

2. Evaluation of IPCC's assessment process

An IPCC assessment is a complex process by which experts review and synthesize available scientific and technical knowledge, and governments agree on the scope of the report, nominate authors, review the results, and approve the Summary for Policymakers (see 'The IPCC Assessment Process in Brief' in Chapter 1). This chapter identifies and recommends ways to address the most significant shortcomings in each major step of IPCC's assessment process, based on the Committee's analysis of current IPCC practices, of the literature on assessments, and community input.

Scoping

The preliminary scope and outline of IPCC assessment reports is developed by an invited group of scientists, other subject-matter experts, and government representatives. A detailed outline is then created by the Bureau and approved by the Panel. The involvement of both scientists and governments in the scoping process helps ensure that the assessment addresses issues both that can be supported by the existing scientific literature and that will be useful for supporting government decision making (NRC, 2007). IPCC's scoping process was generally supported by those who were interviewed or responded to the Committee's questionnaire (Appendix B). However, these individuals raised two concerns about the scoping process. First, the scoping process itself and the selection of participants for the scoping meeting(s) remain somewhat opaque to those who have not participated. Given that the assessment process is receiving close scrutiny and that the scoping process has a major influence on the mandate and goals for the assessment, it is essential that scoping be as transparent as possible.

Recommendation

- ▶ The IPCC should make the process and criteria for selecting participants for scoping meetings more transparent.

The second concern relates to the outline of the assessment reports. Finalizing the outline so early in the process makes it difficult to incorporate relevant emerging scientific advances and new insights into the assessment. Moreover, governments are often interested in topics for which there is little peer-reviewed scientific and technical literature, such as the costs of adaptation. Scientists should not feel obligated to provide an assessment where no reliable information exists. Both problems would be lessened if scientists were given some flexibility to adjust the approved outlines during the assessment process without waiting for another Plenary session. Institutional arrangements that would allow greater flexibility in revising outlines after they are approved are discussed in Chapter 4 (see 'IPCC Management Structure').

Author selection

The selection of authors is one of the most important decisions in the assessment process because credibility of the assessment depends largely on the participation of respected scientists (e.g., NRC, 2007). Coordinating Lead Authors and Lead Authors are selected by the Working Group Co-chairs and Vice Chairs from a list of nominees provided by governments, observer organizations, and other experts (Appendix D). The author team for each chapter is intended to have a range of views, expertise, and geographical representation. Yet in interviews and responses to the Committee's questionnaire, some scientists expressed frustration that they have not been nominated, despite their scientific qualifications and demonstrated willingness to participate. Frustration was particularly strong among developing-country scientists, who felt that some of their Government Focal Points do not always nominate the best scientists from among those who volunteer, either because they do not know who these scientists are or because political considerations are given more weight than scientific qualifications. As a result, the pool of developing-country nominees may not reflect the total available capacity within these regions. Expanding the pool of well-qualified authors from all countries, for example by consulting with the Academy of Sciences for the Developing World and national science academies, learned societies, and universities, was suggested by those interviewed and the questionnaire respondents from all Working Groups, from developed and developing countries, and from government representatives.

Although the individuals who corresponded with the Committee were generally supportive of the author teams chosen, few knew why some

authors are chosen and others are not, and many found the selection criteria arbitrary. The absence of a transparent author-selection process or well-defined criteria for author selection can raise questions of bias and undermine the confidence of scientists and others in the credibility of the assessment (e.g., Pielke, 2010a). The IPCC has no formal process or criteria for selecting authors, although some Working Group Co-chairs established their own for the fourth assessment, considering factors such as scientific expertise and excellence, geography, gender, age, viewpoint, and the ability to work in teams.⁹ Establishing such criteria and applying them in a transparent manner to all Working Groups would alleviate some of the frustrations voiced.

Recommendation

- ▶ The IPCC should establish a formal set of criteria and processes for selecting Coordinating Lead Authors and Lead Authors.

