable action on climate change.

The Executive Director stated that the impacts of climate change and global warming would have serious consequences for humanity. In Egypt alone, global warming could flood much of the Nile Delta and drown 70 centuries of civilization in less than one, and could inundate one fifth of the nation's arable land.

He expressed his satisfaction that since the first meeting of the Panel in November 1988, its three Working Groups had been hard at work. it would be desirable for the Panel's report to be ready by August 1990 for presentation to the Second World Climate Conference and to the United Nations General Assembly. It should be borne in mind that both the Governing Council of UNEP and the Executive Council of WMO expected the first report of IPCC to form the basis for international negotiations on a global convention on climate change. The report can also play a valuable guiding role for the large number of conferences, meetings and symposia on climate change being held all over the world. For all of these reasons, the report should be completed in good time.

Dr. Tolba stressed that independent but swift actions by governments reflected the anxiety of the public on the issue of global warming and other atmospheric environment issues: during 1989, the Montreal Protocol entered into force on 1 January; in March at The Hague, 24 governments called for tough measures to combat ozone depletion and global warming; and in April, in Helsinki, 81 countries committed themselves to the complete phase-out of chlorofluorocarbons by the turn of the century, if not sooner. He added that all the 103 countries attending the 15th session of the UNEP Governing Council (Nairobi, May 1989) signalled their desire to increase the efforts to protect the global environment and supported fully the work of IPCC.

Developing countries needed to be assured of full participation in all actions for limiting the emission of greenhouse gases and for preparing for global warming. Dr. Tolba noted with appreciation the increased participation of developing countries in the second session of IPCC and the active contribution by some to the various sub-group activities. He, however, observed that more remains to be done in this respect and added that financial and technical assistance, education and other concrete support mechanisms were needed immediately. This would necessitate large sums of money. Dr. Tolba noted with concern that thus far, WMO and UNEP had provided the bulk of the financial support to enable developing countries to participate in the Panel's work. There was little money left in the fund established for the Panel. Even if all the pledges were paid, the expenses for 1989 would barely be covered; nothing would be left for 1990.

Decisions also had to be reached on the role of the Panel's Bureau until the tabling of the IPCC report in 1990, as well as the role of the IPCC thereafter. The session should review the progress made by the three Working Groups so as to identify gaps and to revise workplans for the timely completion of the first assessment report.

The issuance of the report would only be the beginning of a far more arduous task. To tackle the problem of climate warming effectively, radical changes would be necessary in international relations, trade, technology transfer, and bilateral and multilateral strategies. The Panel's continued work would be the only guarantee of concerted response to the global threat of climate change.

1.1.4 In his address to the session, Prof. G.O.P. Obasi, the Secretary-General of WMO, recalled the events that had taken place since the Panel met in November 1988 such as resolution 43/53 of the UN General Assembly on preserving global climate, the Ottawa meeting on legal aspects and the The Hague meeting on the Protection of the Global Atmosphere. Political leadership in many parts of the world is responding to the widely-perceived environmental threat of climate warming with a vigour that could not be foreseen a few months ago. In this context, it is imperative that the political leaders be given adequate and reliable information - the unvarnished truth - for them to make timely and effective decisions for the common good.

Professor Obasi said that the Executive Council of WMO, in its last session (Geneva, 5-16 June 1989) had approved three important resolutions on:

- (a) the need for expanding the requisite knowledge base, with speedy and effective actions, through the creation of a special fund for climate and atmospheric environment studies,
- (b) further steps towards the full and equal partnership of the developing world in the task of expanding and contributing to that knowledge base, and
- (c) the need "for the Secretary-General of WMO in co-operation with the Executive Director of UNEP to begin preparations for negotiations on climate change, taking into account the work of the IPCC ....." with actual negotiations to begin after IPCC's first assessment report is received.

Thus, caution has to go hand in hand with prudence. While the model results of the warming and their possible attendant effects have to be interpreted with care, there should be no delay in preparing to act to safeguard the future of the planet. Even with the Montreal Protocol and its contemplated strengthening, the development towards a warmer climate will not be stopped. And the obvious actions will not suffice to avoid the impacts but would delay the change thus providing time for developing more adaptation/limitation options.

The IPCC first assessment report should include a proposal for action. The work of IPCC should now be viewed as the first step in a series that the community of nations will be taking over the years. Consideration of a convention on climate change is such a first step. The report will include the elements of a possible framework convention. One of the effective ways of developing the elements would be to produce an outline (not a draft) of a convention.

Turning to the work plan of IPCC, Professor Bolin said that part of the task of this session would be to prepare carefully for the report, specifying who will do what and when. The schedule that IPCC has been working towards is the completion of its first report by September/October 1990. In light of the requests of the UNEP Governing Council and the WMO Executive Council (see references 1 and 2) and in view of the desires of the Executive Director of UNEP and the Secretary-General of WMO, this schedule may have to be re-examined.

IPCC's first report will contain the 20-page summaries for policy-makers to be produced by the Working Groups and an overall integrated summary of these placed in perspective. Professor Bolin suggested that the integrated summary be written by a drafting group consisting of the officers of IPCC and the chairmen of the Working Groups. He asked that this plan of his be endorsed by the Panel.

Prof. Bolin said that the reports of the Working Groups (each approximately 200 pages long) should be the responsibility of the groups themselves and should not be discussion items at the Stockholm session. But the (three) summaries for the policy-makers and the integrated summary should be matters of discussion and amendment at that session.

He conveyed to the Panel the offer of the Government of Sweden to host that session of the IPCC which will approve its first assessment (1990) report in Stockholm in late August/early September 1990.

#### 1.2 Approval of the agenda (agenda item 1.2)

The provisional agenda was approved as submitted. However, in the course of the session several members had expressed a wish to become core members of one or more of the Working Groups. Several international organizations had offered experts to participate in the peer review process (see para 6.4.). These two items, namely, the core membership of the Working Groups and the contributions of international organizations (other than UNEP and WMO) were discussed under agenda item 6 (Other Matters). The agenda given in Annex II, reflects these additions.

(WCP-425)

Noting that the demands for climate predictions on regional and smaller scales are increasing, he asked for help from the Panel in improving climate monitoring and accelerating climate research; rapid progress could be achieved with increased funding.

Turning to the problem of the inadequate level of participation from the developing countries in IPCC activities, he suggested that there are two aspects of the problem: one is to ensure that invited experts from the developing countries are given the travel assistance to attend the meetings of the sub-groups and the Working Groups and the other is to ensure that these nations develop within themselves the capability to contribute to the scientific issues associated with climate change, and to formulate their policies in a manner consistent with their national aspirations for economic development and betterment of living standards.

The former required allocation of travel funds. He suggested that, as a first step, specific countries could be identified for travel assistance. They could include those

- (a) that are most likely to be seriously affected by global warming and the consequent sea level rise,
- (b) where national actions could have a major impact on carbon dioxide emissions and uptake,
- (c) with special expertise and
- (d) that are centres of major relevant regional projects, such as ACMAD, with participation of more than one nation.

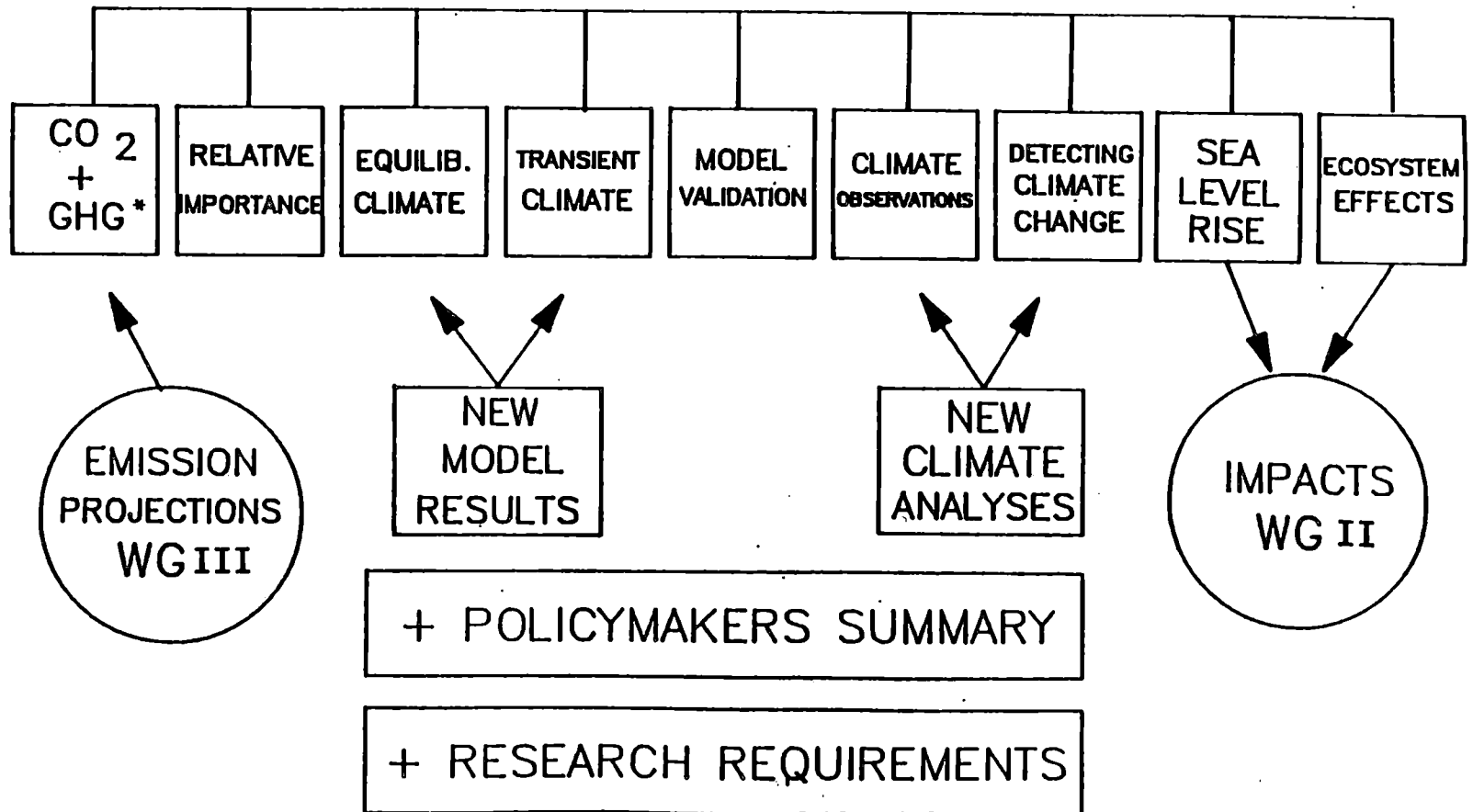
Professor Obasi said that several other UN agencies have expressed willingness to second staff to the IPCC Secretariat to handle the latter's increased workload. He referred to the WMO Executive Council's action in endorsing his strong support for the IPCC Secretariat, in co-operation with the Executive Director of UNEP.

He brought to the attention of the Panel the desire of the WMO Executive Council to have the IPCC first (1990) assessment report ready no later than September 1990, in time for the Second World Climate Conference (SWCC). He announced the joint WMO/UNEP appointment of Prof. J. Dooge of Ireland as the Programme Committee Chairman, and that of Mr. Howard L. Ferguson of Canada as the Co-ordinator, for the SWCC.

1.1.5 In his opening remarks, Prof. Bolin said that the primary objective of IPCC, in making its first assessment, is to produce a document which could provide guidelines for the formulation of global policy and which would enable the nations of the world to contribute to this task. He said that the complexity of the task was such that a fine balance would have to be struck between available scientific evidence for climate change and the uncertainties in that knowledge base. Further, the sense and the significance of the balance would have to be conveyed in unambiguous terms.

There are some key issues on which much uncertainty exists. For example, how has climate changed in the last 100 to 150 years? How much have human activities contributed to such changes? What will be the regional distribution of the expected climate change? Despite the uncertainties, there is little doubt about the role of human intervention and its potential, in causing these changes.

IPCC Working Group I  
 SCIENTIFIC ASSESSMENT OF CLIMATE CHANGE  
 Structure of 1990 Report to IPCC



\* GHG: Greenhouse gases (other than CO<sub>2</sub>)  
 The numbers 1-11 refer to the sections.

Figure 1

1.3 Programme of work of the session (agenda item 1.3)

The Panel decided that its working hours would be 09.30 - 12.30 and 14.30 - 17.30 hours with appropriate breaks. It further decided to arrive at decisions by consensus.

2. REPORT ON THE FIRST SESSION OF THE IPCC BUREAU (agenda item 2)

2.1 IPCC Chairman's briefing on the Bureau session (agenda item 2.1)

2.1 Briefly summarizing the report of the first session of the IPCC Bureau (see reference 3), Professor Bolin recalled that the Bureau had reviewed the plans of the Working Groups. He further recalled the concern expressed by the Bureau on the inadequate participation of the developing countries in IPCC activities. The Bureau had agreed that the IPCC report to the 44th (1989) session of the of the UN General Assembly would contain the arrangements and the plans of IPCC for its work. With regard to the IPCC budget and other support, the Bureau had reviewed the 1989 IPCC budget and had found it to be reasonable.

The Soviet delegation registered its displeasure at the lack of simultaneous interpretation into Russian. They pointed out their difficulty to contribute to the discussions in a fruitful manner as a result. This was especially regrettable in view of their Chairmanship of Working Group II.

The Panel shared the concern of the delegation of the USSR and the Chairman expressed his appreciation for the co-operation shown by that delegation despite the inconvenience.

The Deputy Executive Director of UNEP explained that the circumstances were outside of their control and apologized for the inconvenience. He also expressed his appreciation for the co-operation shown by the Soviet delegation.

2.2 Update report by the Chairman of Working Group I (Science) (agenda item 2.2)

2.2.1 On behalf of Dr. John Houghton, the Chairman of Working Group I, Dr. G.J. Jenkins presented the report and the update. The report, it may be recalled, had been presented to the IPCC Bureau in February 1989. (For a summary of the report to the Bureau, see reference 3.) Since then, some of the sections had been modified so that there would be 11 sections in all. The structure of the report, and areas where new work will be undertaken and special interaction needs with Working Groups II and III have been identified, are shown in Figure 1. The listing of lead authors and work plans for the different sections appear in Figures 2 (a), 2 (b) and 2 (c).

2.2.2 The first meeting of Working Group I took place at Nuneham Park, UK, on 24-26 January 1989. The contents and structure of the 1990 report to IPCC was discussed and agreed. (They were subsequently approved by the IPCC Bureau in February 1989.) The report would be wide ranging, but particular attention would be given to regional climate predictions, changes in extreme events, transient climate change, and uncertainties and the communication of their import to policy-makers. The lead authors were selected from among those proposed at the meeting. They met at Princeton (USA) on 7-8 March 1989. Some restructuring of the report was agreed, in particular on separating the roles of equilibrium and transient models and to compare observations with model predictions.

2.2.3 Each section will endeavour to incorporate its own peer review process during its preparation. In addition, once the complete report has been agreed upon at the lead authors meeting (February 1990), it will be sent to all IPCC countries with a request to arrange for a further scientific peer review. Comments received will be discussed at the Working Group I Plenary meeting in mid-1990, which will agree on the final report of the Working Group to IPCC and to the Second World Climate Conference. The Plenary will also discuss and approve a 20-page draft summary of the report, which would bring out the aspects of special relevance to policy decisions. In order to facilitate this process, it would be desirable to hear from policy-makers what questions they wish to have addressed.

2.2.4 Interaction with the other two Working Groups has been an on-going process. Interaction with Working Group III (WG III) has been through the Bilthoven meeting (April 1989) where emissions scenarios from the Steering Committee of WG III were presented. Discussion is continuing with the Steering Committee and revised emissions scenarios are awaited.

2.2.5 Involvement of developing countries has been frustrated by problems with travel plans, visas etc. This reflects in part the speed with which meetings have had to be set up. The Working Group has the agreement of a number of developing country scientists to contribute to the report and hopes for greater success in involving them in future drafting workshops.

2.2.6 With regard to the areas which have been chosen on scientific grounds for a study of regional effects, several countries enquired whether it would be possible to select additional areas or widen the boundaries of existing areas. Dr. Jenkins pointed out that the investigation of regional changes predicted by model results was being carried out to show, in a general way, the capability of models to identify regional changes by choosing a few climatologically different areas for study. The purpose was not to provide reliable regional predictions for use in impact assessments. Thus, the inclusion of further regional areas in the study would be unlikely to contribute significantly to the conclusion of the study. However, the possible changes in frequency and intensity of tropical cyclones would be addressed in the report of the Working Group. It was also confirmed that the general topic of climate variability would be discussed in detail in the report.

