

## FIFTH ASSESSMENT REPORT

### Expert Meetings and Workshops<sup>1</sup>

#### PLANNED AR5 EXPERT MEETINGS AND WORKSHOPS (OVERVIEW)

| Title  | Proposed by Working Groups involved       | Related to CCM/ CCT or new scenarios               | Time                                    | Duration     | Location            | Participants | Proposal attached |
|--|---|--|---|--------------|---------------------|--------------|-------------------|
| IPCC Expert Meeting on Detection and Attribution Related to Anthropogenic Climate Change   | WGI / WGII Co-Chairs                      |  | 14-16 Sep.09 (Already Held)             | 3 days       | Geneva, Switzerland | 40           | √                 |
| IPCC Expert Meeting on Assessing and Combining Multi Model Climate Projections   | WGI / WGII Co-Chairs                      |  | 25-27 Jan 2010                          | 2.5-3 days   | Boulder, CO, USA    | 40           | √                 |
| Expert Meeting on Human Settlement, Water, Energy and Transport Infrastructure - Mitigation and Adaptation Strategies  | WGIII Co-Chairs                           | Mitigation, adaptation and sustainable development | March/ April 2010                       | tbd          | tbd                 | 80           | √                 |
| IPCC Workshop on Sea Level Rise and Ice Sheet Instabilities  | WGI Co-Chairs                             | Ice sheets and sea level rise                      | 21-24 June 2010 (tbc)                   | 4 days       | Malaysia (tbc)      | 120          | √                 |
| IPCC Workshop on Socioeconomic Scenarios for Climate Change Impact and Response Assessments  | Joint WGII / WGIII                        | New scenarios                                      | Oct 2010 (tbd)                          | 3-4 days     | tbd                 | 70           | √                 |
| Expert Meeting on consistent evaluation of uncertainties and risks   | WGII, possibly involving all WGs          | Consistent evaluation of uncertainties and risks   | Nov 2010 (tbd)                          | 2 days       | tbd                 | tbd          |                   |
| IPCC Workshop on Impacts of Ocean Acidification on Marine Biology and Ecosystems   | Government of Japan, WGI / WGII Co-Chairs | Carbon cycle including ocean acidification         | Feb 2011 (tbd)                          | tbc          | Japan               | 100          | √                 |
| Expert Meeting on Economic Analysis, Costing Methods and Ethics  | WG III/WG II Co-Chairs                    | Costing and economic analysis                      | March 2011 (tbd)                        | 3 days (tbd) | tbd                 | 70 (tbd)     | √                 |
| <b>Other expert meetings and workshops</b>   |   |  |   |              |                     |              |                   |
| Joint IPCC-NRC expert meeting on RCP-2   | WG II                                     | New Scenarios                                      | 2010                                    | tbd          | tbd                 | tbd          |                   |
| Expert meetings on bottom-up/top/down  | WG III                                    | WG III   | 4x2 days, back to back with LA meetings |              |                     | LA s         |                   |
| Regional expert meetings   | WG II                                     | to support Part B of WGII                          | 2011-2012                               | tbd          | tbd                 | tbd          |                   |
| Expert meetings with business and NGOs   | WG III, possibly other WGs                | to support AR5 review process                      | tbd                                     | tbd          | tbd                 |              |                   |
| GEO-IPCC Expert Consultation: "How GEOSS could serve the data needs of the climate impacts and adaptation research communities and support the IPCC assessments" | WGII                                      | General support                                    | 17-19 May 2010                          | 3 days       | Geneva, Switzerland | 40           | √                 |

<sup>1</sup> For any updates please consult the IPCC Website

# **Proposal for a Joint IPCC WGI/WGII Expert Meeting on Detection and Attribution Related to Anthropogenic Climate Change**

*Submitted by the Co-Chairs of IPCC Working Group I and Working Group II*

## **Background**

In the IPCC Fourth Assessment Report in 2007, the WGI report concluded that “it is likely that there has been significant anthropogenic warming over the past 50 years averaged over each continent except Antarctica,” but that “difficulties remain in reliably simulating and attributing observed temperature changes at smaller scales.” Combining this with several sets of evidence including that “Observational evidence from all continents and most oceans shows that many natural systems are being affected by regional climate changes, particularly temperature increases,” WGII was able to conclude that “Anthropogenic warming over the last three decades has likely had a discernible influence at the global scale on observed changes in many physical and biological systems.” Improving technical aspects of detection and attribution, especially harmonizing terms and definitions, is an important goal to advance this topic, with emphasis on impact-relevant changes in the climate system and impacts in natural and human systems. The expert meeting will cover the full set of fundamental detection and attribution issues, including techniques, interpretation and specific examples that are relevant to changes in climate and impacts for the Fifth Assessment Report (AR5).

