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United States Department of State

Bureau of Oceans and International
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Washington, D.C. 20520

Date: January 20, 1993

TO:

NAME: Katie McInty TEL: 224-7179ORG: _____ FAX: 228-2611DOCUMENT DESCRIPTION: Issues for IPCC WG2 MeetingNUMBER OF PAGES, INCLUDING THIS PAGE: 26

FROM:

NAME: Jan Reifsnyder TEL: (202) 647-4069ORG: Office of Global Change FAX: (202) 647-0191OES/EGC - RM. 4329-A

Message:

Paul/Katie - Have prepared the attached per your
request yesterday. Please let me know if you
need anything else.

Thanks,
Jan

IPCC WORKING GROUP II
FIRST MEETING
(Geneva, February 8-12, 1993)

ISSUE

What issues will arise at the first meeting of reorganized Working Group II of the Intergovernmental Panel on Global Change (IPCC)?

CONTEXT

The meeting's purpose is to agree on the specific elements of Working Group II's contribution to the IPCC Second Assessment Report, anticipated for the fall of 1995. Its focus will be on scientific and technical assessment issues related to the Working Group's areas of responsibility -- impacts of climate change and adaptation and mitigation response options. While national delegations will take part, they are not expected to (nor will they likely) make policy statements on behalf of their governments. The meeting will essentially be a "hands on" effort by technical experts to map out what they will do over the next 32 months or so and how they will do it, leading to the IPCC's Second Assessment Report. Most of the action will take place in the Working Group's four subgroups.

A copy of the revised draft workplan, the revised draft outline and a "Dear Colleague" letter that will shortly be sent to governments by the IPCC Secretariat on behalf of the Working Group's co-chairs are attached. Reaching agreement on these documents, as well as scheduling, funding and procedural matters, will absorb the efforts of participants at the five-day meeting.

BACKGROUND

The IPCC agreed on a new structure for the Panel at its 8th Plenary Meeting in Harare from November 11-13, 1992. A reorganized Working Group II emerged from those discussions. It combined the work on impacts performed by previous Working Group II (chaired by the USSR, later Russia) and the work on adaptation and mitigation response options performed by previous Working Group III (chaired by the United States).

Reorganized Working Group II is co-chaired by the United States (State Department DAS for Environment, Health and Natural Resources Bob Reinstein) and Zimbabwe (Director of Meteorological Services Marufu Zinyowera). It has four

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subgroups, each of which is co-chaired by an industrialized country and a developing country; subgroup co-chairs are also vice-chairs of reorganized Working Group II and are members of the IPCC Bureau.

Subgroup responsibilities are:

- Subgroup A - energy, industry, transportation, urban issues including related human settlements, air quality and health, and waste management and disposal
- Subgroup B - coastal zones, small islands, oceans and marine ecosystems, changes in sea level, tropical cyclones and storm surges
- Subgroup C - Unmanaged resources and terrestrial ecosystems, mountain regions, cryosphere, hydrology and terrestrial impacts of extreme events
- Subgroup D - Droughts and desertification, management of water resources, agriculture, managed forests and land use

Subgroup co-chairs are:

- Subgroup A - Japan (Mr. Keiichi Yokobori) and India (Dr. M. Parabrahmam)
- Subgroup B - Netherlands (Dr. Pier Vellinga) and Venezuela (Mrs. Martha Perdomo)
- Subgroup C - Switzerland (Dr. Martin Beniston) and Argentina (Dr. O. Canziani)
- Subgroup D - France (Dr. Michel Petit) and Tunisia (possibly Mr. Habib Tebourbi)

PURPOSE OF FIRST MEETING

The essential purpose of reorganized Working Group II's first meeting will be to agree on elements of working group's contribution to the IPCC's ~~Second Assessment Report~~. The ~~Second Assessment Report~~ will likely be completed and adopted by the IPCC in the early fall of 1995.

What are the troublesome issues?