## SECTION 9

### SEA LEVEL RISE

Lead Authors: WARRICK  
OERLEMANS

- Section lead authors meeting  
Utrecht, March 1989
- Contributors workshop  
Reading, UK, 25-26  
September 1989

New areas discussed:

- Estimation of contributions to  
sea level change
- Estimation of uncertainties

## SECTION 10

### EFFECTS ON ECOSYSTEMS

Lead Authors: MELLILO  
SALATI  
SINHA  
WOODWARD

Liasion with WG2:

- Interaction with Section B/WG2  
Birmingham, 21 April 1989
- Interaction with Section A/WG2  
Bracknell, 16 May 1989  
Toronto, 5-7 July 1989
- Scientific basis for impacts  
assessments carried out in  
WG2 report

## SECTION 11

### RESEARCH REQUIREMENTS

Lead Authors: McBEAN (JSC)  
McCARTHY (IGBP)

Figure 2 (c)

## SECTION 5

### VALIDATION OF CLIMATE MODELS

Lead Authors: GATES  
ROWNTREE  
ZENG

Updated areas:

- Simulation of extremes
- Simulation of feedbacks
- Response to anomalies

## SECTION 6

### TRANSIENT CLIMATE CHANGE

Lead Authors: SCHLESINGER  
BRYAN

- Contributors meeting  
Amherst, 13 May 1989
- Contributors workshop  
Brisbane, December 1989

New areas discussed:

- Simple transient models to investigate policy scenarios
- Coupled A-O GCMs - differences from equilibrium results
- Ocean circulation changes

## SECTION 7

### CLIMATE OBSERVATIONS

Lead Authors: FOLLAND  
KARL/TRENBERTH  
VINNIKOV

- Section lead authors meeting  
Washington, March 1989
- Contributors meeting  
Amherst, 13 May 1989
- Contributors workshop  
UK, 29 Nov - 1 Dec 1989

New areas discussed:

- Changes in frequencies of extremes (temp, ppn)
- Temperature corrections (urbanisation, screens)
- Cryosphere observations

## SECTION 8

### COMPARISON OF OBSERVATION AND SIMULATIONS

Lead Authors: WIGLEY  
BARNETT

New areas discussed:

- Natural variability
- Greenhouse signal detection
- Climate sensitivity

Figure 2 (b)

## SECTION 1

### GREENHOUSE GASES AND OTHER FORCING AGENCIES

Lead Authors: WATSON  
SIEGENTHALER/OESCHGER  
RODHE

- Meeting of section lead authors  
Bracknell, 25 April 1989
- Meeting of contributors  
Berne, 11-13 September 1989  
Stockholm, September 1989

New areas discussed:

- Biosphere feedbacks of CO<sub>2</sub>, CH<sub>4</sub>
- Anthropogenic aerosols as CCN
- Ecosystem flux measurements

Liaison with WG3 (Emissions)

- Scenarios from US/NL SG  
Bilthoven 7/8 April 1989

## SECTION 2

### RELATIVE IMPORTANCE OF CLIMATE FORCING AGENCIES

Lead Authors: MORCRETTE  
RAMANATHAN

- Meeting of contributors  
Reading, UK, 5 August 1989

New areas discussed:

- Revised calculations of relative effect of gases
- CFC substitutes

## SECTION 3

### PROCESSES AND MODELLING

Lead Authors: CUBASCH  
CESS

- Meeting of section lead authors  
New York, 15 May 1989
- Next meeting  
FRG, October 1989

New areas discussed:

- Review of critical processes
- Details of models used for climate predictions

## SECTION 4

### HOW BIG ARE POTENTIAL EFFECTS

Lead Authors: MITCHELL  
TOKIOKA  
MANABE  
MELESHKO

- Contributors meeting  
Amherst, 13 May 1989
- Contributors workshop  
Brisbane, December 1989

Updated areas:

- Paleo-analog and GCM modelling  
- evaluation
- Effects of critical feedbacks  
(eg. cloud)
- Changes in extremes

Figure 2 (a)

2.2.7 Several countries supported the view that, although the report of the Working Group would not be defining a climate change research programme, the opportunity should not be lost to make forceful recommendations about support for research and monitoring in the document. In this context, it is essential to stress the importance of ongoing research and monitoring activities.

2.2.8 Concern was expressed about the inclusion of ecosystems effects in the plan of the Working Group, while the impacts would be dealt with by Working Group II. Dr. Jenkins explained that liaison between Working Groups I and II is excellent; two meetings had already taken place and another was planned.

2.2.9 Responding to a suggestion, Dr. Jenkins agreed that, whereas uncertainties attach to all model predictions, categorization of the degree of certainty (for example, as high, medium or low) for predictions of global or regional, mean or extreme, changes would be highly helpful.

2.2.10 With regard to the peer review process, a question was raised whether non-atmospheric scientists such as statisticians and physicists would be invited to participate. Dr. Jenkins responded that the lead authors would be submitting material to peer reviewers from their own and other disciplines.

2.3. Update report by the Chairman of Working Group II (Impacts)  
(agenda item 2.3)

2.3.1 On behalf of Prof. Ju.A. Izrael, the Chairman of Working Group II, Dr. S.S. Hodkin presented the report and the update.

2.3.2 In accordance with the decision of the first session of the IPCC, the first meeting of the Working Group was held in Moscow from 2 to 3 February 1989. The task of the Working Group is to assess the possible global and regional impacts of anticipated climate change on natural and managed ecosystems, the space-time scales of these impacts and their possible socio-economic consequences for the major fields of human activity. These assessments are to be the basis for the report of the Working Group to be submitted in 1990 to IPCC.

2.3.3 Whilst being aware of their responsibility for the preparation of assessments of possible socio-economic impacts of climate change, the Working Group realized that the reliability and well-foundedness of their assessments would largely depend on the evaluation of the climate change scenarios to be prepared by Working Group I (Science).

2.3.4 Since the conclusions of Working Group II would, in turn, be the basis for Working Group III's recommendations on the development of response strategies, it is vital for all the groups to work in close liaison in view of their great responsibility to the world community as regards the recommendations to be submitted to the UN General Assembly in 1990.

2.3.5 The Working Group was also aware of the concern of Working Group I (Science) about the lack of time for substantially improving the climate change scenarios. Nevertheless, considering the short time available for the preparation of the first IPCC assessment report to the WMO Executive Council and UNEP Governing Council, the group decided to proceed with its work on the basis of existing climate change scenarios, with the hope that efforts would be made to reach the final conclusions and recommendations of IPCC based on improved scenarios.

(WCP-425)

2.3.6 The Working Group decided at its first meeting to form six sub-groups to discuss the following topics:

- Sub-group A: Agriculture and forestry;
- Sub-group B: Natural terrestrial ecosystems;
- Sub-group C: Hydrology and water resources;
- Sub-group D: Energy, industry, transport, settlements and human health;
- Sub-group E: World oceans and cryosphere;
- Sub-group F: Steering Committee.

2.3.7 The Working Group decided that the Steering Committee should assist its Chairman in co-ordinating the work of the five other sub-groups and should include experts from USSR, USA, Australia, UK, Canada, Algeria, Japan and IIASA. (This does not, however, preclude the Chairman from nominating other participants to the Steering Committee.)

2.3.8 Because of the shortness of time, the Working Group agreed that all its sub-groups should work on the basis of the same scenarios of climate change. It authorized the Steering Committee to work closely with Working Group I to provide all the sub-groups, within a month, with unified scenarios of anticipated climate change, so that all sections of the Working Group report would be consistent and based on the same scenarios.

2.3.9 It was also decided that each sub-group should assess the socio-economic impacts in its area of responsibility.

2.3.10 The sub-groups met subsequently and discussed the main objectives for the assessment of environmental and socio-economic impacts of climate change, and selected specific elements for inclusion in the report, and identified authors to draft each of the sections.

2.3.11 As decided at the first session of the Working Group, a meeting of the co-chairmen of its sub-groups was held in Moscow (18-19 May 1989) to prepare an outline of their respective sections. At this meeting, the co-chairmen discussed the principles, general structure and basic content of the report. In line with the recommendations of the IPCC Bureau, it was agreed that the report should not exceed 200 pages and should cover all the topics equally, and that the final version should be submitted to IPCC in May 1990.

2.3.12 Reiterating the view of the first session (Moscow, 2-3 February 1989), the co-chairmen expressed their concern at the absence of recommendations from Working Group I on climate change scenarios. They particularly stressed the need for an analysis from Working Group I of all existing scenarios and assessments of possible climate change obtained using both numerical modelling methods and empirical analogue methods of analyzing the past, present and future climates.

2.3.13 The structure of the report was examined and approved as given in Table 1.

Table 1

	<u>Number of pages</u>
<u>Executive summary</u>	20
Yu.A. Izrael	
<u>Section I*</u>	
Prediction of future climate, including analogue methods, recommendations on their application	25
<u>Section II</u>	
Agriculture, forestry and land-use <u>M. Parry, G. Mendzhulin, S. Sinha</u>	40
<u>Section III</u>	
Environmental and socio-economic impacts of climate change on natural ecosystems <u>K. Dawson, S. Seymonov</u>	25
<u>Section IV</u>	
Hydrology and water resources <u>I. Shiklomanov, H.F. Lins</u>	30
<u>Section V</u>	
Energy, industry, transport, settlements, human health <u>M. Hashimoto, M. Styrikovich</u>	40
<u>Section VI</u>	
World oceans and cryosphere <u>A. Tsyban, J. Titus</u>	25
<u>Section VII</u>	
Climate change and cryosphere (permafrost issues) USSR, Canada	20

Structure and Lead Authors of the Report of Working Group II (Impacts)

(\* See also para 2.4.16)

2.3.14 Considering that the sensitivity of different territories and systems to climate change needed to be analyzed, and that, because of the time limit, Working Group I was not able to submit new climate change scenarios, the co-chairmen agreed that a short section should be included in the Working Group II report summarizing the main scientific results of climate change research and containing recommendations on their use to ensure a unified approach to preparing the different sections of the report.

2.3.15 Concern was expressed at the lack of coverage in the report of extensive areas of the Southern Hemisphere and of Africa. The co-chairmen agreed that the consequences of climate change for developing countries needed to be covered in greater depth.

2.3.16 The co-chairmen also advocated wider representation of developing countries in the work of preparing the report, since, when forming the IPCC Working Groups and their sub-groups, great importance had been attached to the broadest possible representation of these countries in the work of IPCC.

2.3.17 The co-chairmen agreed that the problems of the cryosphere, including the permafrost, should be covered in a separate section. Thus the task of sub-group E was divided into two parts : (a) world oceans and coastal zones and (b) cryosphere including the special problems associated with permafrost. Appropriate references to the cryosphere could, however, be made under the world oceans and coastal zones section also.

2.3.18 The Panel agreed that peer reviews, as in the case of Working Group I, should be undertaken.

2.3.19 Many members expressed the view that a session of the Working Group would be desirable in October/November of 1989 to be held, if possible, in Geneva.

2.3.20 The representative of IGBP offered the assistance of the Programme to the Working Group in formulating future research requirements.

2.4 Update report by the Chairman of Working Group III (Policy)  
(agenda item 2.4)

2.4.1 Dr. F.M. Bernthal, the Chairman of Working Group III, presented the report and the update.

2.4.2 The Working Group met in January 1989 and established four sub-groups in the areas of: (1) Energy and Industry, co-chaired by China and Japan; (2) Agriculture and Forestry, co-chaired by the Federal Republic of Germany and Zimbabwe; (3) Coastal Zone Management, co-chaired by the Netherlands and New Zealand; and (4) Resource Use and Management, co-chaired by Canada, France and India. Also established in January was the Steering Committee to co-ordinate the work of the sub-groups and to undertake cross-cutting tasks such as development of emissions scenarios to be used by the sub-groups and the other two Working Groups, and consideration of response strategy implementation mechanisms. Thirty-three countries and eleven international organizations attended the meeting.  
(WCP-425)

2.4.3 The sub-groups met from 8 to 9 May in Geneva; a meeting of the Steering Committee followed from 10-12 May, also in Geneva. The meetings of the sub-groups demonstrated much progress and co-operation, which is expected to continue. The Steering Committee agreed on a multidisciplinary approach to consider legal, institutional and other implementation processes. These implementation measures would be considered at a meeting of the Working Group in October 1989, which would be open to all governments and relevant international organizations.

2.4.4 The Energy and Industry Sub-group (EIS) heard in-depth reports from five countries, the IEA and UNEP. The presentations revealed the important relationships between greenhouse gases and individual economies. Analytical tools and various models had been discussed at an earlier (10-11 April) meeting of experts in Paris. A detailed nine-month workplan to develop global reference, and options up to the year 2010, was agreed to. The EIS reached substantial consensus on the importance of improving energy efficiency in the short-term and reducing carbon intensity of energy sources in the longer-term. The papers provided a valuable information base and an excellent introduction to important factors in long and short-term policy options. The need to increase contact with the developing countries and centrally-planned economies was stressed.

2.4.5 The Agriculture, Forestry and Other Human Activities Sub-group (AFOS) agreed on a very substantial workplan in including three forestry workshops and one agricultural workshop. The forestry workshops would focus on the role of tropical, temperate and boreal forests as sources and sinks for carbon dioxide. The agricultural workshop will seek to identify baseline emissions of methane (CH<sub>4</sub>), nitrous oxide (N<sub>2</sub>O) and carbon dioxide (CO<sub>2</sub>) and possible reduction strategies. AFOS work is scheduled for completion in April 1990. The group is working in co-ordination with FAO in these efforts.

2.4.6 The Coastal Zone Management Sub-group (CZMS) adopted a workplan which includes two workshops on adaptive options and associated costs for sea-level rise induced by climate change. CZMS will hold workshops in the United States in November 1989 and in Australia in February 1990. Its work is scheduled for completion in May 1990.

2.4.7 The fourth sub-group, the Resource Use and Management Sub-group (RUMS), adopted a workplan calling for one workshop to which papers have been invited on water resources, forestry, agriculture, fisheries animal husbandry, salinization and desertification, unmanaged ecosystems and land use management. The workshop will be held in Geneva from 30 October - 1 November 1989. RUMS work is scheduled for completion in April 1990.

2.4.8 The focus of the Steering Committee's discussion on emissions scenarios was the presentation from the Netherlands and the United States of three scenarios. These correspond to the radiative equivalent of a doubling of the atmospheric concentration of carbon dioxide from its pre-industrial value assumed to occur by the years (a) 2030, (b) 2060 and (c) 2090 respectively and stabilizing thereafter. The need for other scenarios was discussed but decisions were deferred. The Committee agreed that the expert group on scenarios should work with Working Group I on developing new scenarios and answering questions on positive and negative feedbacks. The Committee discussed trade-offs among emissions reductions, technological (WCP-425)

changes, population growth, and growth in per capita GNP. The Japanese delegation presented an analysis which implies that a technological revolution would be required to stabilize the atmosphere by the year 2090, if world economic growth is to be maintained at acceptable levels.

2.4.9 The Steering Committee devoted a substantial portion of the meeting to discussing a timetable and procedure for consideration of several implementation measures. It finally adopted a workplan to examine a range of potential measures to implement response strategies to climate change including: legal measures; technology transfer and development; financial measures; public education and information; economic (market) measures. The Steering Committee will examine both existing and new legal processes, including the elements of a framework convention on climate change.

2.4.10 The Working Group agreed that Canada, Malta and the United Kingdom should act as co-ordinators for legal measures; France and the Netherlands for financial measures; India and Japan for technology transfer and development; China and the United States for public education and information; and Australia and New Zealand for economic measures. The task of the co-ordinators, it was further agreed, should be to provide a faithful summary of views submitted by participating countries. As agreed, the Chairman of Working Group III has invited all members of the WMO and UNEP and relevant international organizations to submit papers on the five topics by 15 August 1989. In October 1989, the Working Group will meet to discuss the summary papers and develop that portion of the report for the IPCC.

2.4.11 The Working Group had recognized from the outset the very great importance of full participation by developing countries in all activities of the Working Group and, in fact, of the IPCC. The concerns of the developing countries are being addressed in all the sub-groups of Working Group III and in the consideration of the implementation strategies. Dr. Bernthal invited the Panel to especially note the section of the May report of the Steering Committee devoted to this issue. The report had recommended several immediate practical steps.

2.4.12 Dr. Bernthal also indicated the possible direction of work on response strategies following completion of the IPCC's 1990 report. First, as had already been mentioned, the conclusions of the report will be the starting point for formal negotiations on a framework convention. Second, concurrently with those negotiations, each country should use the 1990 report to prepare its own strategy for response actions (short-term and longer-term) at the national level based on relevant sections of the report. These national strategies could then be discussed collectively and form the basis for developing a co-ordinated international strategy at future response strategy meetings.