## **Aims of Expert Meeting**

1. Develop consistency and coherence of terminology used for detection and attribution in WGI and WGII, and better understanding of the methods used by the two working groups including their advantages and limitations;
2. Advance the science of attribution of impact-relevant climate change, such as attribution of changes on regional scales, in precipitation and extremes, and of events; as well as the science of the attribution of impacts of climate change, such as on ecosystems, cryosphere, human health, agriculture, etc. Consideration will also be given to the attribution of specific weather events;
3. Improve the understanding of the role that may be played by confounding influences in attribution studies, including internal variability of climate and of the systems, and other factors such as land-use change, other natural and anthropogenic forcings including aerosols, pollution, invasive species, human management, etc.;
4. Expand coverage of data and studies to include more regions and more systems, particularly in the tropics and the Southern Hemisphere, and in developing countries;
5. Develop a better understanding across the two working groups at an early stage in the development of the AR5, thereby improving the process of synthesis.

## **Steering Group**

Thomas Stocker (WGI Co-Chair)

Dahe Qin (WGI Co-Chair)

Chris Field (WGII Co-Chair)

Vicente Barros (WGII Co-Chair)

A scientific steering committee with broad representation is being formed.

**Timing:** 14-16 September 2009, immediately before planned IPCC Bureau Meeting

**Duration:** 2.5 to 3 days

**Location:** Geneva (tbc)

**Participants**

About 40 participants in total, with broad international representation. It is proposed that 16 journeys for experts from developing countries and economies in transition including WGI and WGII Vice-Chairs are allocated as part of the line item “expert meetings related to the AR5” in the already agreed IPCC Trust Fund budget for 2009.

**Expertise**

Detection and attribution of climate change and of the impacts of climate change;  
additional expertise: climate observations and modelling, cryosphere, hydrology, terrestrial ecosystems, marine ecosystems, coastal zones, agriculture, human health, etc.

# **Proposal for an IPCC Expert Meeting on Assessing and Combining Multi Model Climate Projections**

*Submitted by the Co-Chairs of IPCC Working Group I and Working Group II*

## **Background**

Climate model results provide the basis for IPCC projections of future climate change. Previous assessment reports included model evaluations but avoided weighting or ranking models. Projections and uncertainties were based on a 'one model, one vote' approach, despite the fact that they differed in terms of resolution, processes included, forcings and agreement with observations. Projections in the IPCC's Fifth Assessment Report (AR5) will be based largely on the Coupled Model Intercomparison Phase 5 (WCRP CMIP5), a collaborative process in which the community has agreed on the type of simulations to be performed. The widespread participation in CMIP5 provides some perspective on model uncertainty. Nevertheless, these intercomparisons are not designed to yield formal error estimates and remain 'ensembles of opportunity.'

Since participation in the IPCC process is important for modelling centres, the number of models and model versions is likely to increase in CMIP5. Some groups may submit multiple versions of the same model with different parameter settings. The new generation of models is likely to be more heterogeneous than ever, as some but not all of the new models will include interactive representations of biogeochemical cycles, chemistry, ice sheets, land use or interactive vegetation. This makes a simple model average increasingly difficult to defend and to interpret. Many models are not independent and some are clearly more robust than others when compared with selected observations.

The reliability of projections could be improved if the models were weighted according to some measure of skill and if their interdependencies were taken into account. Indeed such methods using forecast verification were shown to be superior to simple averages in the area of weather forecasting. Since there is no verification for a climate forecast on timescales of decades to centuries, the skill or performance of the models needs to be defined, for example, by comparing simulated patterns of present day climate to observations. Such metrics are useful but not unique and often it is unclear how they relate to the forecast of interest. Defining a set of minimum criteria for a model to be 'credible' or agreeing on a metric of performance is therefore difficult and the criteria are likely to depend on the variable and timescale of interest. Combined with an estimated data volume exceeding 1000 Terabytes, the AR5 faces immense obstacles in trying to make sense of the deluge of model runs and data that it will produce.

Recent studies have started to address these issues by proposing ways to weight or rank models, based on process evaluation, agreement with present day observations, past climate or observed trends. While there is agreement that 'the end of model democracy' may be near, there is no consensus on how such a model selection or weighting process could be agreed upon. An IPCC expert meeting addressing these important questions will help to bring the community into a position to make better use of the new model results and will provide more robust and reliable projections of future climate, along with improved estimates of uncertainty. At the same time, the dialogue between WGI and WGII should be strengthened in order to determine what kind of model results from WGI can be provided to WGII and how that exchange can be organized efficiently, given the tight schedule of the AR5.

## **Objectives**

The main objective of the expert meeting is to see if it is possible to establish some type of framework for using and assessing the AR5 model set. Components of this effort are

- To stimulate discussion on metrics to evaluate climate models;
- To learn from other communities where model skill based on forecast verification is used;
- To assess the potential of different model weighting, ranking and selection schemes for not equally credible models for their use in IPCC AR5;
- To determine whether minimum model performance requirements for inclusion in AR5 should and can be defined.

## **Expected outcome**

The expert meeting will provide tentative best practices in selecting and combining results from multiple models for IPCC AR5; in short the beginning of a quantitative framework for analysis and assessment of the models. Specific aims of the meeting will be to maximize the robustness and policy relevance of the projections provided in the presence of model error, projection uncertainty, observational uncertainties and a heterogeneous set of models. Interactions between WGI and WGII will be ensured by the participation of a number of representatives from WGII with broad expertise on impacts and user needs.