A concern raised by some Working Group II scientists is that the selection of the author team for each regional chapter often overlooks some of the best experts if they do not happen to live in that region. For the fourth assessment, few Coordinating Lead Authors and Lead Authors were from countries outside of the region they were assessing. Even selection of the Contributing Authors tends to be restricted to those living in the region they assess; 5 of 7 regional chapters had no more than one outside Contributing Author. Because some of the world's foremost experts on a particular region do not live in that region, this geographic restriction sometimes limits the expertise that can be brought to bear on regional impacts. The Committee supports special efforts to find the necessary expertise within the region, but notes that having the best experts evaluate the available knowledge should be a central tenet of IPCC assessments.

Recommendation

- ▶ The IPCC should make every effort to engage local experts on the author teams of the regional chapters of the Working Group II report, but should also engage experts from countries outside of the region when they can provide an essential contribution to the assessment.

⁹ Written response to a Committee query by Renate Christ, IPCC Secretary, on May 7, 2010.

Sources of data and literature

IPCC assessments are intended to rely mainly on peer-reviewed literature. Although the peer-review process is not perfect, it ensures that the study being considered has had the benefit of independent scrutiny and quality control before it is used in the assessment. However, peer-reviewed journals may not contain all the useful information about some topics, such as vulnerabilities and adaptation and mitigation strategies of particular sectors and regions, which are a significant part of the Working Groups II and III reports. An analysis of the 14,000 references cited in the Third Assessment Report found that peer-reviewed journal articles comprised 84 percent of references in Working Group I, but comprised only 59 percent of references in Working Group II and 36 percent of references in Working Group III (Bjurström and Polk, 2010).

In fact, information that is relevant and appropriate for inclusion in IPCC assessments often appears in the so-called ‘gray literature,’ which includes technical reports, working papers, presentations and conference proceedings, fact sheets, bulletins, statistics, observational data sets, and model output produced by government agencies, international organizations, universities, research centers, nongovernmental organizations, corporations, professional societies, and other groups. The extent to which such information has been peer-reviewed varies a great deal, as does its quality.

Although some respondents to the Committee’s questionnaire have recommended that only peer-reviewed literature be used in IPCC assessments, this would require the IPCC to ignore some valuable information. Examples of important unpublished or non-peer-reviewed sources include very large data sets and detailed model results (Working Group I); reports from farmer cooperatives, government agencies, nongovernmental organizations, the World Bank, and UN bodies (Working Group II); and company reports, industry journals, and information from the International Energy Agency (Working Group III). In addition, indigenous or traditional knowledge may prove useful for understanding the potential of certain adaptation strategies that are cost-effective, participatory, and sustainable (Robinson and Herbert, 2001). While such information is not always easy to find or assess, the process can be helped by the use of the Internet and abstracting services. The role of Lead Authors and Review Editors in the evaluation of such literature is crucial.

The current IPCC procedure requires authors to critically assess unpublished or non-peer-reviewed sources, reviewing their quality and validity

before incorporating them (Appendix D). Lead Authors must also provide a copy of each source used to the Working Group Co-chairs and Secretariat staff, who are responsible for supplying copies to reviewers on request. Non-peer-reviewed sources are to be listed in the reference sections of IPCC reports, followed by a statement that they are not peer-reviewed. The objectives are to ensure that all information used in IPCC reports receives some sort of critical evaluation and its use is open and transparent, and that all references used in the reports are easily accessible.

Although the Committee finds that IPCC's procedures in this respect are adequate, it is clear that these procedures are not always followed. Some of the errors discovered in the Fourth Assessment Report had been attributed to poor handling of unpublished or non-peer-reviewed sources (Ravindranath, 2010). Moreover, a search through the Working Group reports of the fourth assessment found few instances of information flagged as unpublished or non-peer-reviewed. Clearer guidelines and stronger mechanisms for enforcing them are needed. For example, a number of respondents to the Committee's questionnaire requested clearer guidelines on the nature of acceptable unpublished or non-peer-reviewed sources. Blogs, newspaper articles, press releases, advocacy group reports, and proprietary data were thought by many to be inappropriate. Enforcement could be a job of the Review Editors, building on their role of ensuring that such literature is selected appropriately and used consistently in the report.