#### Emissions scenarios

2.4.13 Concern was expressed about the interpretation of the three emissions scenarios developed by the Steering Committee of Working Group III. The scenarios should be such that their implications can be explained in easy, lay terms. They should be described and annotated carefully so that misuse and misinterpretations do not occur. In particular it should be made clear that scenarios are not predictions of the future nor are they descriptions of a desirable goal; they are statements of "what might be" so that the environmental and socio-economic consequences of such conceivable future states might be clarified and evaluated.

(WCP-425)

2.4.14 Several delegations asked that a wider range of emissions scenarios be considered. The Federal Republic of Germany proposed the following additional scenarios and offered to assist in developing them:

- (a) one corresponding to "business-as-usual";
- (b) one in which the radiative equivalent of a doubling of atmospheric carbon dioxide concentration would occur by the year 2050, stabilizing thereafter;
- (c) one with the radiative equivalent of an increase in the atmospheric concentration of carbon dioxide by a factor well below two.

2.4.15 Dr. Hodkin, speaking on behalf of Working Group II, noted that Working Group II recognized the views expressed by the Panel on the use of scenarios for the further work by the Working Group. It was not possible, within the time schedule of the IPCC first assessment report, to obtain reliable predictions of climate change on regional and smaller scales. Nevertheless, available scenarios enable preliminary evaluations of impacts on global and regional scales. In this connection, it would be useful to consider alternative approaches to obtaining scenarios; where such a possibility did not exist, available scenarios should be used to explore the impacts of climate change.

2.4.16 Working Group II would welcome joint discussions with Working Group I to study the question of climate scenarios more in depth. It pointed out the necessity of obtaining from Working Group I predictions of possible changes of climate which are obtained using both numerical modelling and empirical analogue methods. The use of available scenarios at present would serve as substitutes to explore the impacts of a range of possible future climate states. Dr. Jenkins, speaking on behalf of the Chairman of Working Group I, stated that a meeting would be convened as soon as possible to discuss paleo-analogue climate forecasting. Section I of the report of Working Group II will reflect the outcome of the discussion.

2.4.17 Dr. Jenkins further stated that he appreciated that the development of emissions scenarios is a complex matter and, for this reason, Working Group I would accept the three emissions scenarios which have been delivered by Working Group III to explore climate change implications. One further scenario, with stabilization of equivalent carbon dioxide concentrations well below doubling the pre-industrial level could be defined after discussions between the Steering Committee of Working Group II and Working Group I.

2.4.18 The Chairman, in his summary remarks, stated that scenarios serve two useful purposes. One is to explore the range of possibilities in a long-term perspective. The scenarios, as for example those developed by Working Group III, imply major efforts to achieve stabilization of the concentrations of the greenhouse gases, at the low levels implied. They serve to illustrate the stringent measures that would be needed to cope with the current problems of climate warming.

2.4.19 The second use of scenarios is to assess how well can the future be managed step by step. They could be used to explore the efficiencies of various mitigation/limitation measures, as for example, reductions in the rate of growth of fossil-fuel use say from 2% to 1% or, as the Swedish government has decided, down even to 0%. Such applications may open up new action options. For example, the cost effectiveness of measures that are desirable for reasons unrelated to climate (but which would be helpful in the context of climate warming) can be explored and action options developed. This application may also be helpful in determining the flexibility of response.

2.4.20 The socio-economic consequences and the international implications of various scenarios will be a key issue in decision-making. Thus, scenarios should be chosen so as to enable the clear communication of such consequences and implications in a simple, understandable manner.

2.4.21 After further discussion, the Panel agreed:

- (a) that the 2030 scenario of Working Group III could be considered as the "business-as-usual" scenario;
- (b) that the 2060 scenario may serve the purpose of the 2050 doubling of carbon dioxide (scenario b of paragraph 2.4.14); the stabilization aspect would still need to be explored;
- (c) that the 2090 scenario would be available for use; and
- (d) that one additional scenario along the lines suggested by scenario c of paragraph 2.4.14 would be developed by Working Group III in consultation with Working Group I.

### 3. PARTICIPATION OF THE DEVELOPING COUNTRIES IN IPCC ACTIVITIES (agenda item 3)

3.1 Dr. A. Al-Gain, the Vice-Chairman of IPCC and the Chairman of the IPCC Ad-hoc Sub-group on Ways to Increase the Participation of the Developing Countries in IPCC Activities, presented the report of the sub-group. The other members of the sub-group were Brazil, Senegal and Zimbabwe (see reference 3). The report is reproduced in Annex III in two parts, the first being the concept paper and the second on action items.

3.2 The Panel expressed its deep appreciation for, and approval of, the report. The report should serve as the guideline for future IPCC planning in this vital area. In the context of this agenda item, a preliminary budget estimate for supporting the increased participation of the developing countries was presented to the Panel by the Executive Heads of UNEP and WMO (see Annex IV). The ensuing discussion brought out clearly the enthusiasm on the part of the developing countries for the work of IPCC and their genuine concern about climate change, and the full recognition on the part of the others of the needs of the former in shouldering their share of it.

3.3 The Panel agreed that measures in both the short-term and medium- to long-term are needed. The latter falls within the scope of the assignment of Working Group III. Thus, that Working Group should include, in the context of its work on technology transfer and development measures, financial and economic (market) measures and public education and information measures (see reference 4), recommendations for action items and/or programmes for this purpose. The recommendations should be specific and contain as much detail as possible. They should be such as to assure within each nation the scientific and other expert capability to integrate the underlying science of, impacts of, and response measures to, climate change. It is vital that the economic development objectives and needs of the developing countries be considered in the course of developing the international policy options on climate change.

3.4 With regard to short-term measures, the following needs were identified, in addition to the travel support for the invited experts from the developing countries to attend the meetings of IPCC, its Working Groups and their sub-groups:

- (a) the need to raise the awareness and promote the understanding of the public and of the opinion-makers upto and including the level of the Head of State, and
- (b) the need for assistance to develop and carry out the necessary research and monitoring, and other information gathering and analysis activities, in the national context, to provide effective inputs into IPCC work. (This activity would continue into the long-term).

3.5 A number of countries pledged new or further contributions to the joint WMO/UNEP IPCC Trust Fund for the purpose of assisting developing countries to participate in IPCC activities. The details of the contributions are given in Annex V.

3.6 The Panel agreed that the following concrete short-term measures should be undertaken forthwith:

- (a) Identify experts in countries, chosen on the basis of the criteria proposed in para 2 of Annex IV, and ensure their participation in the meetings and other activities of IPCC, especially of its Working Groups and their sub-groups.
- (b) Formulate and implement a "crash programme" of seminars to disseminate information to opinion-makers and others; such seminars will include the one planned on the subject matter of Working Groups I and II in late May/early June 1990.

3.7 Many delegations from both developed and developing countries expressed strong support for the establishment of an IPCC Special Committee on Matters Related to Developing Countries, indicating their willingness to serve on the Committee. The Panel agreed to the proposal of Prof. Bolin that the Special Committee be composed of 5 members each from the developed and the developing worlds, to be chaired by France.

3.8 The Panel also agreed that the IPCC Chairman and the delegates of France and Saudi Arabia be authorized to designate the composition of the Committee. Such designation has since been done and it is as follows:

France (chair)	Algeria
Japan	Brazil
Norway	India
USA	Indonesia
USSR	Kenya

4. OTHER RELEVANT INTERNATIONAL ACTIVITIES (agenda item 4)

4.1 Update on the preparation of the Second World Climate Conference (SWCC)

4.1.1 Mr. J.P. Bruce, the Acting Deputy Secretary-General of WMO, informed the Panel that the WMO Executive Council in its last session (Geneva, June 1989) had agreed to hold the Conference in Geneva from 12 to 23 November 1990. The co-ordinator of the Conference, Mr. H.L. Ferguson of Canada, appointed jointly by the Secretary-General of WMO and the Executive Director of UNEP, would be assuming his duties in mid-August 1989. Substantial financial contributions are being made by UNESCO to the Conference. The WMO Executive Council had expressed a desire to have the Conference provide the forum for the first major public debate of the IPCC first assessment report.

4.1.2 Mr. Bruce stated further that the first six days would be devoted to a review of the World Climate Programme (since its inception immediately after the 1979 World Climate Conference) and to a discussion of the IPCC first assessment report. The last two days of the Conference would be held at a ministerial level for discussion of policy matters.

4.1.3 Pointing out that a major part of IPCC work is concerned with policy matters including the elements of a possible framework convention on climate change, Prof. Bolin requested a clarification of the preparations by WMO and UNEP for a convention (see paras 4.2.1(a) and 4.2.4 below). In response, Mr. Bruce stated that in accordance with the wishes of the governing bodies of WMO and UNEP, the two Executive Heads had formed a small group to decide (1) how the two agencies can contribute to the negotiations and (2) on the time schedule for the negotiations. He stressed that the negotiations would begin after the completion of the IPCC first assessment report and that close liaison would be maintained between IPCC Working Group III and the UNEP/WMO group.

4.1.4 In order to ensure wide participation in the Conference, efforts would be made to provide limited financial support to participants from developing countries. In this connection, Switzerland indicated its willingness to provide some support to a number of delegates to the Conference from developing countries.

4.2 Relevant decisions/discussions of the 15th session of the UNEP Governing Council (15-26 May, Nairobi) and the 41st session of the WMO Executive Council (5-17 June, Geneva)

4.2.1 Reporting on pertinent decisions by the Executive Council of WMO, Mr. J.P. Bruce, informed the session that three resolutions were adopted by the council.

- (a) One on global climate change, similar to a resolution adopted by the UNEP Governing Council earlier. It defines the relationship of the Panel to the parent body. It also, inter alia, calls on the Secretary-General of WMO to work closely with the Executive Director of UNEP on preparations for negotiations on a framework climate convention;
- (b) A second on the establishment of a special fund for climate and atmospheric environment studies from extra-budgetary sources. The fund would support, inter alia, such activities as ocean observations for the World Climate Research Programme, and observations of greenhouse gases. The fund would also be used for assisting developing countries to improve their capabilities in climate-related studies.
- (c) A third on ways to improve the participation of the developing countries in the activities of the World Climate Programme and IPCC.

4.2.2 The Executive Council in the course of its consideration of the report of the 10th session of the WMO Commission for Climatology, inter alia, recommended two important projects:

- (a) the development of an effective climate change detection project, through intensive mobilization and analysis of global climatological data, and
- (b) investigation of the best way of maintaining long-term climatological stations around the world.

4.2.3 Further, the council decided to establish a Global Atmosphere Watch (GAW) programme which combines two existing programmes, namely the Background Air Pollution Monitoring Network (BAPMoN) and the Global Ozone Observing System. Emphasis would be placed on the expansion of observations in the tropics and the Southern Hemisphere under the new programme.

4.2.4 In introducing the relevant decision (see reference 1) of the UNEP Governing Council, Mr. W.H. Mansfield III, the Deputy Executive Director of UNEP, stated that the Council stressed the importance of active involvement in the activities of IPCC by developing countries. The Council also urged the Executive Director to work closely with the Secretary-General of WMO on preparations for negotiations on a framework convention, taking into account the work of the Panel and the past and planned ministerial and other conferences.

5. IPCC BUDGET AND OTHER SUPPORT (agenda item 5)

5.1 The Secretary of IPCC informed the Panel that the budget presented covered only the activities for 1989. It had been assumed earlier that the level of expenditure for 1990 would be similar to that of 1989. However, the tremendous (and welcome) enthusiasm shown by the developing countries to participate in IPCC activities makes such an assumption invalid. Dr. Sundararaman drew the attention of the Panel to budgetary proposals made by Dr. Tolba and Prof. Obasi amounting to US\$ 1,000,000 for the provision of support to developing countries (see Annex IV).

5.2 The Chairman made the following proposals which the Panel accepted:

- (a) The 1989 expenditures as agreed upon by the Bureau at its first session (see Annex VI) be accepted as such;
- (b) The Chairman be authorized to deal with any shortfall in receipts for 1989, should any occur;
- (c) A 1990 budget be prepared for consideration at the first meeting of IPCC or its Bureau, whichever is earlier, in 1990; until the approval of that budget, the level of expenditure for 1990 remain the same as that for 1989;
- (d) The Panel take note of the resolutions of the UNEP Governing Council and the WMO Executive Council (see references 1 and 2) which, inter alia, request the two Executive Heads to consult with IPCC in the determination of its internal structure and procedures, its budget and the means of financing such budget.

5.3 A number of countries and the World Wide Fund for Nature (WWF) made new or further pledges to the joint WMO/UNEP IPCC Trust Fund for Secretariat expenses. The details of the contributions are given in Annex V.

5.4 With regard to the IPCC Secretariat staffing, UNESCO expressed its readiness to second a professional staff member to help with public information and other activities.

6. OTHER MATTERS (agenda item 6)

6.1 Membership in IPCC and its Working Groups

6.1.1 The Panel reiterated its view expressed at its first session (see reference 5) that IPCC being intergovernmental is open to all Members of UNEP and WMO. They are welcome to participate in all its activities. In particular, the Panel agreed that the designation of "core members" of the Working Groups should no longer apply. The Chairmen of the Working Groups are given the discretion and the responsibility to conduct their business in the most effective way.

## 6.2 Liaison on IPCC matters

Formal letters of invitation, the reports of the Panel and its subsidiary bodies and other communication is normally transmitted to the Ministers of Foreign Affairs. In almost all cases copies for information are sent to the Principal Delegates of Members and contact points of international agencies. The Panel requested that members establish one or more focal points for direct liaison, if they so wish, and communicate to the IPCC Secretariat the full contact information on the focal points. This will be in addition to the formal links of communication.

## 6.3 Research and monitoring needs

6.3.1 On the basis of the presentations of the Working Groups at the session, the Panel agreed that increased efforts both with regard to research and monitoring are of vital importance for the long-term development of the knowledge basis which is fundamental for the successful conduct of the IPCC tasks. The Working Groups should specify in broad terms the (research and monitoring) needs as they become apparent in the course of their work.

6.3.2 In the light of the very active pursuit of the World Climate Programme jointly fostered by WMO, ICSU, UNEP and UNESCO, and particularly the plans for extensive global research efforts under the World Climate Research Programme, the monitoring activities carried out by WMO and UNEP as well as the research plans being developed by ICSU for its International Geosphere-Biosphere Programme/Global Change, the Panel considered it appropriate to concentrate its efforts on the prime objectives as formulated by WMO and UNEP and which are recorded in the report of the first session:

"3.1 The Panel considered the organization of its work, from the viewpoint of both structure and schedule, to attain the objectives set up by the governing bodies of WMO and UNEP, summarized in the WMO Executive Council Resolution 4 (EC-XL):

- (i) Assessing the scientific information that is related to the various components of the climate change issue, such as emissions of major greenhouse gases and modification of the Earth's radiation balance resulting therefrom, and that needed to enable the environmental and socio-economic consequences of climate change to be evaluated;
- (ii) Formulating realistic response strategies for the management of the climate change issue." (reference 5)

6.3.3 There is thus, a clear division of work between the assessment work of IPCC and the ongoing work that the two parent organizations are responsible for in other ways which they have undertaken in collaboration with other organizations. However, while the planning and implementation of the research and monitoring programmes is not to be the responsibility of IPCC, the status and future directions of such activities would constitute part of the IPCC first assessment report.

6.3.4 The Panel also emphasized the need to maintain and expand, especially in the developing world, the basic observational networks such as that of the World Weather Watch Programme of WMO.

6.3.5 The Panel noted that, for fully informed considerations of the impacts of climate change on environment and society, reliable information on phenomena in addition to climate - such as vegetation patterns, wildlife distributions etc. - is required. In this respect, the Panel noted the work being carried out under such programmes as the Man and the Biosphere of UNESCO and the IGBP of ICSU. Both research into the relationships between these phenomena and climate, and documentation and monitoring of their changes, is required, particularly in developing countries where the knowledge base is as yet insufficient to confidently assess climate impacts.

6.4 Invitation to international, non-governmental and other organizations to collaborate in the work of IPCC

The Panel invited interested UN organizations, regional or global intergovernmental and non-governmental organizations and private institutions that wish to contribute in the matter, to collaborate with appropriate analyses. It encouraged them to establish appropriate links with the Working Groups as well as their sub-groups. The essential need is to arrange for collaboration at the working level. The Panel invited the contribution from these organizations in order that its own work may be improved.

6.5 Forthcoming meetings and other items

6.5.1 The forthcoming meetings of relevance to IPCC activities were announced:

- (a) Ministerial Conference of Small States on Sea Level Rise, Malé, Maldives, 19-22 November 1989, organized by the Government of Maldives;
- (b) Conference on Tropical Forests, Vienna, Austria, 5 September 1989, organized by the Government of Austria and UNEP.