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There are several elements of Working Group II's contribution on which agreement will be needed, including:

- Workplan (revised draft attached), including specific methodologies to be developed by each subgroup
- Outline of Working Group II's report (revised draft attached), including subgroup responsibilities for preparing each section, overall page length, page lengths of sections and format, as well as lead or co-lead authors and contributing authors
- Timeline for production of the report, including meeting schedule and workshops
- Funding for agreed workshops
- Procedures for peer-review and intergovernmental review of the report

Early drafts of the workplan and outline were discussed by the IPCC as a whole during its 8th Plenary Meeting in November 1992 in Harare. Many delegations commented on these early drafts, and delegations were given until January 5 to provide specific written comments to the Working Group II co-chairs. Revised drafts of these documents were prepared by the U.S. co-chair and sent to his Zimbabwean colleague for review and comment before being sent by the IPCC Secretariat to governments. The revised drafts take into account comments made during the Harare meeting, subsequent written comments received from governments, and extensive comments received from U.S. agencies. The U.S. co-chairman informally provided copies to several Working Group II Bureau members at a meeting in Paris on January 14, and a copy was sent to the Subgroup A co-chairs for use at an experts meeting in Japan that began on January 19. Reaction thus far has been positive.

The IPCC has agreed to produce an interim report for the first meeting of the Conference of the Parties to the U.N. Framework Convention on Climate Change. We anticipate that this will be a limited report consisting of a few discrete items. For example, Working Group I is anticipated to report on its work in developing a methodology for inventorying sources and sinks of greenhouse gases, as well as its continuing work on global warming potentials. At the February meeting, Working Group II will need to consider what

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specific items might be of use to the INC's Conference of the Parties and, ideally, should agree on a specific process for producing these items by the COP's first meeting, which could take place as early as the fall of 1994.

There will likely also be a meeting of the Working Group II Bureau (Working Group co-chairs and vice-chairs) in the evening of February 10 to consider the Working Group's relationship with the IPCC's Working Groups I (on science) and III (on (macro) economics and other cross-cutting issues, in particular emissions' scenarios). Specifically, Working Group II's Bureau will consider what information is needed from those other working groups in order to undertake its work (e.g., information on greenhouse gas emissions' inventories from Working Group I; emissions' scenarios from Working Group III).

There may also be some discussion at the Working Group II Bureau meeting of a future meeting of the bureaus of Working Group I and II (just prior to the IPCC 9th Plenary in June 1993) to consider how the IPCC can contribute to scientific and technical assessment of the objective of the U.N. Framework Convention on Climate Change. That objective, contained in the Convention's Article II, provides that the Convention's ultimate objective is to achieve stabilization of greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system. The objective further provides that such a level should be achieved within a time-frame sufficient to allow ecosystems to adapt naturally to climate change, to ensure that food production is not threatened and to enable economic development to proceed in a sustainable manner.

Coming to grips with this objective, even if only with respect to assessing the scientific and technical issues involved, will likely be fraught with controversy because of the ultimate political implications involved. For example, the IPCC's First Assessment Report observed that, stabilizing atmospheric concentrations of greenhouse gases at current levels, would require an immediate 60 percent cut in greenhouse gas emissions -- a virtual impossibility using existing technologies without dire dislocation for the world's economy.

SCHEDULE FOR THE MEETING

The meeting will take place at the CIGG (Centre Internationale de Conferences de Geneve -- near the Palais des Nations and adjacent to the World Meteorological Organization, the World Intellectual Property Organization and the

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International Labor Organization buildings). It will begin on Monday, February 8, at 10:00 a.m. It will follow normal U.N. working hours, with formal sessions from 10:00 a.m. to 1:00 p.m. and from 3:00 p.m. to 6:00 p.m. Except for the Working Group II Bureau meeting that will likely take place at 8:00 p.m. on Wednesday, February 10, no evening sessions are planned, although they should not be ruled out, particularly as the week progresses.

The first day will be devoted to opening remarks and plenary discussions. Days two, three and four will be taken up by meetings of the subgroups. Two subgroups will meet in the morning; two will meet in the afternoon -- but only one will have interpretation (into the six U.N. languages) in the morning and afternoon; the other morning and afternoon subgroup meetings will be conducted in English only. This pattern of subgroup meetings meets the concerns of developing countries (many of whom have one or two person delegations) that no more than two meetings take place simultaneously. It also distributes interpretation services (which are limited for financial reasons to one team per session) equitably among the subgroups. Interpretation is important, since a number of delegates do not speak English, and others do not speak English with ease.

The final day will be devoted to a plenary meeting that will review the work of the subgroups and agree on a report of the meeting.

Final documents agreed at the meeting will be transmitted to the IPCC for consideration and adoption at its 9th Plenary Meeting, currently scheduled for June 28-30 in Geneva.