Recommendation

- ▶ The IPCC should strengthen and enforce its procedure for the use of unpublished and non-peer-reviewed literature, including providing more specific guidance on how to evaluate such information, adding guidelines on what types of literature are unacceptable, and ensuring that unpublished and non-peer-reviewed literature is appropriately flagged in the report.

Handling the full range of views

An assessment is intended to arrive at a judgment of a topic, such as the best estimate of changes in average global surface temperature over a specified time frame and its impacts on the water cycle. Although all reasonable points of view should be considered, they need not be given equal weight or even described fully in an assessment report. Which alternative

viewpoints warrant mention is a matter of professional judgment. Therefore, Coordinating Lead Authors and Lead Authors have considerable influence over which viewpoints will be discussed in the process. Having author teams with diverse viewpoints is the first step toward ensuring that a full range of thoughtful views are considered.

Equally important is combating confirmation bias—the tendency of authors to place too much weight on their own views relative to other views (Jonas et al., 2001). As pointed out to the Committee by a presenter¹⁰ and some questionnaire respondents, alternative views are not always cited in a chapter if the Lead Authors do not agree with them. Getting the balance right is an ongoing struggle. However, concrete steps could also be taken. For example, chapters could include references to all papers that were considered by the authoring team and describe the authors' rationale for arriving at their conclusions.

Recommendation

- ▶ Lead Authors should explicitly document that a range of scientific viewpoints has been considered, and Coordinating Lead Authors and Review Editors should satisfy themselves that due consideration was given to properly documented alternative views.

Report review

IPCC's review process is elaborate, involving two formal reviews and one or more informal reviews of preliminary text. The early drafts and first complete draft are reviewed by scientific experts. These drafts may undergo extensive revisions to meet any page limitations established by the Bureau. After considering the review comments, the Lead Authors prepare the second draft, which is reviewed by the same experts and by government representatives. Two or more Review Editors for each chapter oversee the review process, ensuring that review comments and controversial issues are handled appropriately.

For recent assessments, some governments made the second draft available for review by national experts and other interested parties, thus considerably opening the review process. Respondents to the Committee's questionnaire generally supported an open review because it increases the

¹⁰ Presentation to the Committee by John Christy, University of Alabama, Huntsville, on June 15, 2010.

range of viewpoints offered and potentially improves the quality of the report, but noted the challenge of dealing with thousands of review comments (e.g., see Table 2.1). Other challenges created by an open review include the possibility of premature release of conclusions by the press and orchestrated efforts by those with strong views about climate change to overwhelm the system. To combat the latter, some respondents suggested requiring reviewers to provide evidence and/or appropriate citations to support their views.

Respondents also offered suggestions for making the review process less onerous, including reducing the number of formal or informal reviews, or finding a way to separate out nonsubstantive comments and undocumented opinions, thereby reducing the number of comments that Lead Authors have to deal with. A process that enables authors to focus their efforts on the most significant issues raised by reviewers has been adopted recently by the U.S. National Research Council (NRC). In this process, the individuals responsible for overseeing the review of the report (analogous to the IPCC Review Editors) prepare a written summary of the most significant issues raised by reviewers shortly after review comments have been received. Authors are asked to consider all reviewer comments, but they are required to provide written responses only to the most significant review issues and any other substantive reviewer comments with which they disagreed and did not make a change to the report. For the IPCC, it may be desirable for the authors to respond to all noneditorial comments to ensure that revisions are traceable and transparent. Removing the editorial comments from discussion would help ensure that authors and Review Editors focus their efforts on the most significant issues raised by reviewers and reduce the administrative burden of documenting responses to reviewer comments.

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 noneditorial comments, and no written responses to editorial comments.