6.5.2 The Panel noted the proposal of the United States of America that all IPCC members consider extending the support of their governments for the designation of the year 1990 as the "International Year of Global Climate Change" by the United Nations General Assembly. Such designation would help focus international attention and concern on the problem of global climate change, more so as the Second World Climate Conference and the release of the IPCC first assessment report will take place in 1990.

7. AGENDA, DATE AND PLACE OF THE NEXT SESSION OF IPCC (agenda item 7)

7.1 The Panel agreed to meet in its third session in Washington D.C., USA from 5 to 7 February 1990 (until noon on 7 February) at the kind invitation of the Government of the United States of America. The Panel further agreed to meet in its fourth session in Stockholm, Sweden in late August 1990 at the kind invitation of the Government of Sweden.

7.2 The Panel set the dates and venue for the second session of the Bureau. The Bureau will meet in Washington D.C., USA, on 7 and 8 February 1990 (starting on the afternoon of 7 February) at the kind invitation of the Government of the United States of America.

7.3 A list of IPCC and related meetings is attached as Annex VII. (WCP-425)

8. ADOPTION OF THE REPORT

The Panel authorized the Chairman to approve the report of the session before its distribution.

9. CLOSURE OF THE SESSION

The Chairman closed the second session of IPCC at 16.40 hours on Friday 30 June 1989.

## SECOND SESSION OF THE INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE

Nairobi, 28-30 June 1989

## LIST OF PARTICIPANTS

1. OFFICERS OF THE SESSION

B. Bolin	Chairman
A. Al-Gain	Vice-chairman
J.A. Adejokun	Rapporteur

2. REPRESENTATIVES OF MEMBERS

<u>Member</u>	<u>Name</u>	<u>Capacity</u>
ALGERIA	M.K. Mostefa-Kara	Principal delegate
ARGENTINA	J.E. Valenzuela	Principal delegate
AUSTRALIA	W.J. McGregor Tegart J.W. Zillman D.C. Griffiths D. Campbell	Principal delegate Alternate Delegate Delegate
AUSTRIA	W. Siegl	Principal delegate
BELGIUM	M. Ardui	Principal delegate
BOTSWANA	G.K. Ramothwa (Ms)	Principal delegate
BRAZIL	L.P. Teixeira Soares A.R. Magalhaes L.P. Medeiros A.C. Do Prado E. Cordeiro	Principal delegate Delegate Delegate Delegate Delegate
BURUNDI	P. Nkundwa	Principal delegate
CANADA	H.L. Ferguson J.D. McTaggart-Cowan A.C. de Hoog D.K. Dawson T.G. Brydges	Principal delegate Alternate Delegate Delegate Delegate
BRITISH CARIBBEAN TERRITORIES	C.E. Berridge	Principal delegate



KENYA	S.J.M. Njoroge	Principal delegate
	L.N. Njau	Alternate
	J.K. Nganga	Delegate
	P.M. Mungai	Delegate
	M. Macodras	Delegate
	J.N. Onyango	Delegate
	M.P. Tole	Observer
MALDIVES	A. Majeed	Principal delegate
MALTA	D.J. Attard	Principal delegate
	G.N. Busuttil	Delegate
	H. Taylor-East	Adviser
MEXICO	M.-A. Caceres	Principal delegate
THE NETHERLANDS	H.M. Fijnaut	Principal delegate
	W.J. Kakebeeke	Alternate
	P. Vellinga	Delegate
	H. van der Kooi	Delegate
	J.F. Boddens Hosang	Adviser
	W.K. Hoogendoorn	Adviser
NEW ZEALAND	M.P. Mosley	Principal delegate
NIGERIA	J.A. Adejokun	Principal delegate
NORWAY	P.M. Bakken	Principal delegate
	O. Saetersdal	Alternate
	A. Grammeltvedt	Delegate
POLAND	T. Janicki	Principal delegate
	W. Wezyk	Delegate
SAUDI ARABIA	A. Al-Gain	Principal delegate
	M. Al-Deghaither	Delegate
	A.H. Al-Shahri	Delegate
	T.M. Zatari	Delegate
SENEGAL	M. Seck	Principal delegate
SPAIN	A. Pou	Principal delegate
	E.A. Lines	Delegate
SUDAN	A.R. Muna (Ms)	Principal delegate
SWEDEN	S. Bodin	Principal delegate
SWITZERLAND	H. Oeschger	Principal delegate
	P. Morand Francis (Ms)	Alternate
UNION OF SOVIET SOCIALIST REPUBLICS	Ju.A. Izrael	Principal delegate
	S.S. Khodkin	Alternate
	G. Iguine	Delegate
	P.I. Medvedev	Delegate
	I. Dimitriev	Delegate
	Y. Vakalyuk	Delegate

UNITED KINGDOM	D. Fisk G. Jenkins R. Beetham	Principal delegate Alternate Delegate
UNITED REPUBLIC OF TANZANIA	D.T. Mussa	Principal delegate
UNITED STATES OF AMERICA	F.M. Bernthal E.W. Friday J. Easton L.J. Fisher (Ms) W.A. Nitze R.J. Ford	Principal delegate Alternate Alternate Alternate Delegate Delegate
YEMEN ARAB REPUBLIC	N.A. Othman	Principal delegate
ZIMBABWE	M.C. Zinyowera R. Karimanzira (Ms) Dudza Gavi (Ms)	Principal delegate Alternate Delegate

### 3. REPRESENTATIVES OF THE UNITED NATIONS ENVIRONMENT PROGRAMME

M.K. Tolba	Executive Director
W.M. Mansfield III	Deputy Executive Director
S. Evteev	Assistant Executive Director Programme
R. Olembo	Deputy Assistant Executive Director Programme
M.D. Gwynne	Director GEMS/PAC
S. Sangweni	Senior Programme Officer DES/PAC
P.E. Usher	Senior Programme Officer GEMS/PAC
W.V. Kennedy	Senior Programme Officer GEMS/PAC
C. Boelcke	Programme Officer GEMS/PAC
M. Gerges	Programme Officer OCA/PAC
W.-L. Cheng	Programme Officer GEMS/PAC
C. Schlosser	Consultant GEMS/PAC

### 4. REPRESENTATIVES OF THE WORLD METEOROLOGICAL ORGANIZATION

G.O.P. Obasi	Secretary-General
J.P. Bruce	Acting Deputy Secretary-General

### 5. REPRESENTATIVES OF INTERNATIONAL ORGANIZATIONS

K. Brendow	Economic Commission for Europe
J. Henningsen	Commission of European Communities
R. Brinkman	FAO
F. Niehaus	IAEA
T. Roswall	IGBP/ICSU
P.W.N. Wessendorp	UNDP

F. Verhoog	Unesco and IOC
V. Aalto	WHO
A. Heidenreich	Environmental Liaison Centre International
R. Wilson	Greenpeace International
A. Kerr	
P. Stevenson (Ms)	
J.S. Lemlin	International Petroleum Industry Environmental Conservation Association (IPIECA)
F. Briand	IUCN - The World Conservation Union
J.W. Shiller	Organisation of International Constructors of Automobiles (OICA)
W.J. Maunder	Stockholm Environment Institute
G.M. Woodwell	Woods Hole Research Center
K. Ramakrishna	
T. Robertson (Ms)	World Wide Fund for Nature (WWF-UK)
A. Markham	World Wide Fund for Nature (WWF-International)

6. IPCC SECRETARIAT

N. Sundararaman	IPCC Secretary
S. Tewungwa	Programme Officer



United Nations  
Environment Programme  
Programme des Nations Unies  
pour l'Environnement  
P.O.Box 30552-Nairobi, Kenya



World Meteorological Organization  
Organisation météorologique mondiale  
National: (022) 730 81 11  
International: +41 22 730 81 11  
Facsimile: +41 22 734 23 26  
Case postale N° 2300  
1211 Genève 2

Distr.: Restricted  
IPCC-II/Doc. 1  
(21.IV.1989)  
ORIGINAL: ENGLISH

INTERGOVERNMENTAL PANEL  
ON CLIMATE CHANGE  
SECOND SESSION  
NAIROBI, 28-30 JUNE 1989

PROVISIONAL AGENDA

1. ORGANIZATION OF THE SESSION
  - 1.1 Opening of the session
  - 1.2 Approval of the agenda
  - 1.3 Programme of work of the session
2. REPORT OF THE FIRST SESSION OF THE IPCC BUREAU
  - 2.1 IPCC Chairman's briefing on the Bureau session
  - 2.2 Update report by the Chairman of Working Group I (Science)
  - 2.3 Update report by the Chairman of Working Group II (Impacts)
  - 2.4 Update report by the Chairman of Working Group III (Policy)
  - 2.5 First assessment (1990) report of IPCC
3. PARTICIPATION OF THE DEVELOPING COUNTRIES IN IPCC ACTIVITIES
  4. OTHER RELEVANT INTERNATIONAL ACTIVITIES
    - 4.1 Update on the preparations for the Second World Climate Conference (SWCC).
    - 4.2 Relevant decisions/discussions of the 15th session of the UNEP Governing Council (15-26 May 1989, Nairobi) and the 41st session of the WMO Executive Council (5-17 June 1989, Geneva).
5. IPCC BUDGET AND OTHER SUPPORT
6. OTHER MATTERS
7. AGENDA, DATE AND PLACE OF THE NEXT SESSION OF IPCC
8. ADOPTION OF THE REPORT OF THE SESSION
9. CLOSURE OF THE SESSION

INVOLVEMENT OF DEVELOPING COUNTRIES IN THE WORK OF THE  
INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE

(Submitted by Saudi Arabia, Senegal, Brazil and Zimbabwe)

The issue of closely involving the developing countries  
in the work of the Panel is discussed and suggestions  
are made on steps that might be taken by UNEP and WMO  
to facilitate greater involvement.

## INTRODUCTION

1. At the first session of the Bureau of the IPCC held in Geneva 6-7 February, considerable attention was given to the issue of strengthening the participation of scientists from developing countries in the work of the Panel and its Working Groups.
2. This will be essential to the work of the Panel and its Working Groups because in each of the three main areas of work - the scientific aspects, the impacts, and the policies, the work to be done is truly global.
3. Among the most widely accepted scenarios for climate change, areas of the globe occupied by developing countries would be most seriously affected. At the same time, the developing countries are not economically or technologically equipped to implement some of the practical and policy measures that are necessary to address the problems.
4. It would be unreasonable to ask developing countries to forego all of the benefits of economic and industrial development already enjoyed by the developed world. Nor should they have to pay directly or indirectly for the repair of damage caused by the scale of industrial development in the developed countries. It is essential that the developing countries be fully involved in a global action plan to address the scientific, social, economic and policy aspects of climate change.
5. This paper addresses the short-term practical steps that might be taken during the life of the IPCC as well as some medium to long-term measures that might be considered by UNEP and WMO for incorporation into their medium and long-term plans.

## ACTIONS TO BE TAKEN IN THE SHORT TERM

### Involvement in IPCC Activities

6. A simple and essential measure for ensuring the full participation of developing countries in the work of the Panel is through financial support for the attendance of representatives from developing countries at meetings of the Panel and its Working Groups and for involvement in other IPCC activities. This is already being accommodated to some extent through the allocation of funds from the IPCC Trust Fund. Some contributing countries have specified additional amounts expressly for this purpose.
7. Further donations from IPCC Member States should be encouraged as well as contributions from all WMO and UNEP Members. A regular report on the status of contributions to the fund should be made.
8. WMO and UNEP should examine the possibility of increasing their regular budget support to the IPCC to enable the use of Trust Fund monies exclusively for the support of developing countries.

9. Because the work of the IPCC requires the involvement of disciplines beyond the scope usually involved in WMO and UNEP work, especially in relation to Working Group III, the Working Groups, with the support of the WMO and UNEP Secretariats, should seek to identify possible funding sources beyond those traditionally associated with the work of WMO and UNEP.

10. In response to a request from the IPCC Bureau in February 1989, other funding sources including UNDP, the World Bank, the Islamic Development Bank and other multilateral financial institutions are being explored by the Executive Heads of WMO and UNEP.

11. It is recommended that WMO and UNEP explore the possibilities of support from private foundations and research-oriented companies.

12. As well as seeking more support through increased donations to the Trust Fund, efforts should be made to give priority to support of IPCC activities in existing technical cooperation programmes. The use of a portion of funds available for short-term fellowships under UNDP and agency regular budget sources is recommended.

#### List of Experts Contributing to IPCC Activities

13. The actions already being taken by Working Groups to identify expertise required in various disciplines and geographic regions should be supported and encouraged further. It would be helpful if, at the time of nominating people, Working Groups would identify those individuals likely to need support and consider possible funding sources.

14. The lists of actual and potential contributors, whether individuals or organisations, should be made available to governments so that they become resource lists for any actions that may be started at the national level.

#### Establishment of National Committees

15. A way of assisting more effective participation in the work of the Panel by developing countries would be through the formation of national committees or the inclusion of the Panel's work in the agenda of existing relevant national committees. This would also help marshaling of resources for national action programmes.

16. WMO and UNEP should jointly recommend this course to their Members. They should provide guidance on the formation, terms of reference and constitution of national committees as well as information on existing committees.

#### Conferences and Seminars

17. IPCC should consider the possibilities for arranging conferences and seminars in developing countries to help mobilise national and regional action.

18. For example, a conference to heighten the awareness of developing country scientists on climate change matters would contribute to the objectives of the IPCC.

19. Roving seminars held on a regional basis have proven to be a cost-effective method of reaching a wide audience and stimulating valuable national action in developing countries. At least one series of roving seminars on a regional basis should be held during the course of the IPCC.

#### **ACTIONS TO ASSIST MEDIUM AND LONG-TERM DEVELOPMENT**

20. While the work of the IPCC must be accomplished in a short period and it is essential that urgent measures be taken to fully involve the developing countries, the opportunity exists to identify measures that will assist developing countries to address climate change issues and implement response strategies in the medium to long term.

#### **Existing Technical Cooperation Programmes**

21. The work of the IPCC is a valuable opportunity to inject new ideas and emphasis into existing technical cooperation programmes. The work of the Panel even in its early stages has served to indicate already that the size and scope of the task facing the world in addressing climate change issues is substantial. It is logical that steps can be taken now or will be identified as an outcome of the work of the Panel, that will contribute to the ability of developing countries to address these issues in the medium to long term.

22. This process can take place as part of the normal review of technical cooperation programmes.

23. It is valuable to note, however, that special opportunities already exist in relation to plans for new regional centres or the upgrade of existing facilities. The African Centre for Meteorology and Development (ACMAD) is a good example where it should be possible to incorporate a small climate research and service group as part of the operations of the centre. In a similar way, plans to establish or upgrade existing Regional Specialised Meteorological Centres might with small modification include specific provision for climate research.

24. It is recommended that this matter be taken up by WMO and UNEP with the UNDP and that it be the subject of reports to the respective governing bodies of UNEP and WMO.

#### **Emphasis on Climate in Existing International Programmes**

25. Apart from specific technical cooperation activities, the Panel might ask the Executive Directors of UNEP and WMO to identify activities under other existing programmes that would contribute directly to the transfer of relevant information, technology and expertise to developing countries.

26. Examples of this include actions under WMO's World Climate Programme and World Weather Watch Programme, and under UNEP's Global Environmental Monitoring System (GEMS) and its GRID system.

27. A relevant example under WMO programmes is the development of the personal-computer-based-climate-data-base and analysis system known as CLICOM. This successfully uses affordable, maintainable technology to enhance the capacity of national meteorological services to handle and analyse climatological data.

28. Another example is the transmission of climatological summary data over the WMO Global Telecommunication System as part of the World Weather Watch. This system also presently carries analysis and computer model outputs of expected atmospheric behaviour over the next 1-10 days. The question needs to be addressed of the possibility of using this facility in the future to disseminate climate model outputs.

#### Emphasis on Climate in National Development Plans

29. The capacity of developing countries to address the climate change issue in the medium and long term will only increase if the countries themselves give this priority in development plans. It is important then that national planning agencies have available to them information and decision-making tools and accord climate change issues appropriate priority.

30. In this respect, emphasis should be placed on linkages between climate-related issues and other issues of vital interest to developing countries. Deforestation, for example, is not only a negative development from the point of view of local and global climatic change but also a serious form of destruction to many developing nations' economic and genetic resources. Assisting developing countries in enhancing their own capability for cost-benefit analysis of climate-related strategies, policies and programmes in the context of their own development objectives is vitally important.

31. In this respect, the Panel need not generate significant new material. Rather it would be valuable to draw attention to the concepts in documents such as the Report of the World Commission on Environment and Development, UNEP's perspective to the Year 2000 and beyond, and to the decisions of the UN itself in affording the climate change issue high priority.