Attachments:

- TAB A - Draft "Dear Colleague" Letter from WG 2 Co-Chairs
- TAB B - Revised draft WG 2 Workplan
- TAB C - Revised draft WG 2 Outline

Dear Colleague:

We wish to thank each of you who submitted comments on the draft workplan (enclosure 1) and outline (enclosure 2) for the Working Group II report that was discussed at the IPCC 8th Plenary (Harare, November 11-13, 1992). Enclosed please find a revised draft workplan and outline for the Working Group II report in which we have sought to incorporate comments received and reflect further on the nature and goals of the IPCC's Second Assessment. The revised draft workplan and outline will serve as the basis for our discussions at the meeting from February 8-12 in Geneva.

Reorganized Working Group II seeks to combine the work on impacts of previous Working Group II, as well as the work on adaptation and mitigation options of previous Working Group III. As many observed in Harare, it is important that the expertise developed in previous Working Groups II and III not be lost in this merger.

We are also mindful of the need for reorganized Working Group II to produce materials that are "user friendly" for a broad range of countries, particularly developing countries. For this reason, the development of specific methodologies for assessing adaptation and mitigation options and of inventories of available technologies will be a vital part of Working Group II's contribution to the IPCC's Second Assessment Report.

Global Climate Models (GCMs) do not now, and may not for some time, provide the level of detail needed to assess specific impacts on individual countries. Still, it is clear that every effort must be made to improve regional assessment of vulnerabilities and adaptation options. The revised draft outline seeks to move in this direction by focussing on ecological/climate/physiographic systems in assessing these vulnerabilities and options.

On the other hand, some mitigation options are primarily oriented toward specific sectors of economic activity. Others may be cross-cutting or economy-wide in nature. The revised draft outline approaches the assessment of both types of options, but is organized by broad economic sectors.

Please note that to facilitate our discussions and the planning effort for each Subgroup, we have developed notional page lengths for each section contemplated in the outline. These will clearly need to be considered further during our meeting in Geneva. It will be important, however, that Working Group II agree both on the overall size of its report as well as on the length of specific sections.

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Please also note that the revised draft outline seeks to integrate the efforts of all four Subgroups into Working Group II's report to eliminate, to the extent possible, overlap and duplication between and among Subgroups. Thus, for example, individual subgroups would have the responsibility for developing particular sections, but the work of each subgroup would be woven into the report as a whole rather than being a discrete sub-report.

We note that Working Group I has had considerable success in the past by designating a lead author or co-lead authors (as well as contributing authors) for each section of its report. This approach may also be relevant to Working Group II. We should be prepared to spend some time at our meeting considering the issue of lead and contributing authors for each section of the revised draft outline.

In addition, we should be prepared at our meeting to consider what workshops may be necessary or useful in developing the Working Group II report. These workshops should be agreed by Working Group II, and the funds needed to support them should be identified, sufficiently far in advance for all interested participants to take part.

Finally, we note that a comment was received concerning scientific and technical assessment efforts that Working Group II might undertake with respect to Article II (Objective) of the U.N. Framework Convention on Climate Change. This issue will be the subject of a meeting between the bureaus of Working Group I and Working Group II, and may lead to a specific workshop on this subject. Consequently, this could become a separate task for the two Working Groups, and we have not sought to incorporate Working Group II's contribution to it in the revised draft outline.

Again, thank you for your comments on the previous draft workplan and outline. We look forward to seeing you in Geneva.

With best wishes,

Robert A. Reinstein
Co-Chairman

Marufu Zinyowera
Co-Chairman

Enclosures:

1. Revised draft workplan
2. Revised draft outline

CONTINUING WORK PROGRAM OF THE IPCC NEW WORKING GROUP II

It is proposed that the continuing work of the IPCC in the areas of impacts and response options be undertaken according to the following workplan. This workplan does not contain specific tasks or dates for completion, as these should be determined by the participants in the first meeting of the proposed Working Group II. Certain elements of this work are expected to be built directly on tasks undertaken as part of preparations of the 1992 Supplement. These tasks include the development of guidelines for impacts assessments, the identification of regional and national components of systematic observation programs for impact assessments, the compilation of an inventory of technology characteristics, and the conduct and synthesis of thematic studies on specific options.

The new Working Group II will prepare an integrated assessment of the state of knowledge regarding the impacts of climate change and options for adapting to or mitigating such climate change. These assessments will be the Working Group's contribution to the IPCC's Second Assessment Report (SAR). In developing this assessment, the subgroups of the Working Group will undertake a number of specific activities and produce a number of discrete products that may be of specific use to individual countries in evaluating their vulnerability to climate change and their options for responding to it. These include thematic or regional workshops, inventories of technologies and methodologies for carrying out analyses.