**Initial organising committee** (a broader scientific steering committee will be formed)

Prof. Reto Knutti (ETH Zurich, Switzerland)

Dr. Benjamin Santer (Lawrence Livermore National Lab, USA)

Dr. Penny Whetton (CSIRO, Australia)

Dr. Mat Collins (Met Office Hadley Centre, UK)

Dr. Daithi Stone (University of Cape Town, South Africa)

Dr. Claudia Tebaldi (Climate Central/NCAR, USA)

Dr. Karl Taylor (Program for Climate Model Diagnosis and Intercomparison, LLNL, USA)

**Timing:** late 2009/early 2010, after the AR5 Scoping Meeting (dependent on date decided for IPCC 31st Plenary)

**Duration:** 2.5 to 3 days

**Location:** possible host organizations have been identified and are being explored with the relevant IPCC national focal point

**Participants:** About 40 participants in total, with broad international representation. It is proposed that 16 journeys for experts from developing countries and economies in transition including WGI and WGII Vice-Chairs are allocated as part of the line item “expert meetings related to the AR5” in the already agreed IPCC Trust Fund budget for 2009.

**Expertise:** Climate model development, model evaluation, statistical methods, uncertainty quantification.

# Concept paper for an IPCC Expert Meeting on Human Settlement, Water, Energy and Transport Infrastructure – Mitigation and Adaptation Strategies

(Submitted by Working Group III Co-Chairs)

## 1. The case for an expert meeting

Cities and other human settlements are at the forefront of climate change. As large emitters of GHG emissions, they significantly contribute to climate change. Simultaneously, due to their concentration of population and infrastructure assets, cities are especially vulnerable to the impacts of climate change. Infrastructure investments in the near future will determine the emission paths of cities in the long-run. Hence, cities are a point where adaptation is necessary and mitigation is possible, in a context of sustainable development.

**Gaps in AR4.** While urban planning is referenced in AR4 at times, there is no comprehensive survey on the role which urban planning can play in adaptation and mitigation, let alone a quantitative overview of the possible contributions of different measures and their costs. Encompassing strategies for urban areas are not discussed. Neither are there estimates on current GHG emissions related to infrastructure. If infrastructure is mentioned, only case studies are presented, stating nothing about general applicability. AR4 states that a credible assessment on general adaptation prospects and on mitigation in the transport sector is limited due to the number and scope of available studies of mitigation potential and cost [AR4,WGII,7.6.7; AR4, WGIII,5.ES].

**The Expert Meeting.** Therefore, the issue of human settlements and infrastructure should be further explored in an expert meeting that will feed into the AR5. However, due to the outcome there may also be the case for a Special Report on the issue.

## 2. The Issues

### 2.1 Human Settlements and Climate Change

**Urban population.** The world's urban population is 3.2 billion (48,6%) [UN, World Urbanization Prospects: The 2007 Revision], 0.6 to 1.2 billion (10-23% of world population) are estimated to live in near<sup>1</sup> coastal regions [AR4,WGII,7.4.2.4].

**Urban emissions.** Cities are major emitters of GHG emissions. The scale of emissions is in large parts determined by the infrastructure and, in part, by the way it is used. The main sources are direct emissions from energy generation from fossil fuels for (residential and non-residential) buildings, vehicle use and industry as well as indirect emissions from the generation of electricity for different purposes.

**Human settlements and climate change.** AR4 discusses the effects of sea-level rise on coastal settlements, physical infrastructure and water supplies. The vulnerability of urban areas to sea level rise is greatly increased when coinciding with increasingly frequent extreme weather events such as storms causing coastal and river flooding [AR4,WGII,6.4.2.3]. According to SRES in all BAU scenarios over 100 million people will be flooded annually (in case of an above 40cm rise) [AR4,WGII,6.4.2.3]. Further stress is put upon cities by Urban Heat Island (UHI) effects or the loss of permafrost. These impacts go beyond urban areas, since these areas mostly play a leading role in regional and global economy [AR4,WGII,7.4.2.4]. Climate change further has an impact on infrastructure being common to all human settlements such as buildings, transportation networks, water supply, wastewater infrastructure and energy facilities [IPCC Technical Report VI].

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<sup>1</sup> up to 100m elevation, maximum of 100km distance from coast

The vulnerability to climate change is especially high in urban areas that are already under distress due to problems typical of the mega-cities in developing countries (scarcity of water, governance structure, unmet resource requirements, congestion, poverty, political and economic inequality, insecurity, growth, aging infrastructure) [AR4,WGII,7.4.2.4]. Especially mega-cities and rapidly growing mid-sized cities in developing countries are already today near their threshold of sustainability [AR4,WGII,7.4.3]. Informal urban settlements in developing countries are especially vulnerable [AR4,WGII,7.4.2.4].

**Adaptation.** Key adaptation issues are strategies to reduce stresses and impacts, the comparison of costs and benefits and limits to adaptation. Ways to adapt are: Introduction of advance warning systems, public awareness and capacity building, institutional structure facilitating collective action, economic systems allowing access to alternatives, contingency planning, risk management and financing and investment in physical infrastructure [AR4 WGII,7.6.7] to increase resilience [AR4,WGII,7.6.4]. Many coastal cities need improved embankment, barrages [AR4,WGII,6.4.2.3] and storm drainage systems [AR4,WGII,7.6.4]. Adaptation requires long lead times [AR4,WGII,7.6.4].