#### Developing the Intellectual and Scientific Resources

32. Problems arising from climate change are global in nature. These problems demand concerted action by all countries based on a common understanding of the potential impacts of climate change and the measures to be taken to minimize adverse impacts. This common understanding will not emerge except under condition of free exchange of information and know-how and full participation in assessment and analysis by all countries. It is recognised that the developing countries lack the scientific resources to fully participate in the scientific assessment and policy analysis. Therefore, a massive and sustained flow of scientific and technological expertise towards the development of the intellectual resources of the developing countries is a necessary pre-requisite.

33. A critical issue for the medium to long-term capacity of developing countries to participate fully in international programs on climate change issues is the development of an indigenous intellectual and scientific base backed up by appropriate technologies.

34. Special emphasis needs to be placed on developing the capacity and infrastructure from within as far as possible using appropriate technology rather than the importation of technology and solutions that only increase dependence on aid from developed countries. This idea needs to be linked with the comments on development of centres such as ACMAD and WMO Regional Specialized Meteorological Centres and systems such as CLICOM and the GRID-GIS.

35. A specific example would be in the development of climate models for national application. It is realised that the development of the larger sophisticated models capable of studying the global situation must take place in major centres with powerful computing power and large teams of scientists and programmers. However, the development or at least local adaptation of smaller-scale national and regional models might well take place in developing countries with modest computing power and using local scientists perhaps led by a more experienced scientist from a developed country.

36. This aspect places special emphasis on the need for increased training. The panel is invited to request the executive Directors of UNEP and WMO to study this aspect in consultation with UNDP to identify existing and possible new opportunities for training and education activities for developing countries that will increase the pool of suitably qualified scientists. At the same time, they should consider how best to involve other agencies with responsibility for other topics such as agriculture, water resources, and economics so that training programmes in these areas might reflect the increased importance of climate change from the impacts and response aspects.

#### CONCLUSION

37. This paper identifies some options for actions to increase the involvement of developing countries in the work of the IPCC and, in the medium to long term, to enhance their capacity to deal with the climate change issue. The Panel is invited to discuss these options and decide on the specific steps to be taken.

A PROPOSAL FOR ASSISTING DEVELOPING COUNTRIES TO MORE EFFECTIVELY CONTRIBUTE TO AN IMPROVED UNDERSTANDING OF THE PHYSICAL BASIS OF GLOBAL CLIMATE CHANGE, ASSESSMENT OF THE SOCIO-ECONOMIC IMPACTS RESULTING FROM CLIMATE CHANGE, AND THE FORMULATION OF SUITABLE RESPONSE STRATEGIES.

### INTRODUCTION

1. At the first session of the Bureau of the Inter-Government Panel on Climate Change held in Geneva 6-7 February 1989, Saudi Arabia was invited to collaborate with Brazil, Senegal and Zimbabwe for the purpose of preparing a proposal as to how developing countries might be assisted and encouraged to participate more fully and more effectively in the work of the Panel and its Working Groups.
2. This proposal responds to the invitation of the Panel by suggesting a number of ways that might be considered to lift the participation of developing countries in the work of the Panel as well as making that participation as effective as possible; and, the proposal takes the opportunity to put forward some ideas that might be considered by UNEP and WHO for enhancing the capability of developing countries to make an ongoing contribution to considerations of climate change and its consequences.
3. In putting together the proposal, the Executive Directors of UNEP and WHO and the Chairman of the each of the IPCC Working Groups were invited to suggest how the objective of assisting the developing countries to participate more fully and effectively in the work of the IPCC, might be achieved. The proposal that is herein presented has taken into account suggestions put forward.

#### WHY ASSIST DEVELOPING COUNTRIES

4. The climate change being examined by the IPCC is global. It knows no national boundaries. It will impact on the developed and developing countries without discrimination. However its devastation may not be equally distributed. The poorer developing countries, in many cases, stand to lose much more than the relatively wealthy developed world. And yet the developing countries are contributing but a fraction to the causes of climate change compared with the developed world. They deserve to be assisted to have their say.

5. Because the climate change is global, and because strategies designed to limit or slow down the rate of change or ameliorate its worst impacts will require a global response, it is imperative that the developing as well as the developed countries participate effectively in any decisions regarding response strategies. Otherwise the commitment needed, to ensure that agreed strategies are pursued, may not be universal.

#### WHAT ASSISTANCE IS NEEDED

6. Participation by developing countries in the decision taking process concerning matters of climate change requires, in the first instance, assisting them to participate as members of the IPCC and its Working Groups. Participation by developing countries is constrained to some extent by a lack of funds and this impediment is obviously alleviated or eliminated through financial assistance.

7. However more than financial assistance is required if participation by developing countries is to be effective. The developing countries additionally need to be assisted to ensure that they are competent to address the issues of concern. To this end arrangements will need to be put in place that enable the developing countries to enhance their scientific appreciation of the physical basis for global climate change, to better comprehend the potential impacts of climate change, and to be adequately informed for assessing practical response strategies.
8. Such arrangements would need to proceed on two time-scales.
9. The first and immediate requirement is for a 'crash programme' to inform opinion leaders and scientists in the developing countries of the basis for concern regarding global climate change, its potential impacts, and the need to identify practical response strategies. This would need to get underway without delay and be completed well within the lifetime of the the IPCC. The objective here would be to assist the developing countries to quickly achieve a familiarity with the issues of concern so that they will be in a position to make an effective input to the final recommendations of the IPCC.
10. The second and more important requirement is to put in place arrangements that will ensure that developing countries maintain and develop their competence in the longer term to effectively consider issues relating to global climate change. Such arrangements, if they are to be successful, will require that the scientific knowledge base as well as the scientific infrastructure of the developing countries be upgraded. There will need to be a technology transfer from the developed to the developing countries.

11. Each of the above types of assistance, namely:

- . facilitating membership of the IPCC and its Working Groups
- . a 'crash programme' of information sharing and
- . technology transfer

are discussed subsequently.

Facilitating Membership of the IPCC and its Working Groups

12. A simple and essential measure for ensuring as full a participation as possible by developing countries in the work of the IPCC and its Working Groups is to provide financial support for attendance of representatives from developing countries at meetings of the Panel and its Working Groups, and for involvement in other IPCC activities.

13. This is already being accommodated to some extent through the allocation of funds from the IPCC Trust Fund. Some contributing countries have allocated specific additional amounts expressly for this purpose.

14. Further donations from IPCC Member States, as well as contributions from all UNEP and WHO members, should be encouraged. A regular report on the status of contributions to the Fund should be made.

15. UNEP and WHO might also examine the possibility of increasing their regular budget support to the IPCC to enable Trust fund monies to be used exclusively for the support of developing countries.

16. Because the work of the IPCC requires the involvement of disciplines beyond the scope usually involved in UNEP and WHO work, especially in relation to Working Group 111 (Response Strategies Working Group), the Working Groups, with the support of the UNEP and WHO Secretariats, should seek to identify possible funding sources beyond those traditionally associated with the work of UNEP and WHO.
17. In response to a request from the IPCC Bureau in February 1989, other funding sources including UNDP, the World Bank, the Islamic Development Bank and other multilateral financial institutions are being explored by the Executive Heads of UNEP and WHO.
18. It is suggested that UNEP and WHO also explore the possibility of support from private foundations and research oriented companies.
19. As well as seeking more support through increased donations to the Trust Fund, efforts should be made to give priority to support of IPCC activities in existing technical cooperation programmes. The use of a portion of funds available for short-term fellowships under UNDP and agency regular budget sources is recommended.
20. And there may be ways that the developing countries can help themselves. For instance, if they have a National Airline, they might consider convening IPCC Working Groups/Sub Groups in their countries and arrange with their National Airline to meet, wholly or in part, the travel costs of invited experts from developing countries. Otherwise they might be able to meet the subsistence expenses of such experts.

A 'Crash Programme' of Information Sharing

21. A 'crash programme' of information sharing would go hand-in-hand with arrangements for supporting attendance of representatives of developing countries at meetings of the IPCC and its Working Groups. It would assist the representatives to make a more effective contribution to the IPCC and at the same time raise the awareness of a wider group of opinion leaders in the developing countries of the urgent need to address global climate change and its potential consequences. Such a programme would be funded principally from the same sources suggested in paras 12-20 above. It would need to be completed well before the final recommendations of the IPCC were to be brought down.

22. A first step in implementing such a programme would be the identification of relevant experts in the developing countries who would be invited to participate in an information sharing programme. Although this action is specifically for promoting a more effective contribution to the work of the IPCC and its Working Groups, it could have a lasting benefit in that it could be the catalyst for creating networks of climate experts (multidisciplinary not only climate) who would be a national focus for climate change and related issues beyond the life-time of the IPCC.

23. Taken further, such networks might provide a basis for the formation of National Climate Committees in developing countries. If the IPCC sees this as a desirable end it might consider providing some guidance on the setting-up, terms of reference and working arrangements for such committees, by drawing upon the experience of existing National Committees in the developed countries.

24. Having identified the experts in developing countries who would be invited to participate in an information sharing programme, the next step would be to put the programme into effect.

25. Bearing in mind that the time for completing such a programme is extremely short (not more than 12 months), the only practical way forward would be to arrange a series of seminars/conferences on climate change in the developing countries. These could be followed up and reinforced with literature and audio/video cassette material specially prepared for this purpose.

26. Roving seminars held on a regional basis have proved to be a cost effective method of reaching a wide audience and stimulating national action in developing countries in the past. It is suggested that at least one series of roving seminars be held during the next 12 months on a regional basis for assisting nominated climate experts in the developing countries to achieve an improved understanding of global climate change and related issues.

#### Technology Transfer

27. Actions to facilitate developing countries participate effectively in the IPCC and its Working Groups are a first step that must be taken by UNEP, WHO and the developed countries if the response strategies and recommendations that the IPCC will eventually present are to have a reasonable chance of being universally supported.

28. As stated in para 9, a second and more important requirement is to put in place arrangements that will ensure that developing countries, after having achieved a heightened awareness of climate change and related issues, are able to maintain and develop their competence in the longer term to effectively contribute to an inevitable on-going consideration and review of climate change, its perceived impacts and favoured response strategies. These arrangements will inevitably involve technology transfer. Both the scientific knowledge base as well as the scientific infrastructure of the developing countries will need to be enhanced. And the time-scale of this action is well beyond the life of the IPCC - maybe 5-10 years or more.

29. How might such an objective be pursued? There are several approaches that suggest themselves as warranting further exploration. Taken together they might constitute an effective way to proceed.

30. The first is for the developed countries to assist scientists in the developing countries create climate models for national and/or regional applications. In doing this though, emphasis needs to be placed on using support technologies appropriate to the developing countries, rather than simply importing technology and solutions that only increase dependence on aid from developed countries. As a start it should not be difficult to set-up a one dimensional radiation transfer model or a one-dimensional chemical kinetics-transport model to run on an IBM PS/2 Personal Computer, nor should it be difficult to promote acquaintance and use of, for example, gas chromatography techniques to observe trace substances. Current programmes in WHO such as CLICOM and INFOCLIMA can be exploited for the purpose as well as the current and planned efforts within the WHO Technical Cooperation Programme.

31. The second is to include provision for climate change research in plans for new Regional Centres or the upgrade of existing facilities in developing countries. The African Centre for Meteorology and Development (ACMAD) is an example where it should be possible to incorporate a small climate research and service group as part of the operations of the centre. In a similar way, plans to establish or upgrade existing Regional Specialised Meteorological Centres might, with small modification, include specific provision for climate research. This might be assisted through bilateral/multilateral arrangements governing technical cooperation among developing countries.
32. It is recommended that this matter be taken up by UNEP and WHO with the UNDP and that it be the subject of reports to the respective governing bodies of UNEP and WHO.
33. The third approach is for UNEP and WHO to identify activities under their existing programmes that would contribute directly or indirectly to the transfer of relevant information, technology and expertise to developing countries. WHO's World Climate Programme and World Weather Watch Programme, and UNEP's Global Environmental Monitoring System are possible vehicles that might be used for this purpose. WHO's Global Telecommunication System might also be employed to distribute climate model outputs for different climate change scenarios.
34. A fourth approach is for UNEP and WHO to consult with UNDP to identify all existing and new opportunities for training and education activities for developing countries that will increase the pool of suitably qualified scientists. At the same time they should consider how best to involve other agencies with responsibility for other topics such as agriculture, water resources and economics so that training programmes in these areas might reflect the increased importance of climate change from the impacts and response aspects.

35. Finally it must be said that the capacity of developing countries to address the climate change issue in the medium and long term will only increase if the developing countries themselves give climate change and related issues a priority consideration in their plans for the future. With this in mind, it is important that National Planning Agencies have available to them information that will enable them to take climate change into consideration when drawing up new plans. In this respect the network of climate experts and/or the National Climate Committees referred to in paragraphs 22 and 23 above might be crucial to ensuring that information on climate change and its consequences is brought to the attention of the appropriate authorities. And, it is highly desirable that the level of representation from developing countries on the IPCC and its Working Groups, especially Working Group III (Response Strategies Working Group), be more at the policy or decision making level than is the case at present for some developing countries. High level representation will make it easier to implement any programmes developed specifically for the developing countries.

RECOMMENDATION

36. It is recommended that the IPCC note the Proposal and request the Executive Directors of UNEP and WHO to seek additional IPCC Trust Fund support either in cash or in kind from the following sources:

- . IPCC Member States,
- . UNEP and WHO regular budgets,
- . Private foundations and research oriented companies,
- . Other United Nations' agencies,
- . The World Bank, The Islamic Development Bank, UNDP and other like institutions,
- . Existing technical cooperation programmes of UNEP and WHO,
- . National Airlines,

for, in the short term,

- . facilitating developing countries a higher representation of the IPCC and its Working Groups; and,
- . implementing a 'crash programme' of information sharing by way of roving seminars on a regional basis and the preparation and distribution of appropriate literature and audio/video cassette material to heighten the appreciation of global change and related issues amongst opinion leaders and scientists in the developing world;

and, in the longer term, putting arrangements in place that will maintain and develop the competence of developing countries to contribute effectively to an on-going consideration and review of climate change, its perceived impacts and favoured response strategies.

PRELIMINARY BUDGET ESTIMATE FOR THE SUPPORT OF THE PARTICIPATION  
OF THE DEVELOPING COUNTRIES IN THE ACTIVITIES OF IPCC

(Submitted by Dr. M.K. Tolba and Prof. G.O.P. Obasi)

1. It may be recalled that the IPCC Bureau in its first session had, in the strongest terms, urged the promotion of the participation of experts from the developing world in all IPCC activities. The various working groups and their subgroups had made similar recommendations. The view is that this is necessary for the mutual benefit of the developing as well as the developed countries.

2. Countries

- (a) that could be seriously affected by the global warming and consequent sea level rise,
- (b) where national actions can have major impact on carbon dioxide emissions and uptake,
- (c) with special expertise and
- (d) that are centres of major relevant regional projects with participation from more than one nation

are initial natural candidates in our ensuring the full participation of the developing world in IPCC activities.

3. A sample listing of such countries could include island nations vulnerable to sea level rise, nations prone to increased dryness, nations with possible enhanced frequency of severe weather, nations in the tropical belt, nations that have developed scientific manpower, and nations where, for example, such centres as the Regional Meteorological Training Centres of WMO are located.

4. Some 20 or so nations can readily be identified from such a listing in a first step. It should be feasible to further identify an average of five experts per nation in different IPCC-related disciplines.

5. The task of Working Group I is divided into 11 sections and that of Working Groups II and III has been assigned to six and four subgroups respectively, together with the two Steering Committees leading to about 20 working parties among the three working groups.

6. Assuming that each expert from the list of nations is able to attend an average of three meetings related to IPCC (2 subgroup meetings + a meeting of a working group, for example), some 300 trips would need to be financed to ensure adequate, initial participation of the developing countries. Costing each trip at an average of \$3,500, about \$1,000,000 would be needed between now and the preparation of the draft first report of IPCC.

7. The two sponsor organizations would, between them, be able to contribute \$100,000 towards this cost.

## CONTRIBUTIONS TO THE JOINT WMO/UNEP IPCC TRUST FUND

1. Table I is a listing of all contributions, remitted and pledged for 1989. They are shown in both their original currency and amount and in equivalent Swiss Francs credited to the Fund.
2. Table II is a listing of all pledges for 1990.
3. Table III lists those contributions that are exclusively for the support of the participation of the developing countries in IPCC activities for both 1989 and 1990, excerpted from tables I and II. It should be noted that some of the unearmarked contributions in tables I and II is also used for the support of the developing countries (unless the contribution is expressly meant for other purposes).
4. It may be noted that several delegations, which are not yet in a position to commit a contribution to the Fund, have expressed their willingness to consider favorably specific allotments for travel assistance to invited participants from the developing countries.
5. It may be noted further that many Members and organizations directly provide an impressive amount of help in kind (including such activities as hosting the meetings of IPCC Working Groups and their subgroups, and supporting the travel of experts). In addition, several Members are providing assistance through bilateral and regional arrangements.
6. The annual cash contributions of WMO and UNEP each of SF 125,000 are not reflected in the tables.