I. GLOBAL AND REGIONAL ASSESSMENTS

As its input to the SAR, the Working Group will prepare assessments, both global and by ecological/climate /physiographic region, of the state of knowledge regarding vulnerability, adaptation and mitigation, and progress in each area covered by subgroups, including degree of institution and capacity building in developing countries. These assessments will draw on the individual tasks carried out by the subgroups, including the inventories and methodologies, and will reflect work priorities for the 1992-93 timeframe.

WORKPLAN

- Each subgroup will coordinate the preparation by lead authors of chapters related to that subgroup's areas of concern.
- These chapters are to be integrated into a synthesis report for input to the 1995 assessment.

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II. METHODOLOGIES

Building on previous work, including the work of the previous Working Groups II and III, the Working Groups will prepare methodologies, for use at national, regional and global scales, for:

- A. assessing and monitoring impacts of climate change, including geophysical impacts, ecosystem impacts, and monitoring and data estimation methods and practices;
- B. assessing vulnerability to the impacts of climate change and further identifying sensitivities to different magnitudes and rates of climate change, including temperature, hydrologic cycle and sea-level change; and
- C. assessing the options available to reduce vulnerability to the impacts of climate change and to mitigate climate change.
 - These methodologies should include a component assessing the results of these actions and the costs and benefits of reductions on areas within the Working Group's purview.

WORKPLAN

- Each Subgroup will coordinate the development by lead authors or co-authors of methodologies related to specific ecological/climate/physiographic regions or economic sectors within the Subgroup's purview.
 - Methodologies for assessing vulnerability to the impacts of climate change should build on the work of the previous Working Group II in developing Preliminary Guidelines for Assessing Impacts of Climate Change and the work of the previous Working Group III Coastal Zone Management Subgroup on a Common Methodology for Assessing Vulnerability to Sea Level Rise.
 - Subgroups should collaborate where appropriate to develop methodologies for certain physiographic regions and systems (e.g., freshwater systems, hydrology and water resources)
 - Some methodologies may or may not include methodologies for assessing geophysical impacts, as this depends on the workplan for WG I;

II. INVENTORY OF TECHNOLOGIES, TECHNIQUES AND METHODS

The Working Groups will prepare an inventory of technologies, methods and practices to mitigate or adapt to climate change. The inventory will be supported by thematic studies and analyses to assist countries in choosing technologies and combinations of technologies. This work

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should facilitate the expeditious and efficient transfer of these technologies, methods and practices, particularly to developing countries.

WORKPLAN

- Each Subgroup will coordinate the development by lead authors or task groups of an inventory of technologies, methods and practices related to specific ecological/climate/physiographic regions or economic sectors within the Subgroup's purview.
 - There will be an appropriate balance of technologies, relying on, where appropriate, thematic studies.
 - This effort will build on existing work.

III. WORKSHOPS

The Working Group will hold workshops on issues of specific interest to the subgroups, including regional issues. In conducting these workshops, it will liaison with other IPCC Working Groups and international institutions and organizations in order to ensure cooperation on common or overlapping work.

WORKPLAN

- Subgroup A to hold, in cooperation where appropriate with IEA, IAEA, OECD and others, workshops on:
 - energy and industry issues such as:
 - end-use energy efficiency;
 - urban road transport
 - methane emission abatement;
 - district heating/waste incineration;
 - in cooperation with WHO, WMO, UNEP, and PAHO, the implications of climate change on health;
 - vulnerability of urban settlements to the impacts of climate change; and,
 - other subjects as determined by the Working Group.
- Subgroup B to hold, in cooperation where appropriate with the UNEP Regional Seas Programme, IOC, and others, workshops on:
 - coastal zone management experiences, and,
 - other subjects as determined by the Working Group.
- Subgroup C to hold, in cooperation where appropriate with FAO, ITTO, and others, workshops on:

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- vulnerability of regional terrestrial ecosystems and unmanaged resources to climate change; and,
 - other subjects as determined by the Working Group;
- Subgroup D to hold, in cooperation where appropriate with FAO, ITTO, and others, workshops on subjects as determined by the Working Group.
 - Subgroup^S B, C, and D, in cooperation as appropriate with Subgroup A and Working Group I, to conduct jointly workshops on a common methodology for assessing the impacts of climate change and the vulnerability of natural and managed systems to these impacts in order to assist countries, particularly developing countries, in conducting vulnerability analyses, identifying critical magnitudes and rates of impacts, and identifying critically sensitive systems and areas.