**Mitigation.** Within existing infrastructures, there is some scope for technical optimization as well as changes in lifestyle. However, in order to achieve a significant change in emissions levels a change in infrastructure will be necessary.

A distinguishing feature of infrastructure assets such as buildings, roads, energy and water networks is their longevity. That is, once investments are made they determine the emission level for decades. This has implications for the necessary policy design as well as for the owners of the infrastructure assets and for investments in new infrastructure (private or public), respectively. That is, structural change requires reliable long-term policies and land-use planning in order to avoid premature capital depreciation. From an investor's point of view, these long investment cycles bear an additional regulatory risk in addition to the risk that emerges from the impacts of climate change itself. This regulatory risk emerges from the societies' mitigation efforts in order to curb climate change. Carbon pricing, for instance, may devalue emission intensive assets, such as coal-fired power plants (UNEP FI 2002). Against this background, the rapid urbanization in many developing countries constitutes a particular challenge.

## 2.2 Sectoral Views

**Transport.** The transport sector is responsible for 23% of the world's energy-related CO<sub>2</sub> emissions (2004) and has the highest growth rate among the end-user sectors. Public transport systems, promotion of non-motorized transport, transport demand management (TDM), heavily taxed motor fuels, increase of biofuel, electricity and hydrogen based transportation, esp. for individual transport, other technological advances, policies ensuring application of those technologies, fuel economy regulations and increases in efficiency can contribute to GHG mitigation [AR4,WGIII,5.ES]. Uncertainties involved are the world oil supply and price, the price of carbon in ETS and technological progress (e.g. improved batteries).

**Energy Infrastructure.** In the case of energy, the future energy grids need to be designed to integrate large shares of renewable, i.e. intermitting energy. That requires the so-called smart grids and super grids and storage systems (air pressure, water storage).

**Water.** Through climate change the intensity and frequency of extreme weather events increases, leading to an increase of precipitation, sea-level rise, storms and floods. This causes saline intrusion, a change in water tables and a worsening of water availability and quality. The degree of impact varies regionally and is especially severe in semi-arid developing countries, on rivers fed by glacier melt and seasonal snow melt, in coastal megacities and more general in coastal lowlands. The situation is worsened by the population growth in many developing countries causing a higher demand for adequate, safe water access. Thus, substantial investment in infrastructure, such as coastal facilities, ports, water supply, storm water drainage systems and sewers is needed for adaptation. This needs to be combined with sustainable water and land-use management providing buffers for water and taking climate variability into account. The following gaps in AR4 need to be filled: The impact of climate change on water quality needs to be better understood. Water-related consequences of different policies

need to be analysed as well as the impact of water management on other policies. Further, profound approaches of risk analysis have to be developed. [IPCC Technical Report VI: 4.5, 4.6.2, 6.2.6, 7.4, 8.2, 8.3]

### **3. Infrastructure policy framework as the nexus of adaptation and mitigation in the context of sustainable development.**

With the exception of dykes and other flood barriers, most infrastructures – especially urban ones – are not exclusively dedicated to mitigation of or adaptation to climate change. Instead, they are built to serve human needs such as housing, energy, water, transport, communication a.s.o. Additional characteristics such as being low carbon intensive or being “climate impact proof” are new or changing side constraints that were not relevant before. The consideration of these new/modified constraints would be a relevant component of revised policy frameworks for infrastructure development in human settlements.

Therefore, the creation of an appropriate infrastructure is at the heart of sustainable development. Revised policy frameworks for infrastructure development in human settlements would include the need to build infrastructure that accomplish the following requirements: (i) low carbon intensity (ii) “climate impact proof” and (iii) provision of the required services.

# **Proposal for an IPCC WGI Workshop on Sea Level Rise and Ice Sheet Instabilities**

*Submitted by the Co-chairs of IPCC Working Group I*

## **Background**

Among the major long-term consequences of climate change is global sea level rise. A reliable global-scale projection is required in order to quantify coastal impacts and to assess the sustainability of coastal settlements around the world. In particular, small islands are already now affected by rising sea level and therefore a reliable estimate of future rates of increase of sea level is crucial. Sea level rise is caused by a number of processes with contributions from: (i) thermal expansion of the ocean, (ii) melting of glaciers and small ice caps, (iii) melting of Greenland and Antarctica, (iv) changes in ocean circulation, and (v) changes in water storage on land. Both the size and the uncertainty of each of these contributions need to be quantified in order to make a useful projection of global sea level rise and its regional expression.

