# Climate Change Assessments

## Review of the Processes and Procedures of the IPCC

Committee to Review the IPCC

InterAcademy Council

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# Preface

Since its founding more than 20 years ago, the Intergovernmental Panel on Climate Change (IPCC) can claim many important accomplishments to its credit. First among these are the periodic assessments of our understanding of the nature, origin, and impact of observed changes in the world's climate. Also among its significant contributions has been the sustaining of a global focus on climate change. Indeed IPCC has provided the framework for a continued and rather remarkable international conversation on climate research both among scientists and policymakers. In many ways IPCC, with its massive, far-flung, and decentralized network of scientists along with the governments represented on the Panel, represents a significant social innovation. For these and other contributions the IPCC was one of the recipients of the Nobel Peace Prize in 2007.

In response to some sustained criticism and a heightened level of public scrutiny of the Fourth Assessment Report, the United Nations and IPCC asked the InterAcademy Council (IAC) to assemble a committee to review the processes and procedures of the IPCC and make recommendations for change that would enhance the authoritative nature of the IPCC reports.

Our review was undertaken amidst a flurry of interesting, very public discussions surrounding aspects of IPCC's fourth assessment that raised concerns in some quarters regarding the continuing credibility of the IPCC assessments themselves and the processes and procedures underlying them. Among the critical contributions to this international discourse was a report from the Netherlands Environmental Assessment Agency on issues of concern in the report of Working Group II and the associated Summary for Policy Makers (PBL, 2010). Similar but more muted concerns followed publication of the Third Assessment Report in 2001. On the other hand, many groups of scientists have insisted that whatever the failings in certain aspects of IPCC's massive assessment, the key findings of the most recent IPCC assessment remain, as the Netherlands Environmental Assessment Agency concluded, unaffected. In the United States, the National Research Council came to the same conclusion after the third assessment and again more recently (NRC, 2001, 2010a, b, c).

Scientific debates have always involved controversies over the value and importance of particular classes of evidence, and this can be expected to continue. Moreover, all scientific knowledge always contains some level of uncertainty and any actions based on scientific evidence inevitably involves an assessment of risk and a process of risk management. Finally, given the dependence of major facets of IPCC assessments on vast data collections and complex models whose parameters are especially difficult to assess independently, risk assessments are especially challenging. However, as the resulting controversies gained some momentum, they tended to expand beyond the IPCC assessments and raise issues ranging from the proper role of science [and scientists] in policymaking to the dangers of 'group think' or consensus building as a general proposition.

Unlike much of the current debate, the focus of this review is on the processes and procedures that support and give structure to IPCC's very distinctive assessments. Our task was to broadly

assess the processes and procedures of the IPCC and make recommendations on how they might be improved in order to enhance the quality and authoritative nature of future assessments.

As I consider IPCC as an organization, it seems to me that its large decentralized worldwide network of scientists is the source of both its strength and its continuing vitality. However, climate science has become so central to important public debates that accountability and transparency must be considered as a growing obligation, and this alone would require revisiting IPCC's processes and procedures. In fact IPCC has shown itself to be an adaptive organization in the past in the sense that it has adjusted the processes and procedures surrounding its assessments both in response to scientific developments and as a result of lessons learned over the years. I expect that it will continue to do so and that the fifth assessment is certain to reflect some continuing change. Nevertheless its overall management and governance structure has not been modified, and in my view this has made it less agile and responsive than it needs to be.

The intersection of climate science and public policy is certain to remain a controversial arena for some time as so many competing interests are at stake, including the interests of future generations and the diverse interests of different nations, regions, and sectors of society around the world. Moreover, thoughtful controversy will remain a critical ingredient in stimulating further developments on the scientific frontier relating to our understanding of evolving climate conditions, their impact and the possible responses of policy makers. Indeed climate science is a collective learning process as data are accumulated, interpreted, and used to construct models, and as alternative hypotheses are tested until we have increased confidence in our measurements and models and as a subset of ideas survive careful testing and competing explanations are eliminated. I hope that the progress of climate science in all of these dimensions may slowly remove some of the uncertainties that continue to impede our fuller understanding of global climate change. In my judgment IPCC can continue to remain a very valuable resource, provided it can continue to highlight both what we believe we know and what we believe is still unknown and to adapt its processes and procedures in a manner that reflects both the dynamics of climate science and the needs of public policy for the best possible understanding of changing global climate, its impacts, and possible mitigation initiatives.

