

**OUTLINE FOR THE IPCC WORKING GROUP I CONTRIBUTION TO  
THE FOURTH ASSESSMENT REPORT**

**CLIMATE CHANGE 2007: THE PHYSICAL SCIENCE BASIS**

**Summary for Policymakers**

**Technical Summary**

**1. Historical Overview of Climate Change Science**

Executive Summary

- Introduction
- Progress in Observations
- Progress in Understanding of Radiative Forcing, Processes, and Coupling
- Progress in Climate Modelling
- Advances in Understanding Uncertainties

Appendix: Glossary of Terms

**2. Changes in Atmospheric Constituents and in Radiative Forcing**

Executive Summary

- Introduction
- Definition and Utility of Radiative Forcing
- Recent Changes in Greenhouse Gases
- Aerosols – Direct and Indirect Radiative Forcing
- Radiative Forcing due to Land Use Changes
- Contrails and Aircraft-Induced Cirrus
- Variability in Solar and Volcanic Radiative Forcing
- Synthesis of Radiative Forcing Factors
- GWPs and Other Metrics for Comparing Different Emissions

Appendix: Techniques, Error Estimation, and Measurement Systems

**3. Observations: Surface and Atmospheric Climate Change**

Executive Summary

- Introduction
- Changes in Surface Climate
- Changes in the Free Atmosphere
- Changes in Atmospheric Circulation
- Patterns of Variability
- Changes in the Tropics and Sub-Tropics
- Extra-Tropical Changes
- Changes in Extreme Events
- Synthesis: Consistency across Observations

Appendix: Techniques, Error Estimation, and Measurement Systems

#### **4. Observations: Changes in Snow, Ice and Frozen Ground**

Executive Summary

- Introduction
- Changes in Snow Cover and Albedo
- Sea Ice Extent and Thickness Changes
- Changes in Glaciers and Small Ice Caps
- Changes and Stability of Ice Shelves
- Changes and Stability of Ice Sheets
- Changes in Frozen Ground

Appendix: Techniques, Error Estimation, and Measurement Systems

#### **5. Observations: Oceanic Climate Change and Sea Level**

Executive Summary

- Introduction
- Changes in Ocean Salinity, Temperature, Heat Uptake, and Heat Content
- Biogeochemical Tracers
- Changes in Ocean Circulation and Water Mass Formation
- Sea Level: Global and Regional Changes

Appendix: Techniques, Error Estimation, and Measurement Systems

#### **6. Paleoclimate**

Executive Summary

- Introduction
- Proxy Methods and their Uncertainty
- Inferred Past Climate System Change
- Abrupt Climate Change
- Paleo-Environmental Model Evaluation and Sensitivity
- Synthesis: Insights into Climate System Behavior

Appendix: Guide to the Use of Paleoclimatic Information.

#### **7. Couplings Between Changes in the Climate System and Biogeochemistry**

Executive Summary

- Introduction to Biogeochemical Cycles
- The Carbon Cycle and the Climate System
- Global Atmospheric Chemistry and Climate Change
- Air Quality and Climate Change
- Aerosols and Climate Change
- The Changing Land Surface and Climate
- Synthesis: Interactions Among Cycles and Processes

#### **8. Climate Models and their Evaluation**

Executive Summary

- Advances in Modeling
- Evaluation of Contemporary Climate as Simulated by Coupled Global Models
- Evaluation of Large Scale Climate Variability as Simulated by Coupled Global Models
- Evaluation of the Key Relevant Processes as Simulated by Coupled Global Models
- Model Simulations of Extremes
- Climate Sensitivity
- Evaluation of Model Simulations of Thresholds and Abrupt Events
- Representing the Global System With Simpler Models

## **9. Understanding and Attributing Climate Change**

Executive Summary

- Introduction
- Radiative Forcing and Climate Response
- Seasonal-to-Interannual Predictions of Climate Change and their Reliability
- Understanding Pre-Industrial Climate Change
- Understanding Climate Change During the Instrumental Era

Appendix: Methods used to assess predictability

Appendix: Methods used to detect externally forced signals (detection/attribution)

Appendix: Methods used to assess uncertainty

## **10. Global Climate Projections**

Executive Summary

- Introduction
- Projected Radiative Forcing
- Timescales of Response
- Climate Change to 2100 and Beyond
- Sea Level Projections
- Scenarios and Simple Models
- Uncertainties in Global Model Projections