The Fourth Assessment Report of IPCC (AR4), as well as post-AR4 studies, have shown that melting of polar ice caps substantially contributes to the observed sea level rise, but that major limitations exist in the scientific understanding of the response of the two large polar ice sheets, Antarctica and Greenland, to the direct effects of surface warming and changes in accumulation (snow fall) as well as to indirect effects such as subsurface ocean warming and sea level rise feedback. This is the primary reason for the large uncertainty in the AR4 projections of sea level rise for the 21st century. The possibility that ice stream and whole ice sheet instabilities may be triggered by slow changes in the forcing adds additional uncertainty. In particular, renewed discussion of instabilities of the West Antarctic Ice Sheet and of thresholds for a Greenland ice sheet meltdown requires comprehensive assessment. The lack of both scientific understanding and a sufficient observational base concerns primarily ice sheet-bedrock interactions as well as ice sheet hydraulics.

WGI has acknowledged the policy relevance of this specific topic and has proposed a chapter on "Sea Level Change" in its contribution to the Fifth Assessment Report of IPCC (AR5). In order to discuss the current understanding comprehensively across various scientific disciplines, ranging from oceanography, ice sheet dynamics, glacier research and hydrology, WGI proposes to the IPCC Plenary to organize an IPCC Workshop on "Sea Level Rise and Ice Sheet Instabilities" to be held in mid-2010. This timing permits input to the AR5 process already at an early stage. Projections of sea level rise require the combination of information from various different fields, and therefore robust procedures with respect to estimating uncertainties should also be discussed in this workshop.

## **Aims of Workshop**

- Bring together the leading world experts on all issues related to sea level rise, including the field of ice sheet dynamics and ice sheet instabilities, in order to accelerate scientific research that will feed results into the AR5;
- Collect and discuss the latest results from observations related to sea level rise (global mean and regional variability) from oceanographic, cryospheric and paleo records,

including information on thermal expansion of the ocean, melting of glaciers and small ice caps, changes in the mass balance of Greenland and Antarctica, changes in ocean circulation, and changes in water storage on land;

- Expose the current understanding, and limitations, of ice sheet and ice stream dynamics, including information on their sensitivity to changes in the forcings and on potential irreversibility associated with ice stream or whole ice sheet instabilities;
- Critically evaluate modelling tools used to project sea level rise (global mean and regional variability; decadal to centennial time scale), the resulting projections, and review and constrain associated uncertainties.

### **Organizing Group (about 5-6 members)**

Thomas Stocker (WGI Co-Chair, Switzerland)

Dahe Qin (WGI Co-Chair, China)

Richard Alley (USA)

Annie Cazenave (France)

Leonard Nurse (Barbados)

Fredolin Tangang (WGI Vice Chair, Malaysia)

A Scientific Steering Committee with broad representation will be formed.

**Timing:** week beginning 21 June 2010 (tbc)

**Duration:** 4 days

**Location:** Malaysia (tbc)

### **Participants**

About 120 participants (experts) in total. In order to ensure broad international representation, it is proposed that there should be a call for governments to nominate scientific experts to attend the workshop. The budget proposed for adoption at IPCC-XXXI includes an allocation of 40 journeys for experts from developing countries and economies in transition including the WGI Vice-chairs. This allocation was tentatively agreed at IPCC-XXX as part of the line item “Workshops related to the AR5” in the already agreed IPCC Trust Fund budget for 2010.

### **Expertise**

Ocean observations and remote sensing of ocean changes, sea level observations, tide gauges, direct measurements on, and remote sensing of, polar ice sheets, ice sheet dynamics, ice sheet-bed rock-ocean interaction, changes in water reservoirs on land, paleo ice sheet reconstruction, models of sea level rise, ice sheet models, glacial isostatic adjustment modeling.

## **Proposal for a Joint IPCC WGII/WGIII Workshop on Socioeconomic Scenarios for Climate Change Impact and Response Assessments**

### **Background**

During its 25th session (Mauritius, 26–28 April 2006), the IPCC decided that rather than directly coordinating and approving new scenarios itself, the process of new scenario development should be coordinated by the research community, with the IPCC catalyzing the development of and assessing results from a new set of scenarios as part of the Fifth Assessment Report (AR5) cycle. This new set is intended to replace and extend the scenarios used in earlier IPCC assessments, and to be compatible with the full range of available baseline and policy emission scenarios.

These scenarios are referred to as “representative concentration pathways” (RCPs), and were developed with the goals of integrating (a) climate change and earth system models (ESM) projections of climate change, (b) integrated assessment models (IAM) projections of changes in GHG emissions, and (c) projections of impacts, adaptation and vulnerabilities (IAV) under different assumptions about emission trajectories and socioeconomic development.

The research community outlined three phases of scenario development: a preparatory phase and two main phases of scenario development—a parallel product development phase and an integration, dissemination, and application phase. In the preparatory phase, radiative forcing pathways based on four integrated assessment (IA) concentration and emissions scenarios were chosen from the existing literature and provided to climate modelers. The RCPs are in the process of being input into ESM to produce a new set of climate simulations that will be used for mitigation, impacts, and adaptation analyses.

### **Rationale for an IPCC Workshop on Socioeconomic Scenarios and Storylines**

During the development phase, the IPCC Expert Meeting Towards New Scenarios for Analysis of Emissions, Climate Change, Impacts, and Response Strategies, held in Noordwijkerhout, The Netherlands (19–21 September, 2007), called for the organization of a meeting of the IAM and impact and adaptation communities to develop a joint strategy for storyline development. The need for such a workshop was reiterated by the Task Group established by the IPCC during its 30th session in Antalya, Turkey (21-23 April, 2009) to facilitate the catalytic role of the IPCC.