Harold T. Shapiro, Chair

# IAC Report Review

This report was externally reviewed in draft form by 12 internationally renowned experts chosen for their diverse perspectives, technical knowledge, and geographical representation, in accordance with procedures approved by the IAC Board. The purpose of this independent review was to provide candid and critical comments that would help the IAC to produce a sound report that meets the IAC standards for objectivity, evidence, and responsiveness to the study charge.

The review procedure and draft manuscript remain confidential to protect the integrity of the deliberative process. Although the reviewers provided constructive comments and suggestions, they were not asked to endorse the conclusions and recommendations, nor did they see the final draft of the report before its release.

## Reviewers of IAC Report

The IAC thanks the following individuals for their review of this report:

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## Monitors of IAC Review Process

The review of this report was overseen by two review monitors. Appointed by the IAC Co-Chairs, the review monitors were responsible for ascertaining that the independent examination of this report was carried out in accordance with IAC procedures and that all review comments

were carefully considered. The IAC thanks the following monitors for their participation in the review process:

**Kurt LAMBECK**, Past President, Australian Academy of Science; Professor of Geophysics, Australian National University, Canberra, Australia

**Ralph CICERONE**, President, United States National Academy of Sciences, Washington, DC, USA

Full responsibility for the final content of this report rests entirely with the authoring Committee and the InterAcademy Council.

# Acknowledgements

Community input was an essential element of this review. The Committee thanks the individuals who participated in IAC Committee or subcommittee meetings (listed below), as well as the more than 400 individuals who provided other oral or written input (listed in Appendix C).

*Committee meetings*. Guy Brasseur; Renate Christ; John Christy; Chris Field; Michel Jarraud; Rajendra Pachauri; Janos Pasztor; Achim Steiner; Hans von Storch; and Robert Watson

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*China meeting*. Yihui Ding; Zhongli Ding; Kiminori Itoh; Jiahua Pan; Dahe Qin; Yanhong Tang; Shaowu Wang; Songling Xu; and Guoguang Zheng

*USA meeting*. Richard Benedick; Diana Liverman; Jonathan Overpeck; Roger Pielke Jr.; Rich Richels; Cynthia Rosenzweig; Ben Santer; Steve Schneider; Susan Solomon; and John Weyant

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Several individuals facilitated the Committee's work in essential ways. Renate Christ, IPCC Secretary, provided the extensive documentation requested by the Committee quickly and in a useful form, and clarified many issues for the Committee in the course of the review. Derek Rector and the Diamax Corporation designed and maintained the Committee's website and communications systems, and provided ongoing support. William Kearney, William Skane, Irene van Houten, Alice Henchley, and Bill Hartnett guided the Committee on public information issues and handled media relations. The Committee greatly appreciates their contributions.

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Last but by no means least, the Committee thanks the InterAcademy Council Board and especially Robbert Dijkgraaf and Lu Yongxiang, IAC Co-Chairs, for providing the opportunity to undertake this important study.

# Contents

**Executive Summary** 1

**1 Introduction** 7
Current Challenges Facing the IPCC, 8
Committee Approach and Methodology, 11
Overview of the IPCC Assessment Process, 11
Organization of This Report, 16

**2 Evaluation of IPCC's Assessment Processes** 17
Scoping, 17
Author Selection, 17
Sources of Data and Literature, 19
Handling the Full Range of Views, 20
Report Review, 21
Summary for Policy Makers, 25
Synthesis Report, 26
Conclusions, 26

**3 IPCC's Evaluation of Evidence and Treatment of Uncertainty** 27
Uncertainty Guidance in the Fourth Assessment Report, 27
Nature of Evidence and Treatment of Uncertainty by Each Working Group, 29
Conclusions and Recommendations, 36

**4 Governance and Management** 39
IPCC Management Structure, 39
Conflict of Interest and Disclosure, 45
Communications, 47
Conclusions, 49