Table 2.1 Number of review comments for chapters of the Working Group II report of the Fourth Assessment

Chapter	First draft	Second draft	
	Expert comments	Expert comments	Government comments
Introduction		4	342
1. Assessment of observed changes and responses in natural and managed systems	1,563	885	319
2. New assessment methods and the characterisation of future conditions	968	412	98
3. Freshwater resources and their management	1,249	702	274
4. Ecosystems, their properties, goods and services	1,468	742	420
5. Food, fibre and forest products	1,346	541	315
6. Coastal systems and low-lying areas	1,406	420	190
7. Industry, settlement and society	863	472	247
8. Human health	1,102	606	263
9. Africa	931	627	90
10. Asia	882	526	145
11. Australia and New Zealand	1,376	543	189
12. Europe	1,078	508	244
13. Latin America	1,033	720	161
14. North America	1,329	566	142
15. Polar Regions	1,354	379	175
16. Small Islands	710	256	57
17. Assessment of adaptation practices, options, constraints and capacity	1,091	532	164
18. Inter-relationships between adaptation and mitigation	618	408	168
19. Assessing key vulnerabilities and the risk from climate change	1,065	427	274
20. Perspectives on climate change and sustainability	773	554	112
TOTAL	22,205	10,826	4,047

Source: Data from <http://ipcc-wg2.gov/publications/AR4/ar4review.html>.

Even IPCC’s extensive review process does not produce critical review comments on every subject covered in the reports. Such critical comments are helpful for ensuring quality and catching errors. Targeted efforts are needed to reach additional qualified reviewers where necessary, especially on issues that support key conclusions or which are discussed in multiple chapters. In some cases, the best reviewers may be authors of different chapters or authors of other Working Group reports. Encouraging other scientific organizations, such as national science academies, to submit nominations would also increase the size of the qualified reviewer pool.

A near-universal observation—made in presentations, interviews, and responses to the questionnaire—was the need to strengthen the authority of the Review Editors to ensure that authors consider the review comments carefully and document their responses. With a tight schedule for completing revisions, authors do not always do an adequate job of revising the text, and Review Editors do not always require an explanation

for rejected comments. In the case of the incorrect projection of the disappearance of the Himalayan glaciers, for example, some of the review comments were not adequately considered and the justifications were not completely explained (see Box 2.1). Although a few errors are likely to be missed in any review process, stronger enforcement of existing IPCC procedures by the Review Editors could minimize their number. This includes paying special attention to review comments that point out contradictions, unreferenced literature, or potential errors; and ensuring that alternate views receive proper consideration. Staff support, perhaps from the Technical Support Unit, as well as improved guidance on the roles and responsibilities of Review Editors could help Review Editors perform their duties more effectively.

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.

Although implementing the above recommendations would greatly strengthen the review process, it would not make the review process truly independent because the Working Group Co-chairs, who have overall responsibility for the preparation of the reports, are also responsible for selecting Review Editors. To be independent, the selection of Review Editors would have to be made by an individual or group not engaged in writing the report, and Review Editors would report directly to that individual or group (NRC, 1998, 2002).

Despite the desirability of an independent review, it is not clear what scientific body has the recognized legitimacy and capacity to carry out such a large task. At the NRC, a special group called the Report Review Committee carries out this function on behalf of the institution. The Report Review Committee is made up of approximately 30 members of the National Academy of Sciences, National Academy of Engineering, and Institute of Medicine, is staffed by individuals from outside the program units, and reports directly to the NRC Governing Board. One option for the IPCC would be to appoint a small group of experts who would report directly to a new Executive Committee (see 'IPCC Management Structure' in Chapter 4) to serve a similar function for the IPCC. Another option would be to engage an international scientific body to provide such services for the IPCC.

BOX 2.1 Himalaya glaciers: Case study on the performance of IPCC's report review process

Perhaps the most talked-about error in the fourth assessment was this statement in the Working Group II report:

'Glaciers in the Himalaya are receding faster than in any other part of the world (see Table 10.9) and, if the present rate continues, the likelihood of them disappearing by the year 2035 and perhaps sooner is very high if the Earth keeps warming at the current rate. Its total area will likely shrink from the present 500,000 to 100,000 km² by the year 2035 (WWF, 2005).'