V. WORK IN COOPERATION WITH WG I AND NEW WG III

The Working Group will, in cooperation with Working Group I and the new Working Group III:

- provide emissions trends from sectors and activities assessed by individual subgroups as input to the Working Group III task on emissions scenarios;
- cooperate with Working Group I on activities related to the objective of the Framework Convention on Climate Change, including the Working Group I work on the relationship between emissions and atmospheric concentrations (the carbon cycle) and the linkages of regional climate change estimates with the Working Group II work on vulnerabilities and sensitivities, especially those of ecosystems (a joint workshop might be held in early 1994).
- cooperate with Working Group I on a Workshop to address the problems of drought and desertification, particularly the interaction between land-use, water resources (including precipitation patterns) and climate change (both due to natural variability and long-term anthropogenic causes)

GENERAL NOTES

1. Institution and capacity building should be integrated into all IPCC work programmes and outputs.
2. Existing work being carried out by current IPCC groups and subgroups should be identified and prioritized for integration into the workplan. The chairs of existing (old) Working Groups II and III have consulted with the chairs of existing subgroups and others to assure full information is available.

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3. Development of methodologies, particularly for impact assessments, should be coordinated and, as much as possible, harmonized across subgroups. For example, the existing work of Japan and the U.K. in developing preliminary guidelines for impacts assessments is very useful in this regard and will be continued.

PROPOSED OUTLINE

IPCC Working Group II: Second Assessment Report

<u>EXECUTIVE SUMMARY</u>	2 pages
<u>POLICY MAKERS SUMMARY</u>	20-25 p.
<u>SECOND ASSESSMENT REPORT</u>	340 p.
I. INTRODUCTION	10 p.
II. ASSESSMENT OF IMPACTS AND ADAPTATION OPTIONS	180 p.
A. Ecological/climate/physiographic Systems	
1. Forests (Sbgrp C)	15 p.
2. Grasslands and rangelands (Sbgrp C)	10 p.
3. Deserts (Sbgrp D)	15 p.
4. Cryosphere, including permafrost (Sbgrp C)	5 p.
9. Mountain regions (Sbgrp C)	15 p.
5. Wetlands (Non-coastal) (Sbgrp C)	10 p.
6. Marine ecosystems, oceans and inland seas (Sbgrp B)	15 p.
7. Coastal zones and small islands (Sbgrp B)	20 p.
8. Freshwater systems, hydrology and water resources (Sbgrps C and D)	10 p.
B. Economic Sectors	
1. Energy Supply and Use (Sbgrp A)	10 p.
2. Materials Supply and Use (Industry) (Sbgrp A)	10 p.
3. Transportation (Sbgrp A)	10 p.
4. Human Settlements (Sbgrp A)	20 p.
5. Agriculture (Sbgrp D)	15 p.
III. ASSESSMENT OF MITIGATION OPTIONS	135 p.
A. Energy Supply and Use (Sbgrp A)	35 p.
B. Transportation (Sbgrp A)	20 p.
B. Materials Supply and Use (Industry) (Sbgrp A)	25 p.
D. Human Settlements including waste management and disposal (Sbgrp A)	15 p.
E. Agriculture (Sbgrp D)	15 p.
F. Managed Forests (Sbgrp D)	20 p.
G. Cross-sectoral Options (All Subgroups)	5 p.
IV. SUMMARY OF METHODOLOGIES (All Subgroups)	10 p.
A. Methodologies for impact assessments	5 p.
B. Methodologies for adaptation and mitigation option assessments	5 p.
APPENDIX A: METHODOLOGIES	
APPENDIX B: INVENTORIES OF TECHNOLOGIES, METHODS AND PRACTICES	

PROPOSED OUTLINE**IPCC Working Group II
Second Assessment Report****EXECUTIVE SUMMARY****POLICY MAKERS SUMMARY****SECOND ASSESSMENT REPORT****I. INTRODUCTION**

- Objectives
- Structure of report
- Summary of GHG and climate change scenarios used in assessment, including population growth
- Definition of ecological/climate/physiographic systems and economic sectors

II. ASSESSMENT OF IMPACTS AND ADAPTATION OPTIONS**A. Ecological/Climate/Physiographic Systems****1. Forests (Subgroup C)**

- a. summary, including methodologies, assumptions and scenarios
- b. boreal forests
 - climate/ecological system characteristics, including biodiversity, human population and other critical factors
 - impacts and ranges of, and sensitivities to, long-term climate change
 - abiotic
 - ecological
 - socio-economic
 - extreme events - storms, cyclones, wildfires, high and low temperature extremes, precipitation extremes
 - contemporary and historical records
 - regional changes due to climate change
 - impacts
- c. temperate forests
 - climate/ecological system characteristics, including biodiversity, human population and other critical factors
 - impacts and ranges of and sensitivities to long-term climate change
 - abiotic
 - ecological, including biodiversity
 - socio-economic