**5 Conclusions** 51
IPCC's Processes and Procedures, 51
Issues for Future Consideration, 55

**References** 59

**Appendixes**
A Letters of Request to the IAC Co-Chairs 65
B Questionnaire on IPCC Processes and Procedures 73
C Contributors to the Review 75
D Excerpts of IPCC Procedures 85
E Committee Biographies 95
F Acronyms and Abbreviations 101

# Executive Summary

Climate change is a long-term challenge that will require every nation to make decisions about how to respond. The Intergovernmental Panel on Climate Change (IPCC) was established by the World Meteorological Organization and the United Nations Environment Programme to help inform such decisions by producing comprehensive assessments of what is known about the physical climate system, its global and regional impacts, and options for adaptation and mitigation. Sitting at the interface between science and politics, the IPCC assessment process has sustained a working dialog between the world's governments and scientists since its inception in 1988. Representatives of 194 participating governments agree on the scope of the assessment, elect the scientific leaders of the assessment, nominate authors, review the results, and approve the summaries written for policy makers. More than a thousand volunteer scientists evaluate the available scientific, technological, and socioeconomic information on climate change, and draft and review the assessment reports. The thousands of scientists and government representatives who work on behalf of the IPCC in this non-traditional partnership are the major strength of the organization.

Through its assessment reports, the IPCC has gained enormous respect and even shared the Nobel Peace Prize in 2007 for informing climate policy and raising public awareness worldwide. However, amidst an increasingly intense public debate over the science, impacts, and cost of climate change, the IPCC has come under heightened scrutiny about its impartiality with respect to climate policy and about the accuracy and balance of its reports. In response, the United Nations and the IPCC commissioned the InterAcademy Council to convene a Committee to review the processes and procedures of the IPCC.

The Committee found that the IPCC assessment process has been successful overall. However, the world has changed considerably since the creation of the IPCC, with major advances in climate science, heated controversy on some climate-related issues, and an increased focus of governments on the impacts and potential responses to changing climate. A wide variety of interests have entered the climate discussion, leading to greater overall scrutiny and demands from stakeholders. The IPCC must continue to adapt to these changing conditions in order to continue serving society well in the future. The Committee's key recommendations for improving IPCC's assessment process are given below.

## KEY RECOMMENDATIONS

The Committee's main recommendations relate to governance and management, the review process, characterizing and communicating uncertainty, communications, and transparency in the assessment process. Other detailed recommendations on specific aspects of the assessment process appear in Chapters 2-4, and a complete list of recommendations appears in Chapter 5.

## Governance and Management

The complexity and scale of climate change research and the associated assessment task have grown significantly over the last two decades, as have public expectations regarding the assessments. Yet the fundamental management structure of the IPCC has remained largely unchanged. The IPCC management structure comprises the Panel itself, which makes decisions about the structure, principles, procedures, and work program of the IPCC; the Bureau, which is elected by the Panel to oversee the assessment work; and a small Secretariat, which supports the work of the Panel and the Bureau. The Panel makes all of its major decisions at annual Plenary sessions. However, important decisions need to be made more often, and the Bureau has too limited a set of responsibilities and meets too rarely to meet this need.

Many organizations in the public and private sector have addressed the need for ongoing decision making by establishing an Executive Committee to act on their behalf. Similarly, the IPCC should establish an Executive Committee elected by and reporting to the Panel. An IPCC Executive Committee would act on issues—such as approving minor corrections to published reports, approving modest alterations in the scope of an ongoing assessment, ensuring effective communication—and any other task specifically delegated by the Panel. To respond quickly, the Executive Committee should be relatively small with ideally no more than 12 members. Its membership would include selected IPCC leaders as well as individuals from academia, nongovernmental organizations, and/or the private sector who have relevant experience and who are not connected with the IPCC or even climate science. Their participation would improve the credibility and independence of the Executive Committee.