TABLE I

1989

MEMBER	CONTRIBUTION		Sfr eq.	REMITTED
	or. cur	or. amount		
Japan	\$	50,000	75,500	yes
Denmark	\$	5,000	7,550	yes
Finland	\$	5,000	7,950	yes
Canada	Can\$	11,000	14,519	yes(1)
	Can\$	5,000		
Saudi Arabia	\$	10,000	16,500	yes
UK	£	10,000 25,000	27,193	yes(2)
Norway	\$	15,000	25,050	yes
USA	\$	10,000	16,700	yes(3)
	\$	50,000	83,500	yes
France	FF	100,000	25,303	yes
Switzerland	SF	10,000	10,000	(4)
	\$	5,000		
Netherlands	\$	25,000		
FRG	DM	50,000		
Australia	Aus\$	10,000	12,677	yes

1. Out of the Canadian contribution, Can\$ 5,000 is for the support of the participation of a representative from the Caribbean region.

2. The contribution of 25,000 from UK is for the support of the participation of selected developing countries in IPCC activities. This amount will be spread over 1989 as well as 1990.

3. The contribution of \$ 10,000 from USA is for the support of the participation of the developing countries in the activities of IPCC Working Group III.

The other contribution of \$ 50,000 is for IPCC Secretariat support.

\$60,000 to  
help NDC's

4. The contribution of \$ 5,000 from Switzerland is for the support of the participation of the developing countries in IPCC activities.

TABLE II

1990

MEMBER	CONTRIBUTION	
	currency	amount
China	\$	10,000(1)
Japan	\$	50,000
Canada	Cans	22,400
Italy	\$	50,000
Finland	\$	10,000
FRG	DM	160,000(2)
USA	\$	50,000
	\$	100,000(3)
WWF	\$	8,000(4)
Norway	\$	100,000(5)

1. Acknowledging the gravity of the consequences of the predicted warming as a common problem for all humanity, and in a fine gesture of co-operation between the developing and the developed worlds, China pledged \$ 10,000 to assist the participation of colleagues from other developing countries.

2. DM 160,000 from the Federal Republic of Germany is its combined contribution for IPCC activities and the Second World Climate Conference.

3. The contribution of \$ 100,000 from the USA is for the support of the participation of the developing countries in IPCC activities.

4. The contribution of \$ 8,000 from the World Wildlife Fund International is for organizing "crash seminars" related to climate change in developing countries.

5. Norway is willing to make available upto \$ 100,000 for "crash seminars" related to climate change in developing countries.

TABLE III

-----  
 SPECIFIC CONTRIBUTIONS FOR SUPPORTING THE PARTICIPATION  
 OF THE DEVELOPING COUNTRIES  
 -----

MEMBER	CONTRIBUTION	YEAR
Canada	Can\$ 5,000	1989
USA	\$ 10,000	1989
Switze- rland	\$ 5,000	1989
UK	£ 25,000	1989-90
China	\$ 10,000	1990
USA	\$ 100,000	1990
WWF	\$ 8,000	1990(1)
Norway	\$ 100,000	1989-90(2)

-----  
 For explanations of footnotes 1 and 2, see table II.

tied  
 for  
 1st



World Meteorological Organization  
Organisation météorologique mondiale

Case postale n° 5  
1211 - GENEVA 20  
SWITZERLAND

United Nations  
Environment Programme  
Programme des Nations Unies  
pour l'Environnement  
P.O.Box 30552 - Nairobi, Kenya



---

INTERGOVERNMENTAL PANEL  
ON CLIMATE CHANGE  
BUREAU, FIRST SESSION

GENEVA, 6-7 FEBRUARY 1989

Distr.: Restricted

IPCC/B-1/Doc. 3  
(16.I.1989)  
ITEM 6  
ENGLISH ONLY

IPCC BUDGET AND OTHER SUPPORT

(Submitted by Secretary, IPCC)

---

IPCC Bureau is invited to comment on this  
document, especially with respect to meeting  
the shortfall in the 1989 estimate.

---

1. IPCC Secretariat is responsible for developing budget proposals for consideration by the executive heads of WMO and UNEP, who will approve, control, and exercise other oversight functions on the expenditures. The Secretariat can commit funds up to the approved amounts and has the responsibility of drawing the attention of the Executive Heads to potential problems.

2. The budget estimates presented in this document are in Swiss francs.

1989 Budget estimate

3. The summary of the 1989 costs of the sessions of IPCC and its Bureau and working groups, together with the assumptions made in arriving at them, are:

(a) IPCC second session	SFR 89 000
- 3-day meeting (28-30 June 1989).	
- Simultaneous interpretation in English, French Russian and Spanish	
- Documentation prepared during session in English only, with subsequent translation into French, Russian and Spanish	
- Support for participants from Nigeria, Brazil, Senegal, China, Malta, Zimbabwe, Tanzania, Algeria, India, Mexico, Indonesia	
- 2 IPCC Secretariat staff attending	
(b) IPCC Bureau sessions	SFR 64 000
- Two 2-day sessions, one in February and another in late 1989, both in Geneva	
- Simultaneous interpretation in English, French and Russian	
- Documentation prepared during sessions in English only, with subsequent translation into French, Russian and Spanish	
- Support to one participant each from Nigeria, Brazil, Senegal, China, Malta, Zimbabwe	
(c) Working group sessions	SFR 180 000
- two rounds of sessions, one in January-February and another in October-November 1989	
- working language English	
- support to one participant from each of the five LDC-Core Members of each of the WGs	
- 1 IPCC Secretariat staff attending each session	
<b>SUBTOTAL</b>	<b>SFR 333 000</b>

It may be noted that, in the above considerations, travel support for the attendance of invited experts at the working group and/or the panel sessions is not included.

## 4. The IPCC Secretariat costs are:

- IPCC Secretary	SFR 188 000
- Programme Officer	145 000
- Administrative Assistant and part-time typist/clerk	144 000
- Overhead at 12.5% of personnel costs	60 000
- Unspecified travel for Secretariat staff (4 trips) for co-ordination purposes	10 000
<b>SUBTOTAL</b>	<b>SFR 547 000</b>

5. Thus the total estimated needs are SFR 880 000 for 1989. Further details are given in Annex 1.

WMO/UNEP IPCC Trust Fund

6. It may be recalled that, during the first session of IPCC, several Members pledged financial contributions to the Trust Fund. The pledges were as follows:

Denmark	US \$5 000
Finland	US \$5 000
Japan	US \$50 000
USA	US \$50 000
UK	£10 000

Since then, Canada has promised Can \$11 000 (this to be per annum until 1991) and Switzerland SFR 5 000.

Of these amounts, Japan has already remitted US \$50 000 to the WMO Secretariat through its Voluntary Co-operation Programme agreement.

7. A WMO/UNEP IPCC Trust Fund has been established at the WMO Secretariat and will be administered by WMO.

8. Letters have been sent out jointly by the Executive Director of UNEP and the Secretary-General of WMO requesting contributions to the Trust Fund from Australia, FRG, France, GDR, Israel, Italy, Netherlands, New Zealand, Norway, Saudi Arabia, Sweden and the USSR.

WMO support

9. The person-year cost of the IPCC Secretary is borne by WMO.

UNEP support

10. The person-year cost of the Programme Officer is borne by UNEP.

Status of 1989 budget

11. Of the 1989 budget estimate of SFR 880 000, the WMO/UNEP support amounts to SFR 333 000. The Trust Fund pledges and remittances amount to approximately SFR 205 000. There is then, a shortfall of SFR 342 000. Both WMO and UNEP have been approached for further contributions of SFR 125 000 each.

1990 budget

12. The budget to cover IPCC activities in 1990 is estimated at the same level as that for 1989.

IPCC Secretariat staff

13. IPCC Secretariat, at present, consists of (a) IPCC Secretary, (b) Programme Officer and (c) a temporary full-time secretarial assistant.

Annex 1

INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE (IPCC)

Proposed budget for 1989

SECTION A: INSTITUTIONAL SUPPORT

1.	SESSIONS OF WORKING GROUPS	SFR
1.1	<u>Working Group I, UK, 24-26 January 1989</u>	
1.1.1	Interpretation	-
1.1.2	Translation of report (F, R, S) (15 pages)	2 500
1.1.3	Reproduction of reports (15 pages) - 300 copies	500
1.1.4	Travel of Secretariat staff (1 officer)	2 150
1.1.5	Support to developing countries, (Brazil, Senegal, China, Tanzania, Kenya)	23 310
1.2	<u>Working Group I, UK, ca. October 1989</u>	
1.2.1	Interpretation	-
1.2.2	Translation of report (F, R, S) (30 pages)	5 100
1.2.3	Reproduction of report (30 pages) - 300 copies	500
1.2.4	Travel of Secretariat staff (1 officer)	2 150
1.2.5	Support to developing countries (Brazil, Senegal, China, Tanzania, Kenya)	23 310
1.3	<u>Working Group II, Geneva, 1-2 February 1989</u>	
1.3.1	Interpretation (Russian/English) (25 people)	1 000
1.3.2	Translation of report (F, R, S) (20 pages)	3 400
1.3.3	Reproduction of report (20 pages) - 300 copies	500
1.3.4	Travel of Secretariat staff	-
1.3.5	Support to developing countries (Algeria, India, Mexico, Nigeria, Indonesia)	14 670
1.4	<u>Working Group II, USSR, ca. October 1989</u>	
1.4.1	Interpretation (R/E)	-
1.4.2	Translation of report (E, F, S) (40 pages)	6 800
1.4.3	Reproduction of report (40 pages) - 300 copies	600
1.4.4	Travel of Secretariat staff (1 officer, 1 administrative assistant)	5 760
1.4.5	Support to developing countries (Algeria, India, Mexico, Nigeria, Indonesia)	20 220
1.5	<u>Working Group III, Washington DC, 30-31 January 1989</u>	
1.5.1	Interpretation	-
1.5.2	Translation of report (F, R, S) (15 pages)	2 500
1.5.3	Reproduction of report (15 pages) - 300 copies	500
1.5.4	Travel of Secretariat staff (1 officer)	4 250
1.5.5	Support to developing countries (China, Malta, Zimbabwe, Brazil, India)	25 000

<b>1.6</b>	<b><u>Working Group III, USA, ca. October 1989</u></b>	<b>SFR</b>
1.6.1	Interpretation	-
1.6.2	Translation of report (F, R, S) (30 pages)	5 100
1.6.3	Reproduction of report (30 pages) - 300 copies	500
1.6.4	Travel of Secretariat staff (1 officer)	4 250
1.6.5	Support to developing countries (see 1.5.5)	25 000
<b>2.</b>	<b>MEETINGS OF THE BUREAU</b>	
<b>2.1.</b>	<b><u>First session of the Bureau, 6-7 February 1989, Geneva</u></b>	
2.1.1	Interpretation (E, F, R) (30 people)	1 500
2.1.2	Translation of report (F, R, S) (40 pages)	6 800
2.1.3	Reproduction of report (40 pages) - 300 copies	600
2.1.4	Secretariat travel	-
2.1.5	Support to developing countries (Brazil, China, Malta, Nigeria, Senegal, Zimbabwe)	23 000
2.1.6	Hospitality	300
<b>2.2.</b>	<b><u>Second session of the Bureau, Geneva, ca. November 1989</u></b>	
2.2.1	Interpretation (E, F, R) (30 people)	1 500
2.2.2	Translation of report (40 pages)	6 800
2.2.3	Reproduction of report (40 pages) - 300 copies	600
2.2.4	Secretariat travel	-
2.2.5	Support to developing countries (See 2.1.5)	23 000
2.2.6	Hospitality	300
<b>3.</b>	<b>SESSIONS OF THE PANEL</b>	
<b>3.1.</b>	<b><u>Second session of the panel, Nairobi, 28-30 June 1989</u></b>	
3.1.1	Interpretation (E, F, R, S) (150 people)	25 000 *
3.1.2	Translation of report (50 pages)	8 500
3.1.3	Reproduction of report (50 pages) - 300 copies	700
3.1.4	Travel of Secretariat staff (2 officers)	9 480
3.1.5	Support to developing countries (Brazil, China, Nigeria, Senegal, Malta, Zimbabwe, Tanzania, Kenya **, Algeria, India, Mexico, Indonesia)	45 000
3.1.6	Hospitality (approx. 150 people)	500

\* Includes DSA and travel for interpreters from Geneva to Nairobi

\*\* Not included in costing.

**SECTION B: PERSONNEL**

	SFR
1. IPCC Secretary * (P.5)	188 000
2. Programme Officer ** (P.4)	145 200
3. Administrative assistant (G.6)	108 000
4. Typist (half-time)	36 000

\* will be paid by WMO

\*\* Will be paid by UNEP

**SECTION C: OVERHEAD COSTS**

Telephone, telexes, telefax, postage, etc. (12.5% of personnel cost)	60 000
-------------------------------------------------------------------------	--------

**SUMMARY (Swiss francs)**

	Interpretation	Translation	Reproduction	Travel (Sec)	Support (OC)	Hospitality	TOTAL
A. WG 1 (1)	-	2 500	500	2 150	23 310	-	28 460
WG 1 (2)	-	5 100	500	2 150	23 310	-	31 060
WG 2 (1)	1 000	3 400	500	-	14 670	-	19 570
WG 2 (2)	-	6 800	600	5 760	20 220	-	33 380
WG 3 (1)	-	2 500	500	4 250	25 000	-	32 250
WG 3 (2)	-	5 100	500	4 250	25 000	-	34 850
BUREAU (1)	1 500	6 800	600	-	23 000	300	32 200
BUREAU (2)	1 500	6 800	600	-	23 000	300	32 200
IPCC (2)	25 000	8 500	700	9 480	45 000	500	89 180
<b>TOTAL</b>	<b>29 000</b>	<b>47 500</b>	<b>5 000</b>	<b>28 040</b>	<b>222 510</b>	<b>1 100</b>	<b>333 150</b>
(Per cent)	(9)	(14)	(2)	(8)	(67)	-	(100)
<b>B. TOTAL PERSONNEL</b>							<b>477 200</b>
<b>C. OVERHEAD COSTS (12% of total personnel costs)</b>							<b>60 000</b>
<b>D. UNSPECIFIED TRAVEL (Secr. staff)</b>					<b>10 000</b>		<b>10 000</b>

LIST OF IPCC MEETINGS

<u>Date</u>	<u>Venue</u>	<u>Meeting/activity</u>	<u>Organization</u>
<u>AUGUST</u>			
8	Toronto	Ecosystems subgroups	IPCC WGI/WGII
<u>SEPTEMBER</u>			
11-15	Berne	Workshop: Greenhouse Gases Subgroup	IPCC WGI
18-20 (postponed to 26-27 Oct. 1989)	Geneva	Hydrology and Water Resources Subgroup	IPCC WGII
18-20	Toronto	Meeting of Subgroup on Cryosphere and Permafrost	IPCC WGII
18-21	Tokyo Japan	Subgroup on Energy, Industry, Transportation, Health and Humann Settlements	IPCC WGII
21-22 (postponed)	Paris	Agriculture and Forestry Subgroup	IPCC WGII/OECD*
25-26	Pangbourne, UK	Workshop: Sea level rise Subgroup	IPCC WGI/Univ. of East Anglia
28-29	Paris	IPCC Special Committee on Developing Countries	Govt. of France/ IPCC
28-29	Geneva	Energy and Industry Subgroup	IPCC WGIII
-	Washington	Agricultural Data and Practices: Subgroup on Agriculture and Forestry (AFOS)**	IPCC WGIII
-	Helsinki	Workshop on Boreal Forests: (AFOS)	IPCC WGIII
<u>OCTOBER</u>			
2-6	Geneva	Second session	IPCC WGIII
2-6	Moscow	Climate Change and World Fisheries: Subgroup on World Oceans and Cryosphere	IPCC WGII

\* OECD - Organization for Economic Co-operation & Development

\*\* AFOS - Agriculture and Forestry Subgroup of WG III  
(WCP-478)

18-20	Boston	Workshop: Greenhouse gases (non-CO <sub>2</sub> )	IPCC WGI
30-31	Bonn	Workshop on Temperate Forests (AFOS)	IPCC WGIII
30-1 Nov.	Geneva	Resource Use & Management Subgroup	IPCC WGIII
31-3 Nov.	Geneva	Second session	IPCC WGII
<u>NOVEMBER</u>			
2-3	Geneva	Agriculture & Forestry Subgroup	IPCC WGIII
23-24	Egham, UK	Paleo-analogue Climate Forecasting	IPCC WGI/WGII
27-1 Dec.	Miami	Coastal Zone Management Subgroup	IPCC WGIII
29-1 Dec.	Bracknell, UK	Climate Trends Subgroup	IPCC WGI
<u>DECEMBER</u>			
11-15	Brisbane	Subgroup on Model Predictions and Validation	IPCC WGI
<u>SECTION B: 1990</u>			
<u>JANUARY</u>			
-	Reading, UK	Workshop: Climate Forcing Agencies	IPCC WGI
-	San Diego, USA	Workshop: Comparison Transient Simulations	IPCC WGI
-	Brazil	Workshop: Tropical Forests, WGIII (AFOS)	Govts. of USA/ Brazil/IPCC WGIII
<u>FEBRUARY</u>			
5-7	Washington	IPCC third session	Govt. of USA/IPCC
7-8	Washington	IPCC Bureau second session	Govt. of USA/IPCC
26-2 Mar.	UK ?	Meeting Lead Authors	IPCC WG I
- (WCP-478)	Australia	Coastal Zone Management Subgroup	IPCC WGIII

		<u>MAY</u>	
IPCC WGIII	Third session, approval or report of WG	TBD	8-10 (tentative)
IPCC WGI	Second session, approval of report of WG	UK	23-25
		<u>JUNE</u>	
IPCC WGII	Third session, approval of report of WG	Moscow	-
		<u>AUGUST</u>	
Govt. Sweden/IPCC	IPCC fourth session, approval of first assessment report	Stockholm	-

## REFERENCES

1. UNEP Decision 15/36 of the 15th session of the UNEP Governing Council (Nairobi, May 1989).
2. WMO Resolution 4(EC-XLI) of the 41st session of the WMO Executive Council (Geneva, June 1989).
3. IPCC, Report of the first session of the IPCC Bureau, IPCC-2, WMO TD-No. 294, WMO, Geneva, 1989.
4. IPCC, Report of the second session of the Steering Committee of IPCC Working Group III/Response Strategies Working Group, Geneva, 10-12 May 1989.
5. IPCC, Report of the first session of IPCC, Geneva, 9-11 November 1988, IPCC-1, WMO TD-No. 267, WMO, Geneva, 1989.