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- impacts of extreme events - storms, cyclones, wildfires, high and low temperature extremes, precipitation extremes
 - contemporary and historical records
 - regional changes due to climate change
 - impacts
 - d. tropical forests
 - climate/ecological system characteristics, including biodiversity, human population and other critical factors
 - impacts and ranges of, and sensitivities to, long-term climate change
 - abiotic
 - ecological
 - socio-economic
 - impacts of extreme events - storms, cyclones, wildfires, high and low temperature extremes, precipitation extremes
 - contemporary and historical records
 - regional changes due to climate change
 - impacts
 - e. adaptation options
 - f. future research, including monitoring
2. Grasslands and rangelands (Subgroup C)
- a. summary, including methodologies, assumptions and scenarios
 - b. High latitude
 - climate/ecological system characteristics, including biodiversity, human population and changes in other critical factors
 - impacts and ranges of, and sensitivities to, long-term climate change
 - abiotic
 - ecological
 - socio-economic
 - impacts of extreme events - storms, cyclones, wildfires, high and low temperature extremes, precipitation extremes
 - contemporary and historical records
 - regional changes due to climate change
 - impacts
 - c. Temperate
 - climate/ecological system characteristics, including biodiversity, human population and other critical factors
 - impacts and ranges of, and sensitivities to, long-term climate change
 - abiotic

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- ecological
 - socio-economic
 - impacts of extreme events - storms, cyclones, wildfires, high and low temperature extremes, precipitation extremes
 - contemporary and historical records
 - regional changes due to climate change
 - impacts
- d. Tropical
- climate/ecological system characteristics, including biodiversity, human population and other critical factors
 - impacts and ranges of, and sensitivities to, long-term climate change
 - abiotic
 - ecological
 - socio-economic
 - impacts of extreme events - storms, cyclones, wildfires, high and low temperature extremes, precipitation extremes
 - contemporary and historical records
 - regional changes due to climate change
 - impacts
- e. adaptation options
- f. future research, including monitoring
3. Deserts (Subgroup D)
- a. summary, including methodologies, assumptions and scenarios
- b. climate/ecological system characteristics, including biodiversity, human population and other critical factors
- c. impacts and ranges of, and sensitivities to, long-term climate change
 - abiotic
 - ecological
 - socio-economic
- d. impacts of extreme events - storms, cyclones, wildfires, high and low temperature extremes, precipitation extremes
 - contemporary and historical records
 - regional changes due to climate change
 - impacts
- f. adaptation options
- g. future research, including monitoring

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4. Mountain regions (Subgroup C)

- a. summary, including methodologies, assumptions and scenarios
- b. climate/ecological system characteristics, including biodiversity, human population and other critical factors
- c. impacts and ranges of, and sensitivities to, long-term climate change
 - abiotic
 - ecological
 - socio-economic
- d. alpine permafrost areas - stability and spatial analysis based on paleo-contemporary records
- e. adaptation options
- f. future research, including monitoring

5. Wetlands (non-coastal) (Subgroup C)

- a. summary, including methodologies, assumptions and scenarios
- b. climate/ecological system characteristics, including biodiversity, human population and other critical factors
- c. impacts and ranges of, and sensitivities to, long-term climate change
 - abiotic
 - ecological, including biodiversity
 - socio-economic
- d. impacts of extreme events - storms, cyclones, wildfires, high and low temperature extremes, precipitation extremes
 - contemporary and historical records
 - regional changes due to climate change
 - impacts
- e. adaptation options
- f. future research, including monitoring

6. Cryosphere, including permafrost (Subgroup C)

- a. summary, including methodologies, assumptions and scenarios

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- b. climate/ecological system characteristics, including biodiversity, human population and other critical factors
 - contemporary and historical records of snow cover
 - analysis of stability
 - permafrost
 - ice sheets
 - c. impacts and ranges of, and sensitivities to, long-term climate change
 - abiotic
 - permafrost degradation - gas release, stability of structures
 - ecological
 - permafrost degradation and vegetation cover
 - socio-economic
 - e. adaptation options
 - f. future research, including monitoring
7. **Marine ecosystems, oceans and inland seas (Subgroup B)**
- a. summary, including methodologies, assumptions and scenarios
 - b. climate/ecological system characteristics, including biodiversity and other critical factors
 - c. impacts and ranges of and sensitivities to long-term climate change
 - abiotic
 - ecological
 - socio-economic
 - d. impacts of extreme events
 - e. adaptation options
 - f. future research, including monitoring
8. **Coastal zones and small islands (Subgroup B)**
- a. summary, including methodologies, assumptions and scenarios
 - b. climate/ecological system characteristics, including biodiversity, human population and other critical factors