**Recommendation: The IPCC should establish an Executive Committee to act on its behalf between Plenary sessions. The membership of the Committee should include the IPCC Chair, the Working Group Co-chairs, the senior member of the Secretariat, and 3 independent members, including some from outside of the climate community. Members would be elected by the Plenary and serve until their successors are in place.**

The IPCC Secretariat supports the Panel and Bureau by organizing meetings, communicating with governments, supporting the travel of developing-country scientists, managing the IPCC budget and website, and coordinating report publication and outreach. Although the number of staff has grown from 4 to 10 individuals, the growth in the magnitude and intricacy of the assessment task, advances in digital technologies, and new communications needs (see "Communications" below) have changed the mix of skills required of the Secretariat. An Executive Director is needed to lead the Secretariat, ensure that IPCC protocols are followed, keep in touch with the Working Group Co-chairs, and speak on behalf of the IPCC. As a peer of the Working Group Co-chairs, the individual selected as Executive Director would be capable of acting on behalf of the IPCC Chair. The Executive Director would also be a member of the Executive Committee.

**Recommendation: The IPCC should elect an Executive Director to lead the Secretariat and handle day-to-day operations of the organization. The term of this senior scientist should be limited to the timeframe of one assessment.**

## Review Process

Peer review is an important mechanism for assuring the quality of reports. IPCC's peer review process is elaborate, involving two formal reviews and one or more informal reviews of preliminary text. The first complete draft is formally reviewed by scientific experts nominated by government representatives, observer organizations, and the IPCC Bureau. Lead Authors consider the review comments and prepare the second draft, which is reviewed by the same experts as well as government representatives. Two or more Review Editors for each chapter oversee the review process, ensuring that review comments and controversial issues are handled appropriately. However, the Lead Authors have the final say on the content of their chapter.

With the tight schedule for the revision process, authors do not always consider the review comments carefully, potentially overlooking errors in the draft report that might have been caught. Some errors will be missed in any review process; but with stronger enforcement of existing IPCC review procedures, the number of errors could be minimized. Staff support and clarification about the roles and responsibilities of Review Editors would help them carry out proper oversight.

**Recommendation: The IPCC should encourage Review Editors to fully exercise their authority to ensure that reviewers' comments are adequately considered by the authors and that genuine controversies are adequately reflected in the report.**

For recent assessments, some governments made the second draft available for review by national experts and other interested parties, considerably opening the review process. Although an open review potentially improves the report by increasing the level of scrutiny and widening the range of viewpoints offered, it also substantially increases the number of review comments. Drafts of the Fourth Assessment Report drew 90,000 review comments (an average of a few thousand comments per chapter), stretching the ability of Lead Authors to respond thoughtfully and fully. A more targeted process for responding to reviewer comments could both ensure that the most significant review issues are addressed and reduce the burden on authors, who currently must document responses to all reviewer comments. In the targeted process envisioned, the Review Editors would prepare a written summary of the most significant review issues. While the Lead Authors would prepare written responses to these issues and all other non-editorial comments, they could focus their attention on the most significant matters.

**Recommendation: The IPCC should adopt a more targeted and effective process for responding to reviewer comments. In such a process, Review Editors would prepare a written summary of the most significant issues raised by reviewers shortly after review comments have been received. Authors would be required to provide detailed written responses to the most significant review issues identified by the Review Editors, abbreviated responses to all non-editorial comments, and no written responses to editorial comments.**

## Characterizing and Communicating Uncertainty

Uncertainty is characterized and communicated by describing how much is known about a topic (i.e., the quality and nature of the evidence available) and the probability that a particular event will occur. Each key conclusion in the Summary for Policy Makers is accompanied by a judgment about its uncertainty. For the fourth assessment, each Working Group used a different variation on IPCC's guidance to describe uncertainty. Working Group I relied primarily on a quantitative likelihood scale (e.g., "extremely likely" indicates a greater than 95 percent probability that a particular event will occur). Working Group II relied primarily on a quantitative confidence scale (e.g., "high confidence" indicates an 8 out of 10 chance of being correct). Working Group III relied exclusively on a qualitative level-of-understanding scale (i.e., understanding is described in terms of the amount of evidence available and the degree of agreement among experts). The level-of-understanding scale is a convenient way of communicating the nature, number, and quality of studies on a particular topic, as well as the level of agreement among studies. It should be used by all Working Groups, as suggested in the IPCC uncertainty guidance for the Fourth Assessment Report.