## **11. Regional Climate Projections**

Executive Summary

- Introduction
- Evaluation of Regionalization Methods
- Alternative Simple Methods
- Projections of Regional Climate Changes
- Small Islands
- Uncertainties in Regional Projections

**List of Authors and Reviewers**

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# OUTLINE FOR THE IPCC WORKING GROUP II CONTRIBUTION TO THE FOURTH ASSESSMENT REPORT

## CLIMATE CHANGE 2007: IMPACTS, ADAPTATION AND VULNERABILITY

### Summary for Policymakers

### Technical Summary

#### Introduction

- Scope of this Assessment
- Relation to other reports and studies

### A. ASSESSMENT OF OBSERVED CHANGES

#### 1. Assessment of Observed Changes and Responses in Natural and Managed Systems

- Methods in detection and attribution of observed changes
  - Data and methods in observation of current and recent changes, including extremes
  - Climate and non-climate drivers of change
  - Exploring confidence in methods and results
- Systems and sectors under investigation: observed changes including vulnerability and adaptation
  - Cryosphere
  - Hydrology and water resources
  - Coastal processes and zones
  - Terrestrial biological systems
  - Freshwater and marine biological systems
  - Agriculture and forestry
  - Human health
  - Aspects of socio-economic systems
  - Disasters and hazards
- Larger scale aggregation and attribution
  - Regional aspects and dimensions of the issue
  - Relative sensitivity, resilience and adaptive capacity of different systems
  - Assessing the relation of observed changes in systems to regional climate trends
  - Assessing the relation of observed regional climate trends to anthropogenic climate change
  - Uncertainties and confidence levels
  - Learning from current and recent observed adaptation

### B. ASSESSMENT OF FUTURE IMPACTS AND ADAPTATION: SYSTEMS AND SECTORS

#### 2. New Assessment Methodologies and the Characterisation of Future Conditions

- New developments in methods
  - Resulting uncertainties and confidence levels
- Characterising the future: climate/other environmental/socio-economic assumptions
  - Data requirements for assessment
  - Sensitivity analysis
  - The development and application of scenarios including extreme events
  - Stabilisation scenarios
  - Future requirements; caveats and uncertainties

*Content guide for subsequent chapters in section B:*

1. Scope, key issues, summary of TAR conclusions, specific methods
2. Current sensitivity/vulnerability: to weather and climate (including extreme events); and to other stresses; recent and current trends; current adaptation
3. Assumptions about future trends: climate, development, technology, etc.
4. Key future impacts and vulnerabilities
5. Costs and other socio-economic aspects
6. Adaptation: practices, options and constraints
7. Implications for sustainable development
8. Key uncertainties, confidence levels, unknowns, research gaps and priorities

### **3. Fresh Water Resources and their Management**

- Water cycle: precipitation, evapotranspiration, soil moisture, snow cover
- Surface water: rivers, lakes, ice cover; quantity and quality
- Groundwater: extraction, salinisation; quantity and quality
- Water demand and use: agriculture, industry, energy, domestic
- Extreme events: floods, droughts and other precipitation events

### **4. Ecosystems, their Properties, Goods and Services**

- Grasslands and savannahs
- Forests and woodlands
- Deserts
- Tundra
- Mediterranean ecosystems
- Wetlands
- Freshwater lakes and rivers
- Mountains
- Oceans, shallow seas and their ecosystems
- Overall implications for biodiversity

### **5. Food, Fibre and Forest Products**

- Food-crop farming
- Livestock production
- Industrial crops and biofuels
- Forestry
- Fisheries: marine and fresh water; aquaculture and marine farming
- Global food trade and food security
- Subsistence systems, local food supply, regional employment and rural livelihood
- Further environmental consequences with respect to: water use, run-off, land use

### **6. Coastal Systems and Low-lying Areas**

- Natural systems, including their services
  - Wetlands, mangroves, mudflats and coral reefs
  - Deltas, estuaries and lagoons
  - Beaches and cliffed coasts
  - Atoll island systems
- Human society