With the RCPs, climate model simulations are envisioned to be complemented by a “library of socioeconomic scenarios and storylines” to inform impacts and adaptation analyses and IAM emission trajectories in ways that are mutually consistent. While each RCP was generated by an IAM driven by a set of assumptions about future socioeconomic development, technology, and policy, many other alternative sets of assumptions could result in the same concentration/radiative forcing pathway. This flexibility is an intentional and innovative feature of the RCP process. However, the assumptions chosen can significantly affect the outcomes of impacts and adaptation projections and analyses. Consistent scenario definitions of baseline and mitigation scenarios are critical to ensure comparability across studies that will be assessed in the IPCC AR5; this process needs to be initiated soon. An IPCC Workshop involving

the relevant communities engaged with the scenario development is necessary to address these issues.

### **Aims of IPCC Workshop**

The overall aim of the workshop is laid down in the Noordwijkerhout report (II.3.2 – New IAM scenarios). In detail this includes:

1. Development of consistent sets of baseline and mitigation scenarios that allows for an assessment of all relevant mitigation and adaptation options. Therefore, baseline and mitigation scenarios will be analyzed in terms of impacts, adaptation needs and mitigation requirements. These alternative scenarios should cover and lay open the reasonable range of socio-economic, technological and climate science assumptions and employ the RCPs as benchmark scenarios.
2. Identify the most crucial socio-economic uncertainties and underlying assumptions relevant for baseline as well as mitigation scenarios, such as demographic development, land-use changes, technological change, macro-economic growth and trade patterns.
3. Exploring a number of (mitigation) scenario which take into account more “real world” mitigation scenarios like the limited availability of certain technologies, delayed participation of crucial countries, sub-optimal design of policy instruments like taxes and emission trading schemes as well as other barriers of implementation.
4. Outline a valid, robust, and consistent approach across the IAM and IAV communities to employing these alternative scenarios that characterize and frame different possible futures in each set of baseline and mitigation scenario.
5. Extract and identify a minimum set of illustrative quantitative socioeconomic trajectories that can be clustered to develop narrative storylines relevant to IAV and IAM ex-post analyses.

### **Science Steering Group**

WGIII Co-Chairs: Ottmar Edenhofer, Ramon Pichs, Youba Sokona; WGII Co-Chairs: Vicente Barros and Chris Field will chair the Science Steering Group. Additional members will be identified from Working Group II and III scientists.

**Timing: 2010**

**Duration: 3-4 Days (IPCC Workshop)**

**Participants: ca. 70**

**Trust Fund: 30 Journeys of the 2010's pre-defined budget-line “New Scenarios” are requested.**

## **Proposed IPCC Workshop on Impacts of Ocean Acidification on Marine Biology and Ecosystems**

Submitted by:  
Government of Japan  
WGII and WGI Co-Chairs

October 5, 2009

### Background

The oceans currently absorb about one-third of fossil fuel CO<sub>2</sub> emitted to the atmosphere and have, as a consequence, been increasing in acidity. Ocean acidification is now recognized as a critical component of global change, potentially responsible for a wide range of impacts on ecosystems, with subsequent consequences on livelihoods and food security. Further, one important aspect is that more CO<sub>2</sub> mitigation may be required to achieve particular stabilization targets, because acidification limits the ability of the oceans to continue to absorb CO<sub>2</sub>. Previous IPCC assessment reports considered biogeochemical and temperature effects of anthropogenic carbon on the oceans, but the direct impacts of ocean acidification, its combined effects with ocean warming on marine ecosystems and productivity, and potential feedbacks to the climate system have not been fully assessed.

The Synthesis Report of AR4 concluded: *While the effects of observed ocean acidification on the marine biosphere are as yet undocumented, the progressive acidification of oceans is expected to have negative impacts on marine shell-forming organisms and their dependent species* [IPCC 2007 Synthesis report 3.3.4]. The Technical Summary of AR4 WG2 concluded: *Ocean acidification is an emerging issue with potential for major impacts in coastal areas, but there is little understanding of the details. It is an urgent topic for further research, especially programmes of observation and measurement* [IPCC 2007 WG2 Box TS.5].

Since the publication of the AR4, ocean acidification research, especially experimental studies of the impact of increased concentrations of seawater CO<sub>2</sub> on marine biology in different regions, and modeling studies of future ocean environments, has been advancing rapidly. With this progress and increasing interest from stakeholders in understanding the implications of ocean acidification, it is extremely valuable to have the IPCC sponsor a meeting of the growing scientific community, which would stimulate communication among the scientists, encourage efficient transfer of information to modelers, and encourage the production of peer-reviewed papers that will be assessed in the AR5. The report of the meeting will focus attention on a specific issue highlighted in the AR4 as requiring additional work

### Aim of Workshop

The strategic aim of the Workshop will be to update the rapidly advancing scientific findings on ocean acidification and its impacts since the publication of AR4, and to provide comprehensive, timely scientific information as input to AR5.

