

POSSIBLE AREAS THAT COULD BE COVERED BY A TECHNICAL PAPER ON CLIMATE CHANGE AND WATER.

As agreed by IPCC-21

Executive Summary

1. Introduction to Climate Change and Water (~15-pages)

The first part of the report would seek to introduce basic concepts and issues involving climate change and water in the context of interlinkages with Agenda 21, WEHAB and the World Water Conference and global environmental change issues.

It would also describe the boundary conditions – observed and projected change in climate and socio-economic and environmental conditions.

- **Background**

This section would give a brief overview of relevant IPCC work, drawing especially on the findings of the TAR and AR4. It would continue with a review of how water resources issues have been addressed in climate change analyses and their relevance to policy formulation, and conversely, how climate change problems have been dealt with in water resources analysis and policy formulation. The section would conclude with the main rationale for writing the report and identify the target audience. The objectives would be described in detail in relation to the context and content of the technical paper.

- **Observed and Projected Changes in Climate.**

Observed changes in precipitation, temperature, vapor pressure, including palaeodata and projections of precipitation and temperatures.

- **Observed and Projected Changes in Socio-economic and Environmental Conditions.**

The subject of integrated scenarios for future socio-economic development would be introduced. Key sources of uncertainties, vulnerabilities and the issue of multiple baselines would be discussed. Implications of critical processes (multiple stresses) for climate change and water resources would be analyzed (e.g., globalization, urbanization, deforestation, land use and land cover changes, environmental pollution, desertification, biodiversity loss, etc.), taking into account regional differences where appropriate, as stemming from the IPCC Working Groups' contributions to TAR and AR4

2. Linking Climate Change and Water Resources (~100pages)

This part would constitute the main body of the report. Broadly, it would provide an assessment of the implications of climate change and climate change policies (adaptation and mitigation) for water resources (including links to other WEHAB sectors) and how they could affect the vulnerability of socio-economic and environmental systems to climate change.

Conversely, it should also assess the implications of changes in water resources on climate change and climate change policies.

Synergies and tradeoffs for achieving climate change and water management objectives would be analysed.

The main substantive points would be illustrated throughout with case studies and boxes, including lessons learned from - success stories as well as failures. Both successes and failures would be evaluated for both short and long term effectiveness. Each topic would be articulated in line with global, regional, national and local priorities, as appropriate.

- Observed Change and Variability in Hydrology and Water Resources

Detection of change in physical variables: runoff volume and timing, characteristics of floods and droughts, lake levels, groundwater, evapotranspiration, soil moisture, glaciers, snow cover, water quality, etc. Detection in managed variables (trends in flood damages, water supply crisis, etc).

- Climate Change Impact on Hydrological Cycle and Water Resources - Projections

Projected impacts of changes in mean climate and extreme climatic events on hydrological cycle (precipitation, evapotranspiration, streamflow, lake storage, infiltration, soil moisture, groundwater, aquifer recharge, snow cover, glaciers) and water resources. Water availability (e.g., water stress, region criticality). Water quality: potential impacts on surface waters (rivers, lakes and reservoirs) and groundwater. Coastal hydrology; sea water intrusion into deltas, estuaries and aquifers due to sea-level rise. Water-related consequences of CO₂ fertilization effect.

- Extreme Hydrometeorological Events – Floods and Droughts

What may happen with hydrometeorological extremes under climate change (i.e., changes in floods and droughts and their frequency, intensity, duration). ENSO and AO/NAO and other related events would also be considered.

- Feedback mechanisms in climate involving water
- Adaptation to Climate Change – Water Management

The essence of water resources management has always been – adaptation to changing conditions, e.g. natural variability of available water, or changes in water demand. Yet, adaptation to climate variability and change, might be very difficult, in particular in areas currently under multiple stresses, including water stress. Effects of climate change on water demand (e.g., its relation to population growth and economic development, impacts on agricultural, domestic, municipal and industrial demand, effect on irrigation withdrawals). Climate change and water resources planning and operation. Climate change scenarios for water resources management. Implication of non-linear climate induced effects for water management (i.e., critical thresholds, carrying capacity). Review of adaptation strategies applicable in water resources practice as well as elements affecting adaptive capacity. Adaptation options at different temporal and organizational scales (strategic, tactical, operational). - New decision support tools affecting adaptive capacity. Allocation of water among multiple competing uses. Stressing importance of institutional issues. Adaptation options cannot be seen in isolation but must be viewed within the context of Integrated Water Resources Management, and the other climate adaptation strategies, and sustainable development. Due care would be taken to include these issues in the AR4 undertaking.

- Climate Change Mitigation and Water

The effects of mitigation options (e.g., sequestration - reforestation) on quantity and quality of water in the different phases of the hydrological cycle (e.g. acid rain). Opportunities for energy use reduction in water sector (i.e., scope for energy efficiency gains, curbing emission from the water sector). Opportunities for increased contribution of hydropower to meeting energy demands. All of them would be compiled from the IPCC WG contributions to AR4.

- Analysing Implications of Interlinkages between Climate Change and Water Resources in Critical Areas (Systems and Sectors)

Water availability is indispensable to sustain life on Earth. It is needed, in large volumes, in every human activity. In this section, a number of critical areas (sectors and systems) would be reviewed in depth. The relevance of the report for practical policymaking would be enhanced, by focusing specifically on these key sectors and vulnerable systems. The main sectors and vulnerable systems identified include:

- agriculture and food security
- human health and sanitation (e.g., water-related ill health)

- arid, semi-arid and desert regions
- settlements
- land use and forestry
- natural ecosystems (both aquatic and terrestrial)
- coastal systems
- energy
- financial services and insurance
- industry
- transportation

Sample of problem areas: Water availability and demands in different sectors. Water for food security in the changing climate. Water and natural ecosystems (e.g. biodiversity, wetlands). Opportunities for increased contribution of hydropower to meeting energy demands. Extreme events and insurance.

- Analysing Regional Implications of Interlinkages between Climate Change and Water Resources
 - Africa
 - Asia
 - Australia and New Zealand
 - Europe
 - Latin America
 - North America
 - Polar Regions
 - Small Islands

Highlighting a few hotspots, that need priority attention due to severe vulnerability and multiple stresses.

3. Policy-relevant implications and suggestion for further work (~10 pages)

The final part of the report would summarize the main findings and draw appropriate, policy relevant, but not policy-prescriptive conclusions, as developed in AR4.

- Policy Relevant Implications

This section would begin with a discussion of timing issues, synergies, and trade-offs between climate change, mitigation and adaptation and water management objectives. By explicitly examining the interactions between climate change and water, the potential for developing integrated policy packages would be assessed. Analysis of the sustainable development context of climate change and water would be given.

- Gaps in knowledge and Suggestions for Future Work

The TPCCW would present in simple, accessible language for decision making - the suggestions for further work, based on the analysis of the information on gaps in scientific knowledge, weaknesses in the interaction between science and policy, and shortcomings in the dissemination of knowledge to stakeholders, as indicated in AR4.