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- c. impacts and ranges of and sensitivities to long-term climate change (dynamic changes in sea-level)
 - abiotic
 - ecological
 - socio-economic
 - d. impacts of extreme events (e.g. tropical cyclones and storm surges, including frequency and severity)
 - abiotic
 - ecological
 - socio-economic
 - e. adaptation options
 - assessment of vulnerability to sea level rise
 - objectives of coastal zone management
 - coastal zone management planning
 - f. future research, including monitoring
9. **Freshwater systems, hydrology and water resources (Subgroups C and D)**
- a. summary, including methodologies, assumptions and scenarios
 - b. system characteristics, including associated ecosystem characteristics, human population and other critical factors
 - c. impacts and ranges of, and sensitivities to, long-term climate change
 - abiotic
 - regional changes of precipitation due to climate change
 - ecological
 - socio-economic
 - d. impacts of droughts and other extreme events
 - contemporary and historical records
 - regional changes due to climate change
 - impacts
 - e. regional vulnerability
 - f. adaptation options
 - g. future research, including monitoring

B. Economic Sectors

1. Energy Supply and Use (Subgroup A)

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- a. summary, including methodologies, assumptions and scenarios
 - b. sector characteristics, including anticipated changes due to non-climate factors (e.g., population growth)
 - c. impacts and ranges of, and sensitivities to, long-term climate change
 - d. impacts of extreme events - storms, cyclones, wildfires, high and low temperature extremes, precipitation extremes
 - contemporary and historical records
 - regional changes due to climate change
 - impacts
 - e. adaptation options
 - f. future research, including monitoring
- 2. Materials Supply and Use (Industry) (Subgroup A)**
- a. summary, including methodologies, assumptions and scenarios
 - b. sector characteristics, including anticipated changes due to non-climate factors (e.g., population growth)
 - c. impacts and ranges of, and sensitivities to, long-term climate change
 - d. impacts of extreme events - storms, cyclones, wildfires, high and low temperature extremes, precipitation extremes
 - contemporary and historical records
 - regional changes due to climate change
 - impacts
 - e. adaptation options
 - f. future research, including monitoring
- 3. Transportation (Subgroup A)**
- a. summary, including methodologies, assumptions and scenarios
 - b. sector characteristics, including anticipated changes due to non-climate factors (e.g., population growth)
 - c. impacts and ranges of, and sensitivities to, long-term climate change

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- d. impacts of extreme events - storms, cyclones, wildfires, high and low temperature extremes, precipitation extremes
 - contemporary and historical records
 - regional changes due to climate change
 - impacts
- e. adaptation options
- f. future research, including monitoring

4. Human Settlements (Subgroup A)

- a. summary, including methodologies, assumptions and scenarios
- b. sector characteristics, including anticipated changes due to non-climate factors (e.g., population growth)
- c. impacts and ranges of, and sensitivities to, long-term climate change
 - health
 - air quality
 - waste management and disposal
 - other issues
- d. impacts of extreme events - storms, cyclones, wildfires, high and low temperature extremes, precipitation extremes
 - contemporary and historical records
 - regional changes due to climate change
 - impacts
- e. adaptation options
- f. future research, including monitoring

5. Agriculture (Subgroup D)

- a. summary, including methodologies, assumptions and scenarios
- b. rainfed/dryland
 - system characteristics, including anticipated changes due to non-climate factors (e.g., population growth)
 - impacts and ranges of, and sensitivities to, long-term climate change
 - impacts of extreme events - storms, cyclones, wildfires, high and low temperature extremes, precipitation extremes
 - contemporary and historical records
 - regional changes due to climate change