The specific aims should include:

- Synthesis of observations and projections of ocean CO<sub>2</sub> and seawater pH including geochemical carbon budget studies for open and coastal ocean systems;
- Summary of manipulation experiments up to mesocosm scale focused on assessing

biological and ecosystem impacts of ocean acidification, including the combined effects of ocean acidification and climate change and the implications for livelihoods and food security;

- Discussion of possible ecosystem modeling techniques to study ecological and socioeconomic impacts of future ocean acidification;
- Assembling and assessing emerging scientific findings on ocean acidification to update the AR4 and contribute to the development of the AR5.

#### Scientific Steering Group

A Scientific Steering Group (SSG) for the planning and execution of the Workshop will be established, taking into account the need for balanced scientific expertise, as well as geographical and developed/developing country representation. The WGII and WGI Co-chairs will jointly lead the SSG selection process and the meeting planning, with WGII taking the operational lead for the meeting.

#### Product

A workshop report, based on material presented or discussed at the workshop or in the recent literature, will be produced by mid-2011. The workshop report is expected to organize the results of existing research, highlight key issues, identify major unknowns, and stimulate new research, providing an important starting point for the assessment in the AR5.

#### Timetable and Location

The Workshop is proposed to be held in the first quarter of 2011 in Japan (exact venue to be decided).

#### Participants

About 100 participants will be invited, including LAs for relevant chapters of the AR5 from all three WGs. The list of invitees will be developed by the SSG in consultation with the Co-Chairs and Vice-Chairs of WGII and WGI.

#### Financial Resources

The Ministry of the Environment, Japan is exploring financial resources to host the Workshop (not secured yet). The Ministry would like to obtain authorization for financial support from the IPCC Trust Fund budget to support the participation of developing country experts. It is proposed that 40 Trust Fund journeys should be allocated, including those of WG Vice-Chairs.

# **Proposal for an IPCC Expert Meeting on Economic Analysis, Costing Methods and Ethics**

**(Submitted by the Co-chairs of Working Group III and II)**

## **1. Background**

As laid out in part D of the output document from the scoping meeting in Venice, Italy (13-17 July 2009) and in part C of the scoping document provided to the current Plenary Session (IPCC-XXXI/Doc. 4), a number of Cross-Cutting Methods (CCM) and Cross-Cutting Themes (CCT) have been identified. One of the CCMs concerns the economic analyses that play a major role in WG III as well as in WG II.

At the Venice meeting, the need to clarify a number of cost concepts and their underlying rationale emerged. In particular, this includes problems with representing climate impacts in monetary and non-monetary terms, and with aggregating benefits and costs and the implications for cost-benefit-analysis (CBA) and other methods. Furthermore, the ethical dimensions of estimating costs of mitigation, adaptation and residual damages need to be assessed.

## **2. Aim of the Meeting**

The aim of the meeting is to congregate a diverse set of views and to make suggestions for how assessment frameworks can be created. In particular, the meeting will address:

- Identifying and comparing metrics
  - Multidimensional metrics for evaluating damages; key dimensions of characterising damages.
  - Metrics of mitigation costs: balanced growth equivalents, net present value and beyond
  - Economic implications of global warming potentials
- Measuring risk and valuing information
- Technical change: opportunities, incentives and past evidence
- Adaptation as an economic process
- Integrated assessment -- state of the art
- Behavioral dimensions of consumer and firm choice vis-a-vis energy conservation and carbon reduction
- Reconciliation of negative cost opportunities with observed behaviour
- Intragenerational justice and costs: comparing actors, households, regions; willingness to pay, willingness to accept, equity weighting and beyond
- Intergenerational justice and costs: discounting, overlapping generation models and beyond
- Economic and ethical implications of decision making under uncertainty
- Social cost-benefit analysis
  - The social costs of carbon in the context of multiple discount rates, heterogenous households and social cost-benefit-analysis
- Optimal carbon prices in second-best settings (multiple market failures)

## **3. Scientific Steering Group**

A Scientific Steering Group (SSG) for the planning and execution of the Workshop will be established, taking into account the need for balanced scientific expertise, as well as geographical and developed/developing country representation. WGs III and II will jointly lead the SSG selection process and the meeting planning. WG III will take the operational lead for the meeting.

#### **4. Participation and Output**

The meeting is expected to have around 70 participants. It will be comprised of scientific experts in the topic areas identified, including lead authors from WG II and III responsible for the economic and valuation sections of the various chapters in the respective working group contributions to the AR5.

The meeting outcome will be an agreed guidance paper for the authors to feed directly into the respective working group contributions.

#### **5. Timing, Duration and Location**

The meeting is scheduled for Spring 2011 and shall last for two days. The location is still to be determined.

#### **6. Trust Fund**

30 journeys (across all WGs) from the budget line 'AR5 cross cutting meetings and SYR'.

## **GEO-IPCC Expert Consultation: “How GEOSS could serve the data needs of the climate impacts and adaptation research communities and support the IPCC assessments”**

### **Objective:**

The workshop will explore how the data and information needs of the research communities dealing with climate impacts and adaptation, whose work will underlie an important part of the Fifth Assessment Report (AR5) and other future IPCC assessment reports, could be served by the Global Earth Observation System of Systems (GEOSS).