To determine the extent to which the error might reflect weaknesses in the IPCC review processes, the Committee examined the draft text and relevant reviewer comments. The detailed record of all the review comments and author responses maintained by the IPCC made such an analysis possible.^a The Committee's analysis showed that six experts reviewed this section in the first draft and that none of their comments were critical. However, of the 12 expert reviewers' comments on the second draft (see Table 2.2), two were related to the erroneous statement. Comment E10-466 pointed to a contradiction in the text: one sentence read 'if the present rate continues, the likelihood of them [Himalayan glaciers] disappearing by the year 2035 and perhaps sooner is very high if the Earth keeps getting warmer at the present rate,' and the next read 'Its total area will shrink from the present 500,000 km² to 100,000 km² by the year 2035.' However, the authors did not change the text.

The other reviewer (comment E10-468) questioned the statement, providing references with different conclusions. Had the authors and/or Review Editors consulted the references, they would have found two peer-reviewed articles, which, at the very least, were more cautious about the disappearance of the Himalayan glaciers. Hewitt (2005) states:

Table 2.2 Reviewer comments on the rate of Himalayan glacier retreat

Comment number	Comment	Writing team notes
<i>Expert reviewer comments on the second draft</i>		
E10-466	100,000? You just said it will disappear. (David Saltz, Desert Research Institute, Ben Gurion University)	Missed to clarify this one
E10-468	I am not sure that this is true for the very large Karakoram glaciers in the western Himalaya. Hewitt (2005) suggests from measurements that these are expanding—and this would certainly be explained by climatic change in precipitation and temperature trends seen in the Karakoram region (Fowler and Archer, J Climate in press; Archer and Fowler, 2004) You need to quote Barnett et al.'s 2005 Nature paper here—this seems very similar to what they said. (Hayley Fowler, Newcastle University)	Was unable to get hold of the suggested references will consider in the final version (sic)
E10-471	only 3 references in the last 6 pages (Clair Hanson, IPCC TSU)	More references added
E10-472	only one reference in this whole section (Clair Hanson, IPCC TSU)	More references added
<i>Government reviewer comment on the summary for policymakers</i>		
GSPM-643	This is a very drastic conclusion. Should have a supporting reference otherwise should be deleted (Government of India)	Boxes removed and statements reworded and reduced to just around 8-10 lines per sector/region – see SPM FGD pages 6-10

'In the late 1990s widespread evidence of glacier expansion was found in the central Karakoram, in contrast to a worldwide decline of mountain glaciers. The expansions were almost exclusively in glacier basins from the highest parts of the range and developed quickly after decades of decline. Exceptional numbers of glacier surges were also reported.'

The article by Fowler and Archer (2006) was in press at the time. The abstract states:

'The observed downward trend in summer temperature and runoff is consistent with the observed thickening and expansion of Karakoram glaciers, in contrast to widespread decay and retreat in the eastern Himalayas.

This suggests that the western Himalayas are showing a different response to global warming than other parts of the globe.'

In this example, IPCC's review process failed in two ways:

1. Failure of the authors to carefully consider thoughtful review comments (E10-466 and E10-468), which would have improved the quality of the report
2. Failure of the Review Editors to ensure that reviewer comments were adequately addressed and that controversies are reflected adequately in the text of the report (E10-468)

This example also points to insufficient evaluation of non-peer-reviewed literature by the Lead Authors.

^a See <http://ipcc-wg2.gov/publications/AR4/ar4review.html>.

Summary for Policymakers

A Summary for Policymakers is prepared for each of the three Working Group reports and for the Synthesis Report. These four summaries are arguably the most influential part of the assessment report because they are the part that policymakers are most likely to read. Each Summary for Policymakers is written by a team of scientists and reviewed by experts and government representatives as part of the second draft of the Working Group report. Government representatives then negotiate and agree to the final wording line by line. This process is intended to result in language that can be understood by policymakers and to increase the chance that governments will ‘buy in’ to the key conclusions of the assessment.