## BUSH PROPOSING TALKS IN U.S. ON GLOBAL WARMING

In a policy shift, President Bush has proposed that the U.S. sponsor an international conference in Washington next fall to begin negotiating a treaty on global warming.

Until now, White House officials have resisted a specific commitment to begin such negotiations, choosing instead to play down the urgency of the global warming issue. In recent months, however, Bush has faced pressure from members of Congress, Administration officials and several European nations to take stronger action.

The President made the treaty proposal at the Malta summit conference with the Soviet president. The U.S. and the Soviet Union lead in emissions of carbon dioxide, which scientists say is accumulating in the atmosphere and contributing to global warming.

(Allan Gold, New York Times, A15)

# CRS Issue Brief

Major Tracking Issue

## Global Climate Change

Updated March 2, 1989

by  
Robert E. Morrison, Coordinator  
Science Policy Research Division



Congressional Research Service • The Library of Congress

## Global Climate Change

### SUMMARY

There is growing concern that human activities could be adversely affecting the energy-exchange balance between the Earth, the atmosphere, and space, inducing global climate changes with far-reaching effects. Human activities, particularly the burning of fossil fuels, have increased atmospheric carbon dioxide (CO<sub>2</sub>) and other trace gases, including chlorofluorocarbons (CFCs), methane, and nitrous oxide. If these gases continue to accumulate in the atmosphere at current rates, global warming could occur through intensification of the "greenhouse effect," a process which moderates the Earth's climate, making it habitable and supportive of life. Such warming could affect agriculture, forestry, and water resources, and could lead to rising sea levels and inundation of vulnerable coastal regions. Although causal relationships between such longer term trends and recent severe-weather events have not been established, such conditions have focused public attention on potential climate change and on the need for better understanding of global and regional climate and improved climate prediction models. The basic issues are whether the global warming threat is real and, if so, what policy responses are appropriate.

Fossil-fuel combustion is the primary source of CO<sub>2</sub> emissions, and it also emits other "greenhouse" gases. Removing these gases after combustion imposes severe technical difficulties and economic penalties. Policy options to curb emissions stress energy efficiency and conservation and the substitution of nuclear energy, renewable energy, and less CO<sub>2</sub>-intensive fossil fuels, like natural gas, for coal and oil.

Global warming would probably have significant effects on agriculture and forestry. Regional agricultural practices could change, yield stabilities might decrease in some regions, and survival over winter of some insect pests might increase. Forest productivity might decline in some regions, and changes in climate, when added to other stresses which forests are undergoing, could produce major regional disturbances. Some changes, e.g., in northernmost growing regions, might be beneficial, however.

Congress has sought to acquire information about possible climate change, to evaluate potential economic and strategic impacts of a warmer climate, and to formulate appropriate policy responses. Because of the global implications of this problem, some Members and committees of Congress have also attempted to elevate concern internationally through direct communication with world leaders, participation in international conferences, passage of congressional resolutions, and exchange of views and information with international organizations within and outside the United Nations system. It is in this milieu that scientists, diplomats, and policymakers are combining efforts to achieve consensus on an eventual agreement to limit or modify expected global warming.

## ISSUE DEFINITION

The emission of carbon dioxide (CO<sub>2</sub>) and other gases from burning of fossil fuels and other human activities and their buildup in the atmosphere are likely enhancing the process by which the atmosphere is able to trap infrared radiation emitted by the earth, warming the Earth's surface in a process analogous to that which occurs in a greenhouse. If such warming is occurring or is soon to occur, resultant climate changes eventually could bring about serious consequences for human activities and resources, in areas such as energy use, coastal land use, agriculture, forestry, and water supplies, and could also produce population shifts.

The basic issues are whether the threat of global warming is real and, given uncertainties about the degree and the timing of that threat, what are the appropriate policy responses.

## BACKGROUND AND ANALYSIS

### **Greenhouse Effect and Global Warming**

Man's burning of fossil fuels, coupled with his destruction of vast forests, has led to an increase over the past century in CO<sub>2</sub> concentration in the atmosphere that is approaching the level contributed by natural processes. This increase in CO<sub>2</sub> could soon be great enough to affect the Earth's temperature regulation processes, with a net global temperature increase along with changes in precipitation and soil moisture. Regionally, there would be a complicated pattern of increases in temperature and changes in precipitation which would generally tend to affect adversely most countries in low to mid latitudes but could benefit higher latitude areas.

#### **What is the "Greenhouse Effect"?**

Essential to the habitability of the Earth, moderating its temperature and sustaining life, is its enveloping blanket of air, a mixture of major and minor component gases. The mechanism by which the atmosphere controls the Earth's temperature depends on the fact that some of the minor atmospheric constituent gases, including those of natural origin and some produced by human activities, are relatively transparent to incoming short-wavelength sunlight, but are opaque to longer wavelength infrared radiation arising from the Earth's surface and from the lower atmosphere. This mechanism has been termed the "greenhouse effect," since it is similar to the optical processes which occur in a greenhouse, where on a micro-scale the glass envelope acts like a compressed atmosphere, passing and absorbing radiation of different wavelengths, with the equilibrium temperature inside the greenhouse rising to a level above that of the surroundings.

Sunlight not reflected by clouds or absorbed by the atmosphere passes through the relatively transparent atmosphere and impinges on the Earth's surface -- oceans, land, and snow- and ice-covered areas, where much of it is absorbed and some is reflected back to space. The absorbed energy warms the surface of the Earth, which

acts as a radiator, re-emitting energy upward into the atmosphere. This re-radiated energy is infrared thermal radiation, of longer wavelength than the visible light radiated by the hotter sun, which is more readily transmitted by the atmosphere. Most of this infrared radiation is absorbed by the clouds and by the infrared-absorbing trace gases of the atmosphere, warming the atmosphere, particularly the lower portion, called the troposphere. This region, in turn, radiates long-wavelength energy back to the earth, to higher levels of the atmosphere, and ultimately to space. The resultant effect of all the interacting and somewhat complicated processes of absorption and re-radiation of energy at the surface of the earth and at the various levels in the atmosphere is the establishment of equilibrium temperatures at the Earth's surface and in the lower atmosphere which are greater than those which the Earth would otherwise experience if there were no intervening atmosphere to trap and re-radiate the long-wavelength radiation.

While these processes occur over the entire Earth, there are local variations in their rates and magnitudes and in the resultant surface temperatures, depending on the latitude, season, and distribution of continents and oceans. Averaged over the globe, however, incoming solar radiation and outgoing long-wavelength infrared radiation from the Earth-atmosphere system are in balance, and local surface temperatures are maintained at relatively comfortable levels for sustaining life. The average ocean and land surface temperatures are about 63° F and 57° F (17.5° C and 14° C), respectively; without atmospheric "greenhouse gases," the Earth's surface temperature might be as low as -4° F (-20° C), the average temperature at the top of the cloud layer.

### **What is the Public Concern?**

Many are concerned that increased atmospheric concentrations of carbon dioxide and other "greenhouse gases," given no other mitigating effects, will lead to more efficient absorption of infrared radiation by the atmosphere, producing global warming and accompanying effects. Estimates of global warming by the middle of the 21st century vary between 3° and 16° F (2° and 9° C). If such a temperature rise were to occur, substantive changes might be seen on the Earth's surface. For example, longer more productive growing seasons would be likely in countries such as Canada and the Soviet Union as a result of increased surface temperatures and soil moisture. Agriculture and forestry in most other parts of the world might suffer adversely from higher temperatures, with accompanying decreases in rainfall and soil moisture. Sea levels could rise, at an average worldwide rate of 2 inches per decade, with inundation of low-lying cities and highways, agricultural regions, and coastal properties, and the shift of large populations away from some coastal areas. Water supplies, which depend on the quantity and timing of local and regional precipitation, could be adversely affected in some areas of the world, including the western United States.

Recent meteorological events in the United States have served to focus attention on enhanced greenhouse warming and the possibility that human activities could now threaten the future ability of the atmosphere to sustain natural balances. Four of the hottest years recorded in the past 100 years occurred in the 1980s, and the first 5 months of 1988 were the hottest yet recorded in the United States. Over much of the world, however, the year was cooler than normal. Dry weather gripped the U.S. midsection, parts of the South, and parts of the Northwest in 1988; for some of these

areas, this was the third year of unusually low rainfall. The worst drought years in the United States were in the 1930s, not the 1980s; throughout most of the world, 1988 was relatively free from drought.

Consequently, though there is a strong scientific case that the world's climate will warm at a rate exceeding any seen heretofore by human civilizations, the most that can be said about recent high temperatures and drought in the United States is that they are not inconsistent with a long-term warming trend. A few scientists have concluded that global warming is already here, but most atmospheric scientists would hasten to say that recent events do not prove that warming will result from continued release of greenhouse gases.

## Greenhouse Gases: Sources and Trends

The four most important variable greenhouse gases, whose atmospheric concentrations can be influenced by human activities, are CO<sub>2</sub>, methane, nitrous oxide, and chlorofluorocarbons. Methane is the major constituent of natural gas and is also produced from many biological decay processes. Historically, CO<sub>2</sub> has been the most important, but over the past several decades other gases have assumed increasing significance. Collectively, they are projected to contribute about as much to global warming over the next 60 years as CO<sub>2</sub>.

The amount of carbon cycling from naturally occurring processes each year through the biosphere as CO<sub>2</sub> is enormous -- some 7 trillion tons. As evidenced by the general long-term stability of the global climate, the amounts generated by natural processes have been about equal to the amounts absorbed by natural processes. Human activity, mostly in the form of burning fossil fuels, is now generating some 22 billion tons of CO<sub>2</sub> per year; incomplete evidence available shows that only about half this amount is being absorbed by natural processes. Thus, atmospheric CO<sub>2</sub> concentrations are increasing steadily and are now about 25% higher than they were 100 years ago.

*Heritage*

Human activities are believed to be responsible for half or more of the total annual generation of methane and nitrous oxide. Much less scientific effort has been expended on study of sources and sinks (both natural and human-related) of these materials, so uncertainties are quite large. Nonetheless, what data are available show that their atmospheric concentrations are also growing steadily. Methane from human activities comes from cattle-raising, rice paddies, and trash dumps, as well as from losses to the atmosphere of natural gas during its production, transportation, and use. Natural sources include wild animals, wetlands, and termites. Most people-related nitrous oxide results from combustion, while most naturally occurring nitrous oxide emissions are from biological processes in soil.

There are no naturally occurring chlorofluorocarbons (CFCs). These gases, which last in the atmosphere for a century or more, all result from human activity. Current annual world production of these gases is about 1 million tons, and has increased over the past several years by over 5% per year. Ironically, CFCs have become so ubiquitous because they are nontoxic, nonflammable, and stable. Their

effects on the atmosphere, such as their capacity for depleting stratospheric ozone, were totally unforeseen when they entered commerce. (See CRS Issue Brief 89021 for further details.)

## State of Understanding in Climate Change

It is clear from regular monitoring of the atmosphere's constituents that concentrations of greenhouse gases are definitely increasing, and there is beginning to be a quantitative understanding of the size of mankind's contributions to these changes. There are still many unanswered questions, however, regarding the magnitudes, spatial distribution, and timing of climatic changes which are expected to occur in response to changes in atmospheric composition. It is uncertain, for example, to what extent heat absorption by the oceans will retard the overall warming at the Earth's surface. Furthermore, though general spatial gradations of climate changes can be estimated, it is extremely difficult to predict changes in climate patterns for specific regions owing to the state of the science and the inadequate precision of current climate prediction models, which are the principal tools used for projecting climate change.

Numerical climate models have been used to study climatic changes that could result from changes in environmental variables. Both simple models and the more complex three-dimensional global circulation models show a global warming with increased concentrations of CO<sub>2</sub> and other radiative trace gases in the atmosphere. A convenient measure of increased CO<sub>2</sub> concentration, which has been used for discussion purposes and for climate change predictions, is the concept of doubling the present concentration. Since CO<sub>2</sub> is the preponderant variable greenhouse gas in the atmosphere and the radiative effects of all these gases are generally additive, the other trace gases are accommodated in the models by assuming their increases to be part of the CO<sub>2</sub> doubling. Estimates are that such doubling could occur some time during the 21st century, based on assumptions regarding the rate of CO<sub>2</sub> generation and the ability of sinks such as the oceans and tropical forests to absorb some of this increase. For a doubling of CO<sub>2</sub> concentration, the models predict an estimated global warming of about 6° to 10° F (3° to 5° C).

Estimated warming due to intensified greenhouse effect varies with latitude, being greatest toward the poles and least near the Equator. It is also greater in the Northern Hemisphere than in the Southern Hemisphere, because of the greater expanses of ocean surface south of the Equator, leading to greater heat absorption at the Earth's surface. Increased warming is also expected to be greater for a given region in winter than in summer, other conditions being equal.

Global circulation models have been used in a number of "climate model experiments," where there is an attempt to quantify differences between model run results for existing conditions and model predictions obtained after changing significant model inputs, such as a doubling of atmospheric CO<sub>2</sub>. Although numerical models tend to give reasonable and consistent results on a global or hemispherical basis, the models are not yet sufficiently precise to provide detailed, regional climate

UNANSWERED  
QUESTIONS

distributions. Consequently, estimates of increased greenhouse warming on a regional basis from different models show considerable variability, with uncertainties and inconsistencies increasing as geographical dimensions decrease and the number of model grid points decreases. More sophisticated computer models are being developed by atmospheric scientists, incorporating larger numbers of grid points as well as more realistic environmental conditions and processes such as cloud effects and more complete interchanges between the oceans and the atmosphere.

## Energy Options and Policy

Concern about accelerated global climate change due to increasing atmospheric concentrations of CO<sub>2</sub> and other greenhouse gases has focused attention on the potential for reducing emissions from man-made sources. Fossil fuel use is the primary man-made source of CO<sub>2</sub> emissions, and the intensity of these emissions varies with the particular type of fossil fuel, as shown below:

**TABLE 1. Emission Intensity of Fossil Fuel Combustion**  
(millions of tons of carbon dioxide per quadrillion Btu, Q)

<u>Fuel</u>	<u>Extraction &amp; Production</u>	<u>Combustion</u>	<u>Total Emissions</u>	<u>Relative Intensity</u>
Natural Gas	0.0	57.5	57.5	1.0
Oil	0.0	80.0	80.0	1.4
Coal	0.0	102.0	102.0	1.8
Synthetic Oil	73.1	80.0	153.1	2.7
Synthetic Gas	104.0	57.5	161.5	2.8
Shale Oil	107.9	80.0	187.9	3.3

Congressional attention has begun to focus on the potential for reducing the CO<sub>2</sub>-generating consequences of fossil fuel use. Particular emphasis is placed on coal, because of its high emission intensity. Since 1973, the Nation has adopted energy efficiency and conservation policies to reduce dependence on foreign oil imports. A CO<sub>2</sub> reduction policy, were it to be explicitly put into place, would reinforce these elements of national energy policy. However, on the supply side, national policy has in large part emphasized the substitution of coal for oil (and for gas, until recently), in order to serve energy security interests. Here, a goal of CO<sub>2</sub> reduction would be counterproductive to U.S. energy security policy by setting reduced coal use as a higher priority than displacing oil use.