- Water supply (including aquifers)
- Agriculture, forestry and fisheries (including aquaculture)
- Human settlement, built infrastructure, industrial development; migration
- Health
- Tourism/recreation
- Extra-coastal effects on coastal environments
  - Inland effects: freshwater input and quality, sediment input
  - Oceanic effects

## **7. Industry, Settlement, and Society**

- Industry: manufacturing, construction, energy
- Services: retailing and trade, transport, tourism, insurance and finance
- Utilities: water supply, energy, waste disposal
- Human settlement: urbanisation, urban design, planning, rural settlement
- Social issues: demography, migration, employment, livelihood and culture

## **8. Human Health**

- Thermal stress
- Physical effects of extreme weather and climate events
- Synergies and interactions with environmental quality e.g. air and water quality and aeroallergens
- Infectious diseases (including water- and vector-borne) and changing distributions; emerging diseases
- Changes in food quality, food supply and nutrition
- Demographic, economic and social aspects of health
- Cumulative effects; multiple stresses

## **C. ASSESSMENT OF FUTURE IMPACTS AND ADAPTATION: REGIONS**

*Content guide for chapters in section C:*

1. Summary of knowledge assessed in the TAR
2. Current sensitivity/vulnerability: to weather and climate (including extreme events); and to other stresses; recent and current trends; current adaptation
3. Assumptions about future trends: climate, development, technology, etc.
4. Summary of expected key future impacts and vulnerabilities and their spatial variation
5. Adaptation: practices, options and constraints and their spatial variation
6. Case studies
7. Implications for sustainable development
8. Key uncertainties, confidence levels, unknowns, research gaps and priorities

### **Chapter 9: Africa**

### **Chapter 10: Asia**

### **Chapter 11: Australia and New Zealand**

### **Chapter 12: Europe**

### **Chapter 13: Latin America**

## **Chapter 14: North America**

## **Chapter 15: Polar Regions (Arctic and Antarctic)**

## **Chapter 16: Small Islands**

### **D. ASSESSMENT OF RESPONSES TO IMPACTS**

#### **17. Assessment of Adaptation Practices, Options, Constraints and Capacity**

- Methods and concepts: vulnerability, resilience, adaptive capacity
- Assessment of current adaptation practices: current vulnerability, risk management, local knowledge; adapting to current climate and other stresses; policies and institutions
- Assessment of adaptation capacity, options and constraints: criteria for decision making; effectiveness; benefits and costs; limitations/barriers; role of technology; links to development; equity issues
- Enhancing adaptation: opportunities; development and transfer of technologies and know-how; constraints; adaptive learning

#### **18. Inter-relationships between Adaptation and Mitigation**

- Elements for effective implementation: determinants, capacities
- Objectives and decision processes: reducing sensitivity vs. exposure; dealing with risk
- Scale issues: global, national, sectoral, local and project levels
- Timing issues: timing of outcomes, including rates of change; time discounting
- Differing roles of stakeholders: governments, private, civil society
- Consideration of costs and damages avoided and/or benefits gained
- Synthesis of complementarities and differences between adaptation and mitigation; mixes of strategies
- Uncertainties, unknowns, priorities for research

#### **19. Assessing Key Vulnerabilities and the Risk from Climate Change**

- Methods and concepts: issues relating to Article 2 of the UNFCCC; reasons for concern; measuring damage; identifying key impacts and vulnerabilities, and their risk of occurrence
- Approaches to determining levels of climate change for key impacts
- Assessing key global risks
- Assessing key risks for regions and sectors
- Assessment of response strategies to avoid occurrence: stabilisation scenarios; mitigation/adaptation strategies; avoiding irreversibilities; role of sustainable development; treatment of uncertainty
- Uncertainties, unknowns, priorities for research

#### **20. Perspectives on Climate Change and Sustainability**

- Summary of new knowledge relating to impacts and adaptation
- Impacts and adaptation in the context of multiple stresses
- Implications for environmental quality
- Implications for risk, hazard and disaster management
- Global and aggregate impacts
- Implications for regional and sectoral development; access to resources and technology; equity
- Sub-regional and local issues
- Opportunities, co-benefits and challenges for adaptation (including over long term)
- Uncertainties, unknowns, priorities for research

**List of authors, reviewers**

**Glossary**

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# OUTLINE FOR THE IPCC WORKING GROUP III CONTRIBUTION TO THE FOURTH ASSESSMENT REPORT