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- impacts
- adaptation options
- c. irrigated
 - system characteristics, including anticipated changes due to non-climate factors (e.g., population growth)
 - impacts and ranges of, and sensitivities to, long-term climate change
 - impacts of extreme events - storms, cyclones, wildfires, high and low temperature extremes, precipitation extremes
 - contemporary and historical records
 - regional changes due to climate change
 - impacts
 - adaptation options
- d. agroforestry
 - system characteristics, including anticipated changes due to non-climate factors (e.g., population growth)
 - impacts and ranges of, and sensitivities to, long-term climate change
 - impacts of extreme events - storms, cyclones, wildfires, high and low temperature extremes, precipitation extremes
 - contemporary and historical records
 - regional changes due to climate change
 - impacts
 - adaptation options, including genetic engineering
- e. future research, including monitoring

III. ASSESSMENT OF MITIGATION OPTIONS

A. Energy Supply and Use (Subgroup A)

1. Description of energy sources and uses (e.g., industrial, commercial and residential energy use, extraction and processing, storage and distribution), including a summary of greenhouse gas emissions for the sector (as determined by Working Group I) and critical factors, including changes resulting from non-climate factors (e.g., population growth)
2. Mitigation options, including implementation measures, for energy supply and use (e.g., combustion efficiency, fuel substitution) and their potential impacts

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B. Transportation (Subgroup A)

1. Description of transportation modes and infrastructure, including a summary of greenhouse gas emissions for the sector (as determined by Working Group I) and critical factors, including changes resulting from non-climate factors (e.g., population growth)
3. Mitigation options, including implementation measures, for transportation modes and infrastructure (e.g., fuel efficiency, increased public transport, increased vehicle occupancy, modal shifts) and their potential impacts

C. Materials Supply and Use (Industry) (Subgroup A)

1. Description of industries, materials and uses, including a summary of greenhouse gas emissions for the sector (as determined by Working Group I) and critical factors, including changes resulting from non-climate factors (e.g., population growth)
2. Mitigation options, including implementation measures, for materials supply and use (e.g., use efficiency, material substitution, CFC's phase-out, aerosol emission controls) and their potential impacts

D. Human Settlements including waste management and disposal (Subgroup A)

1. Description of greenhouse gas emissions from human settlements, including a summary of greenhouse gas emissions for the sector (as determined by Working Group I) and critical factors, including changes resulting from non-climate factors (e.g., population growth)
2. Mitigation options, including implementation measures, for human settlements (e.g., district heating/cooling, building/housing fuel efficiency, trees and vegetation) and their potential impacts
3. Waste management and disposal
 - Mitigation options, including implementation measures, for waste management and disposal
 - waste recycling
 - methane collection

E. Agriculture (Subgroup D)

1. Description of agricultural practices and sectors, including production, storage, processing, transportation and marketing, and a summary of

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greenhouse gas emissions for the sector (as determined by Working Group I) and critical factors, including changes resulting from non-climate factors (e.g., population growth)

2. Mitigation options, including implementation measures, and their potential impacts

F. Managed Forests (Subgroup D)

1. Description of forestry practices and sectors, including a summary of greenhouse gas emissions for the sector (as determined by Working Group I) and critical factors, including changes resulting from non-climate factors (e.g., population growth)
 - boreal
 - temperate
 - tropical
2. mitigation options, including conservation and afforestation, and their potential impacts (climatic, ecological and socio-economic)

G. Cross-Sectoral Mitigation Options (All Subgroups)

1. Description of mitigation options (e.g., deep-sea carbon storage, sunlight screening, ocean biomass stimulation with iron) and their potential impacts

IV. METHODOLOGIES (All Subgroups)

(This section will contain a summary description of methodologies developed by the Subgroups for use by countries interested in undertaking impact assessments and technologies options assessments. The detailed methodologies will be contained in Appendix B)

1. Methodologies for impact assessments
2. Methodologies for adaptation and mitigation options assessments

APPENDIX A: METHODOLOGIES

A. Methodologies for impact assessments

B. Methodologies for adaptation and mitigation options assessments

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Appendix B. INVENTORY OF TECHNOLOGIES, METHODS AND PRACTICES**A. Adaptation**

1. Coastal zones and small islands (Subgroup B)
2. Oceans and marine ecosystems (Subgroup B)
3. Wetlands (Subgroup C)
4. Grasslands (Subgroup C)
5. Mountain regions (Subgroup C)
6. Agriculture (Subgroup D)
7. Forests (Subgroup D)
8. Water resources (Subgroup D)
9. Human settlements (Subgroup A)

B. Mitigation

1. Energy (Subgroup A)
2. Industry (Subgroup A)
3. Transportation (Subgroup A)
5. Waste management and disposal (Subgroup A)
6. Forests (Subgroup D)
7. Agriculture (Subgroup D)
8. Human settlements (Subgroup A)