The following sections describe some estimates of the potential for energy efficiency and nonfossil energy supply sources to cut U.S. CO<sub>2</sub> emissions. One section also compares these emission reductions with the impact that would result from eliminating the use of CFCs.

## Energy Efficiency

In 1985, U.S. fossil energy use produced about 5.4 billion tons of CO<sub>2</sub>. This represents about 24% of the total world man-made CO<sub>2</sub> emissions, which reached about 22 billion tons in 1985. According to the Department of Energy's (DOE) Energy Information Administration (EIA) projections, U.S. CO<sub>2</sub> emissions would climb to 6.4 billion tons per year by the year 2000. The following table shows projected emissions by sector for the year 2000. It also shows potential emission reductions from energy efficiency improvements and energy conservation programs.

**TABLE 2. U.S. Carbon Dioxide Emissions, Year 2000**  
(million tons, Mtons)

Sector	EIA Projected Use	Potential Reduction	
		Low	High
Electric Utilities	2,489	98	1,060
Buildings	636	--	189
Residential	394	--	95
Commercial	242	--	94
Industrial	1,478	137	721
Transportation	1,799	0	769
Totals	6,402	235	2,739

The table shows that energy efficiency and conservation could cut projected CO<sub>2</sub> emissions by an amount ranging from 240 Mtons, or 4%, to 2,700 Mtons, or 43%. Figure 1 illustrates the potential for efficiency to reduce CO<sub>2</sub> emissions as a percentage change from the 1985 level. The low figure could result if low oil prices persist, population continues to grow, and only a few of the available energy efficient devices come into widespread use. Such slow market penetration could be exacerbated by a reversal in energy efficiency trends. The recent turnabout in consumer tastes and manufacturer strategies toward bigger, less energy-efficient automobiles is an example. The high reduction figure is achievable if energy prices increase, governmental programs of incentives to conserve are expanded, and technological development continues.

# Nation

## Global warming trend continued in 1989, researchers say

By Dianne Dumanoski  
GLOBE STAFF

Though the bitterly cold December in the Eastern United States might suggest otherwise, 1989 was another warmer-than-normal year for the earth as a whole and continued the apparent global warming pattern of the 1980s, according to a British research group monitoring global temperature trends.

Although last year's global temperatures were slightly lower than 1988 and 1987, researchers from the University of East Anglia's Climate Research Unit and the United Kingdom's Meteorological Office found that last year was the fifth warmest year in the record dating back to the mid-nineteenth century.

Overall, report David Parker of the Meteorological Office and Phil Jones of the University of East Anglia, the 1980s represent the warmest decade by far in the past century, accounting for six of the ten warmest

years on record.

"Over the past 20 years, the global surface temperature has warmed .25 degrees Celsius" or roughly half a degree Fahrenheit, said Barry Parker, the press spokesman for the Meteorological Office. "That's nothing fantastic to the man on the street, but to the climatologist that's a large amount."

Right now, average global temperature is the best indication of whether the climate is changing, explained David Rind, a climate researcher with the National Aeronautics and Space Administration's Goddard Institute for Space Studies in New York, because it shows less year-to-year fluctuation than average temperatures on a local scale.

At any single spot on the earth, such as Boston, the normal fluctuations are much greater, Rind said, so scientists do not yet expect to see any clear sign of global warming in local weather.

In the United States, according to meteorologist David Miskus of the National Ocea-

nic and Atmospheric Administration's Climate Analysis Center, 1989 was slightly cooler than normal in large part because of a static weather pattern in December. This sent Arctic air shooting into the lower 48 states for many days.

He noted that some of the warmer years on record in the United States have been in the '80s. But with only 2 percent of the earth's surface, he said, the United States is only a small part of the global picture.

Miskus noted that there are many difficulties in trying to calculate the average temperature for the earth. "There are too many areas where you don't have accurate data. And it's really hard to measure the sea surface temperature. That's 70 percent of the world. I'm not trying to discount what they report, but I'm slightly skeptical."

Is the warming in the '80s a sign of the greenhouse problem?

"The feeling in the Met Office," replied Parker, the press spokesman, "is there is evidence of global warming at least during

the 20th century. This global warming is an observation based on data. To go beyond that and say the cause is the greenhouse effect is something we can't do. We don't have enough data for that particular linkage."

The Goddard Institute, the only other group monitoring global temperature trends, uses different data and, unlike the British group, do not take sea surface temperatures into account. Nevertheless, their preliminary analysis of 1989 temperatures generally agrees with the British findings, said researcher Sergej Lebedeff, finding 1989 to be the sixth warmest year in the '80s.

He added that many had been predicting that 1989 would be significantly cooler than the two preceding years, because those years had been affected by the ocean circulation cycle in the Pacific known as El Niño, which is associated with higher temperatures.

Some observers have questioned the accuracy of temperature records that provide the basis for these global temperature

trends. They note that inconsistent methods have been used to sample ocean waters and that long-term land records might be skewed toward figures showing warming because of increasing urban development around many measuring stations. Pavement and buildings hold more heat than green countryside.

Parker said that the British team is aware of these problems and has been doing research to improve its ability to account for them in the calculations.

Although skeptics have recently cited uncertainties in computer models predicting future global warming linked to the greenhouse problem, the models, Rind said, seem to be doing a reasonably good job so far.

For climate modelers, he said, "the '90s will be the decade of put up or shut up. The models say continued warming in the '90s and pretty rapid warming. If the coming decade turns out to be cooler, he said, modelers will be going back to the drawing boards to find out what's going on."



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY  
WASHINGTON, D.C. 20460

THE ADMINISTRATOR

STATEMENT

BY

WILLIAM K. REILLY

ADMINISTRATOR

U.S. ENVIRONMENTAL PROTECTION AGENCY

MINISTERIAL CONFERENCE

ATMOSPHERIC POLLUTION AND CLIMATIC CHANGE

NOORDWIJK, THE NETHERLANDS

NOVEMBER 6, 1989

\*\* AS DELIVERED \*\*

● MR. CHAIRMAN, LET ME EXTEND MY COMPLIMENTS AND THANKS TO YOU AND TO YOUR GOVERNMENT FOR HOSTING A CONFERENCE THAT HAS ALREADY ADDED SIGNIFICANTLY TO PUBLIC AWARENESS, FOSTERED A GROWING CONSENSUS, AND EVEN TURNED UP THE HEAT ON POLICYMAKERS EVERYWHERE, WITH RESPECT TO GLOBAL CLIMATE.

● THROUGHOUT THE WORLD, AWARENESS IS GROWING OF THE NEED TO PRESERVE THE EARTH'S ECOLOGICAL BALANCE. THIS INCLUDES AWARENESS THAT CHANGES IN THE ATMOSPHERE COULD ALTER OUR PLANET'S CLIMATE.

● THE POTENTIAL FOR GLOBAL CLIMATE CHANGE FORCES ALL OF US TO LOOK AT THIS EARTH AS AN INTEGRATED SYSTEM.

ADDRESSING THIS ISSUE THEREFORE REQUIRES A MULTILATERAL COMMITMENT FROM THE COMMUNITY OF NATIONS.

IT ALSO REQUIRES AN INTEGRATED APPROACH IN POLICY, FOR GLOBAL CLIMATE CHANGE INVOLVES SCIENCE, ENERGY, ECONOMICS, AND FOREIGN AFFAIRS AS WELL AS THE ENVIRONMENT.

A PRUDENT COURSE TODAY IS TO PROVIDE INSURANCE AGAINST POSSIBLE ADVERSE IMPACTS TOMORROW FROM THE GREENHOUSE EFFECT.

- AS PRESIDENT BUSH AND THE OTHER LEADERS AT THE ECONOMIC SUMMIT AGREED IN JULY, WE NEED COMMON EFFORTS TO LIMIT EMISSIONS OF CARBON DIOXIDE AND OTHER GREENHOUSE GASES.

THE UNITED STATES AGREES WITH THE BROAD NEED FOR ACTION TO LIMIT EMISSIONS OF ALL GREENHOUSE GASES -- BASED ON SOUND SCIENCE -- IN ORDER TO SLOW GLOBAL WARMING.

- WE RECOGNIZE THE DESIRABILITY ON THE PART OF ALL COUNTRIES TO STABILIZE WORLD GREENHOUSE GAS EMISSIONS. FOR THE U.S. TO ACHIEVE STABILIZATION OF CO<sub>2</sub> BY THE YEAR 2000 WOULD REQUIRE A NATIONWIDE PROGRAM OF REFORESTATION, A DOUBLING OR MORE IN AVERAGE AUTOMOBILE FUEL EFFICIENCY, VERY LARGE IMPACTS IN ENERGY EFFICIENCY IN INDUSTRY AND IN HOUSING, IN LIGHTING AND IN HOUSEHOLD APPLIANCES.

WE ARE STUDYING SUCH MEASURES AND ASSESSING THEIR FEASIBILITY AND COST. WE COMPLIMENT OTHER NATIONS WHICH ALREADY ARE PREPARED TO MAKE SUCH A COMMITMENT, EVEN IN SOME CASES, PRIOR TO THE COMPLETION OF SUCH ANALYSES.

WHILE IT IS NECESSARY FOR ALL COUNTRIES TO WORK TOWARD THESE GOALS, LEADERSHIP BY THE INDUSTRIALIZED COUNTRIES IS PARTICULARLY IMPORTANT.

- THE UNITED STATES FIRMLY SUPPORTS THE WORK OF THE INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE, ESTABLISHED UNDER THE AUSPICES OF THE UNITED NATIONS ENVIRONMENT PROGRAMME AND THE WORLD METEOROLOGICAL ORGANIZATION.

WE EXPECT IT TO PROVIDE A SOLID FOUNDATION FOR INTERNATIONAL ACTION, INCLUDING SUBSEQUENT AGREEMENTS ON CONTROL MEASURES. THE IPCC IS THE FORUM IN WHICH WE IN THE UNITED STATES INTEND TO ADDRESS THE ISSUE INTERNATIONALLY.

- WE EXPECT THE IPCC TO LEAD TO A FRAMEWORK CONVENTION ON CLIMATE CHANGE. THE UNITED STATES LENDS IT FULL SUPPORT TO THE WORK OF THE IPCC.
- WE BELIEVE THAT AN AGREEMENT SETTING OUT GENERAL PRINCIPLES OR GUIDELINES IS THE BEST, MOST SENSIBLE WAY TO START DEALING WITH THE ISSUE BEFORE US.

SUCH AN APPROACH WILL PROVIDE A FORUM FOR FOSTERING A  
WORLDWIDE CONSENSUS ON APPROPRIATE RESPONSES TO  
GLOBAL CHANGE.

- last fall?*
- TO BEGIN THIS DISCUSSION, THE UNITED STATES RECENTLY  
HOSTED, IN OUR CAPACITY AS CHAIR OF THE RESPONSE  
STRATEGIES WORKING GROUP OF THE IPCC, A WORKSHOP TO  
ADDRESS THE LIKELY ELEMENTS OF A FRAME WORK  
CONVENTION ON GLOBAL CLIMATE CHANGE.

THIS WORKSHOP PROVIDED OVER 30 NATIONS THEIR FIRST  
OPPORTUNITY TO TRY TO REACH A COMMON UNDERSTANDING  
OF THE MYRIAD ISSUES TO BE CONFRONTED IN A FRAMEWORK  
CONVENTION.

- IN ADDITION TO THE MULTILATERAL IPCC EFFORT, EACH  
COUNTRY NOW NEEDS TO TAKE STOCK OF ITS OWN DOMESTIC  
SITUATION AND TO IDENTIFY AND ASSESS THE POSSIBLE COSTS  
AND ECONOMIC EFFECTS, AS WELL AS THE ENVIRONMENTAL  
BENEFITS, OF MEASURES TO LIMIT GREENHOUSE GAS EMISSIONS  
OR ADAPT TO CLIMATE CHANGE.

FOR OUR PART, THE UNITED STATES IS COMMITTED TO EXPLORING ALL POSSIBLE POLICY OPTIONS, INCLUDING THE EXAMINATION OF THEIR BENEFITS, THEIR TECHNICAL FEASIBILITY AND THEIR ECONOMIC IMPLICATIONS.

WE ARE CURRENTLY ANALYZING COST-EFFECTIVE EMISSION SINKS IN THE NEAR TERM IN THE ENERGY, FORESTRY, AND OTHER SECTORS.

FOR LONGER TERM EMISSION REDUCTIONS, WE ARE ALSO ASSESSING OUR PRIORITIES FOR RESEARCH AND TECHNOLOGICAL DEVELOPMENT. WE EXPECT TO HAVE OUT INITIAL ASSESSMENTS READY BY NEXT SPRING.

\* \* \*

*DEVELOPING NATIONS*

- I WISH TO MAKE IT ABSOLUTELY CLEAR THAT THE UNITED STATES RECOGNIZES THE SPECIAL PROBLEMS OF DEVELOPING COUNTRIES IN PARTICIPATING IN THE EFFORT TO ADDRESS GLOBAL ENVIRONMENTAL PROBLEMS.

WE FULLY ENDORSE, AND EVEN SHARE, THE ASPIRATIONS OF THE DEVELOPING WORLD FOR ECONOMIC IMPROVEMENT.

- TO THIS END, WE PARTICIPATE IN AND SUPPORT A BROAD SPECTRUM OF BILATERAL AND MULTILATERAL FINANCIAL AND TECHNICAL ASSISTANCE EFFORTS -- MANY OF WHICH WE HELPED INITIATE.

WE ALSO RECOGNIZE THE NEED TO RECONCILE GLOBAL ECONOMIC DEVELOPMENT WITH A GLOBAL ENVIRONMENT CAPABLE OF SUSTAINING THIS GROWTH.

- THE UNIQUE CIRCUMSTANCES OF DEVELOPING WORLD WILL BE TAKEN INTO ACCOUNT. WE HAVE JUST LAUNCHED, FOR EXAMPLE, A HIGH-LEVEL STUDY ON HOW TO MAKE ENVIRONMENTAL TECHNOLOGIES AVAILABLE TO DEVELOPING COUNTRIES.



WE ARE ALSO INVESTIGATING THE POSSIBILITIES OF DEBT-FOR-NATURE SWAPS AND OTHER INNOVATIVE FINANCING APPROACHES.

- IN ADDITION, THE U.S. AGENCY FOR INTERNATIONAL DEVELOPMENT HAS DEVELOPED AN AGGRESSIVE PLAN TO INTEGRATE ENVIRONMENT AND SUSTAINABLE GROWTH IN ITS PROGRAMS FOR DEVELOPING COUNTRIES.
  
- WE BELIEVE FURTHER THAT THE WORLD BANK AND OTHER MULTILATERAL DEVELOPMENT BANKS HAVE A PARTICULARLY IMPORTANT ROLE TO PLAY IN PROMOTING SUSTAINABLE DEVELOPMENT, A ROLE WHICH WE EXPECT WILL INCREASE AS THE WORLD COMMUNITY ORGANIZES ITSELF TO RESPOND TO CLIMATE CHANGE UNDER A FRAMEWORK CONVENTION AND SUPPORTING PROTOCOLS.
  
- WE STRONGLY SUPPORT THE MOVEMENT TO HAVE THE DEVELOPMENT BANKS INCORPORATE ENVIRONMENTAL ASSESSMENTS INTO THEIR DECISION MAKING AND TO TAKE ACCOUNT OF THE GREENHOUSE EFFECT WHEN EVALUATING NATURAL RESOURCE PROJECTS.

- IN CONCLUSION, THE UNITED STATES RECOGNIZES THAT WE ALL ARE AS ONE WITH RESPECT TO GLOBAL CLIMATE CHANGE.
- IN THE WORDS OF PRESIDENT BUSH, AS HE SPOKE WITH RESPECT TO THE PROBLEM OF GLOBAL WARMING IN HIS RECENT ADDRESS TO THE UNITED NATIONS, "THE UNITED STATES WILL DO ITS PART."

THE PRESIDENT BELIEVES STRONGLY THAT SUCCESS WILL REQUIRE THE COOPERATION OF ALL COUNTRIES.

- AGREEING ON A SOUND SET OF INTERNATIONAL STRATEGIES IS A PROFOUNDLY IMPORTANT TASK AND WILL REQUIRE AND FULLY MERIT THE BEST EFFORTS OF US ALL.

THANK YOU VERY MUCH.