The governments’ line-by-line approval of the Summary for Policymakers drew more concerns and suggestions for improvement by respondents to the Committee’s questionnaire than any other part of the IPCC assessment process. Although most respondents agreed that government buy-in is important, many were concerned that reinterpretations of the assessment’s findings, suggested in the final Plenary, might be politically motivated. However, participating governments may have diverse political agendas that might cancel each other out. Moreover, the Working Group Co-chairs and Lead Authors exercise the authority to reject proposed revisions they believe are not consistent with their underlying Working Group report. Thus, the continued involvement of scientists in the drafting and approval process of the Summaries for Policymakers is critical to the scientific credibility of the report. A complication could arise when Lead Authors are sitting side by side with their government representative, which might put the Lead Authors in the difficult position of either supporting a government position at odds with the Working Group report or opposing their government’s position. This may be most awkward when authors are also government employees.

Plenary sessions to approve a Summary for Policymakers last for several days and commonly end with an all-night meeting. Thus, the individuals with the most endurance or the countries that have large delegations can end up having the most influence on the report. The process could be made somewhat more efficient by requiring all issues to be raised in advance of the Plenary, rather than allowing additional issues to be added from the floor of the meeting. Another option would be to have the Panel adopt the report one section at a time (as is done for the body of the Synthesis Report) rather than approve one line at a time, and to focus on key messages. This could both speed the approval process and lessen the opportunity for political interference.

- ▶ The IPCC should revise its process for the approval of the Summary for Policymakers so that governments provide written comments prior to the Plenary.

Another concern raised by respondents to the Committee's questionnaire was the difference in content between the Summary for Policymakers and the underlying report. The distillation of the many findings of a massive report into the relatively brief, high-level messages that characterize the Summary for Policymakers necessarily results in the loss of important nuances and caveats that appear in the Working Group report. Moreover, the choice of messages and description of topics may be influenced in subtle ways by political considerations. Some respondents thought that the Summary for Policymakers places more emphasis on what is known, sensational, or popular among Lead Authors than one would find in the body of the report. A recent review by the Netherlands Environmental Assessment Agency, for example, observed that the Working Group II Summary for Policymakers in the fourth assessment is more focused on the negative impacts of climate change than the underlying report, an approach agreed to by participating governments (PBL, 2010).

Synthesis Report

The Synthesis Report is intended to summarize and integrate the findings of the three Working Group reports in a form designed to address issues of concern to policymakers in nontechnical language. In practice, the actual framework of the Synthesis Report is negotiated within the Panel and thus varies from one assessment to the next. It is the Committee's judgment that the Synthesis Report is most valuable when it is structured as a document that attempts to integrate, not simply summarize, the findings of the three Working Group reports. This is a challenging task.

Respondents to the Committee's questionnaire were divided about the usefulness of the Synthesis Report. Scientists commonly found the report to be redundant with the Working Group reports and too political. Several thought that better integration among Working Groups would eliminate the need for a Synthesis Report. The selection of authors can be a mystery, involving an unexplained mix of Coordinating Lead Authors and Lead Authors. In contrast, government representatives generally found the report valuable and more accessible than the Summary for Policymakers

in each of the three Working Group reports. There was disagreement about whether the Synthesis Report should cover issues or policy questions, with different approaches tried in different assessments.

The production of the Synthesis Report is supported by a Technical Support Unit, sometimes with assistance from one or more of the Working Group Technical Support Units. Given the utility of the Synthesis Report to government representatives, the constitution and management of the Technical Support Unit is of critical importance.

Conclusions

The overall structure of the IPCC assessment process appears to be sound, although significant improvements are both possible and necessary for the fifth assessment and beyond. Key improvements include enhancing the transparency of the process for selecting Bureau members, authors, and reviewers; strengthening procedures for the use of the so-called ‘gray literature;’ strengthening the oversight and independence of the review process; and streamlining the report revision process and approval of the Summary for Policymakers.