**Recommendation: All Working Groups should use the qualitative level-of-understanding scale in their Summary for Policy Makers and Technical Summary, as suggested in IPCC's uncertainty guidance for the Fourth Assessment Report. This scale may be supplemented by a quantitative probability scale, if appropriate.**

The Working Group II Summary for Policy Makers has been criticized for various errors and for emphasizing the negative impacts of climate change. These problems derive partly from a failure to adhere to IPCC's uncertainty guidance for the fourth assessment and partly from shortcomings in the guidance itself. Authors were urged to consider the amount of evidence and level of agreement about all conclusions and to apply subjective probabilities of confidence to conclusions when there was high agreement and much evidence. However, authors reported high confidence in some statements for which there is little evidence. Furthermore, by making vague statements that were difficult to refute, authors were able to attach "high confidence" to the statements. The Working Group II Summary for Policy Makers contains many such statements that are not supported sufficiently in the literature, not put into perspective, or not expressed clearly. When statements are well defined and supported by evidence—by indicating when and under what climate conditions they would occur—the likelihood scale should be used.

**Recommendation: Quantitative probabilities (as in the likelihood scale) should be used to describe the probability of well-defined outcomes only when there is sufficient evidence. Authors should indicate the basis for assigning a probability to an outcome or event (e.g., based on measurement, expert judgment, and/or model runs).**

## Communications

Communicating the results of IPCC assessments is challenging because of the range and complexity of climate science and response options and the increasing need to speak to audiences beyond scientists and governments. The communications challenge has taken on new urgency in the wake of recent criticisms regarding IPCC's slow and inadequate responses to

reports of errors in the Fourth Assessment Report. Such criticisms underscore the need for a media-relations capacity to enable the IPCC to respond rapidly and with an appropriate tone to the criticisms and concerns that inevitably arise in such a contested arena. In addition, IPCC leaders have been criticized for making public statements that were perceived as advocating specific climate policies. Straying into advocacy can only hurt IPCC's credibility. A comprehensive communications strategy is needed to identify who should speak on IPCC's behalf and to lay out guidelines for keeping messages within the bounds of IPCC reports and mandates. IPCC's new communications and media relations manager is developing a communications strategy, and the Committee urges its rapid completion.

**Recommendation: The IPCC should complete and implement a communications strategy that emphasizes transparency, rapid and thoughtful responses, and relevance to stakeholders, and which includes guidelines about who can speak on behalf of IPCC and how to represent the organization appropriately.**

## Transparency

Given the high stakes in the climate change debate and IPCC's role of providing policy-relevant information, the IPCC can expect that its reports will continue to be scrutinized closely. Thus, it is essential that the processes and procedures used to produce assessment reports be as transparent as possible. From extensive oral and written input gathered by the Committee, it is clear that several stages of the assessment process are poorly understood, even to many scientists and government representatives who participate in the process. Most important are the absence of criteria for selecting key participants in the assessment process and the lack of documentation for selecting what scientific and technical information is assessed. The Committee recommends that the IPCC establish criteria for selecting participants for the scoping meeting, where preliminary decisions about the scope and outline of the assessment reports are made; for selecting the IPCC Chair, the Working Group co-chairs, and other members of the Bureau; and for selecting the authors of the assessment reports. The Committee also recommends that Lead Authors document that they have considered the full range of thoughtful views, even if these views do not appear in the assessment report.

If adopted in their entirety, the measures recommended in this report would fundamentally reform IPCC's management structure while enhancing its ability to conduct an authoritative assessment. However, no matter how well constructed IPCC's assessment practices may be, the quality of the result depends on the quality of the leaders at all levels who guide the assessment process. It is only by engaging the energy and expertise of a large cadre of distinguished scholars as well as the thoughtful participation of government representatives that high standards are maintained and that truly authoritative assessments continue to be produced. Moreover, the IPCC should think more creatively about maintaining flexibility in the character and structure of the assessment, including the number and scope of Working Groups and the timing of reports. For example, releasing the assessment of regional impacts substantially after the assessment of sectoral impacts would reduce the burden on the small community that carries out both assessments. It may also be desirable to release the Working Group I report a year or two ahead

of the other Working Group reports. Although such issues are routinely raised and settled in the scoping process, the traditional approach may not be the best model for future assessments.