## CLIMATE CHANGE 2007: MITIGATION OF CLIMATE CHANGE

### Summary for Policy Makers

### Technical Summary

#### A. INTRODUCTION AND FRAMING ISSUES

##### 1. Introduction

- Article 2 of the Convention and mitigation
- Past, present, future, including previous IPCC reports
- Time scales
- Structure of the report, the rationale behind it, the role of Cross Cutting Themes and framing issues

##### 2. Framing issues

- The scope of the global climate change problem
- Climate change mitigation and sustainable development
- Mitigation, vulnerability and adaptation relationships
- Regional dimensions
- Technology research, development, deployment, diffusion and transfer
- Risk and uncertainty
- Distributional and equity aspects
- Cost and benefits concepts
- Decision making and implementation

Regional differentiation will be emphasized in all chapters in parts A, B, C and D as far as literature is available. However, this regional disaggregation may differ by sector and could be along different characteristics, such as level of development, national circumstances or geographical location.

#### B. ISSUES RELATED TO MITIGATION IN THE LONG-TERM CONTEXT

##### 3. Issues related to mitigation in the long-term context

###### Executive summary

- Emission scenarios: assessment of new literature since SRES
- Mitigation and stabilization scenarios and strategies, and costs and socio-economic implications (with appropriate uncertainties) including multiple gases
- Development pathways, trends and goals
- Role of technologies in long-term mitigation and stabilization: research, development, deployment, diffusion and transfer
- Interaction of mitigation and adaptation, in the light of climate change impacts and decision making under long-term uncertainties
- Linkages between short and medium term mitigation and long-term stabilization, including the implications of inertia, risk and uncertainty for decision making

## C. SPECIFIC MITIGATION OPTIONS IN THE SHORT AND MEDIUM TERM

Chapters 4-10 will follow the following template. Template issues will only be incorporated when relevant and when literature is available.

Executive summary

- Introduction
- Status of the sector, development trends including production and consumption, and implications
- Emission trends (global and regional)
- Description and assessment of mitigation technologies and practices, options and potentials (technical, economic, market and social), costs and sustainability
- Interactions of mitigation options with vulnerability and adaptation
- Effectiveness of and experience with climate policies, potentials, barriers and opportunities / implementation issues
- Integrated and non-climate policies affecting emissions of greenhouse gases
- Co-benefits of greenhouse gas mitigation policies
- Technology research, development, deployment, diffusion and transfer
- Long-term outlook / systems transitions, decision making; inertia and its relation with long-term/short-term choices, decision tools

### 4. Energy supply

### 5. Transport and its infrastructure (road, rail, aviation, shipping, including transport fuels)

### 6. Residential/commercial (including services)

### 7. Industry

### 8. Agriculture (including land use and biological carbon sequestration)

### 9. Forestry (including land use and biological carbon sequestration)

### 10. Waste management<sup>1</sup>

## D. CROSS SECTORAL, NATIONAL AND INTERNATIONAL DIMENSIONS

### 11. Mitigation from a cross-sectoral perspective

Executive summary

- Introduction, including system perspective, relationship with chapter 3, key issues across sectors and use of models/analysis
- Cross-sectoral mitigation options: description, characterization and costs
- Technology research, development, deployment, diffusion and transfer
- Synergies and trade-offs with other policies
- Overall mitigation potential and costs, including portfolio analysis and cross-sectoral modeling
- Macroeconomic effects
- Spill-over effects
- Assessment of bottom-up and top-down analysis
- Mitigation and adaptation - synergies and trade-offs

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<sup>1</sup> Recycling of industrial waste would be covered in chapter 7 as was done in TAR.

## **12. Sustainable development and mitigation**

Executive summary

- Introduction
- Impact of mitigation policies on sustainable development goals
- Impact of sustainable development policies on climate change mitigation
- Determinants of mitigative capacity (link to adaptive capacity in Working Group II)
- Sustainable development and climate change mitigation - issues and opportunities

## **13. Policies, instruments and co-operative arrangements**

Executive summary

- Economic and other generic policy instruments (including taxes, emissions trading)
- Implementation of and interaction between policies
- Climate change agreements and other arrangements (including international co-operation and insights from and interactions with other inter-governmental arrangements)
- Insights from and interactions with private, local and non-governmental initiatives

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