### **Background:**

Over the longer term, the scientific literature and research that underlies the IPCC assessments will benefit enormously from improved and sustained Earth observations. In the shorter term, the IPCC's Fifth Assessment Report, to be published in 2013-2014 based primarily on the peer-reviewed literature available by 2012, would greatly benefit from any additional observation data and information that is made available to researchers over the next two or three years.

Three main research communities provide the scientific basis for IPCC assessments: the climate modelling community, the impacts and adaptation community and the integrated assessments community. The climate modelling community is relatively mature and coordinates its needs through GCOS (for data and information) and through WCRP; for this reason, the workshop will not focus on this community. The impacts and adaptation community also receives support from GCOS and others but, because they are multi-disciplinary and wide ranging, they experience gaps in the availability of observations data and information. They may therefore benefit from additional support in accessing Earth observation data and information. The needs of the integrated assessments community should be addressed at a later stage.

The Global Earth Observation System of Systems is being built by the Group on Earth Observations, which currently consists of 79 governments, the European Commission and 56 international organizations. GEOSS seeks to connect the producers of environmental data and decision-support tools with the end users of these products, with the aim of strengthening the use of Earth observations for global decision-making. The end result is to be a global public infrastructure that offers free access to comprehensive, cross-cutting and near-real-time environmental data, information and analyses for a wide range of users. This emerging 'system of systems' can clearly contribute to all the issues addressed by the IPCC, from the assessment of observed impacts to the attribution of changes to the effectiveness of various policies and technologies. (For more details see [www.earthobservations.org](http://www.earthobservations.org).)

### **Outputs and benefits:**

This expert consultation will explore the potential of the Global Earth Observation System of Systems (GEOSS) to improve and accelerate access to a broad range of relevant information by the research community dealing with climate change impacts and adaptation.

The research community will present its user needs to GEO, including quality, quantity, format and timeliness of data and information. The Group on Earth Observations (GEO) will respond to the stated user needs by encouraging and facilitating efforts by its members to improve the collection and dissemination of relevant data and information via GEOSS. In this way, the workshop results can drive the implementation of GEOSS over the next several years in a way that contributes in a concrete and practical manner to the research process for the AR5 and other future assessments.

The AR5 and other future IPCC assessments will benefit from the availability of a stronger research base as reflected in peer-reviewed articles. The organizations and governments that contribute to GEOSS through GEO would benefit from the guidance and incentive provided by these key user communities.

### **Organization:**

A three-day working meeting for 30-40 representatives from the impact-adaptation research community and from the GEO community (data and information providers) will be organized in Geneva on 17-19 May 2010. The consultation will be jointly organized by the secretariats of the Group on Earth Observations (GEO) and the Intergovernmental Panel on Climate Change (IPCC). Limited funding will be made available for developing country participants.

### **Organizing Committee:**

José A. Marengo (IPCC, TGICA), Centro de Previsao de Tempo e Estudos Climáticos, Brazil  
Gino Casassa (IPCC), Centro de Estudios Científicos, Chile  
Steven W. Running (IPCC), University of Montana, USA  
Paul Mason (GCOS), Reading University, UK, and GCOS Steering Committee  
Carolin Arndt (IPCC Secretariat – science officer)  
Michael Williams (GEO Secretariat – press officer)  
Fernando Ramos (GEO Secretariat – energy issues)  
Imraan Saloojee (GEO Secretariat – ecosystem issues)  
Mike Tanner (GEO Secretariat – climate issues)

### **Participants and speakers:**

The intended participants are managers and experts of climate research programmes and Earth observation community, including those responsible for Earth observation systems and data sets. Representatives of GCOS, WCRP and other relevant bodies will also be invited.

### **Indicative agenda:**

The workshop will consist of presentations together with plenty of time for discussion and the sharing of ideas. Based on early consultations with the research communities, a draft outline of user priorities will be circulated in advance of the workshop as a basis for discussion.

- 1) Introduction (setting the stage: linking the users and the producers of Earth observations)
  - The IPCC and the AR5
  - GEO and GEOSS
- 2) Data and information requirements (what are the major gaps that need to be filled)
  - The climate modeling community (for reference and comparison)
  - The impacts and vulnerabilities research community
  - The integrated assessments research community
  - The decision making and policy community
- 3) Data and information products and resources (indicative list) (presenters to be identified from relevant providers of Earth observations)
  - Biodiversity and ecosystems
  - Greenhouse gas emissions and concentrations
  - Forest carbon monitoring
  - Atmosphere and Climate
  - Coastal and oceans
  - Cryosphere
  - Disasters and hazards, including fires
  - Energy
  - Human health and migration

- Hydrology and water resources
- Land-use change (including agriculture and forestry)
- Socio-economic data

4) Refining GEOSS outputs to meet research needs (this session will consist of a debate and exchange of views)

- Integrated data sets at various spatial resolutions
- Access and dissemination
- Timing and deadlines
- Priorities

5) Conclusions and way forward