

COMMENT

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ILLUSTRATION BY DAVID PARKINS



Rethink IPCC reports

Voluntary work alone cannot sustain the assessments carried out by the Intergovernmental Panel on Climate Change. **Thomas F. Stocker** and **Gian-Kasper Plattner** call for institutional support and a longer report cycle.

Working on an assessment for the Intergovernmental Panel on Climate Change (IPCC) is utterly exhausting. Most authors are proud of their team's achievement and enjoy the intense discussions involved in reaching common ground on contentious scientific issues. But there are also countless hours and late nights of ploughing through the latest research, analysing gigabytes of data and responding to thousands of comments by reviewers.

Once elected by the IPCC, authors are engaged in a tightly scheduled three-year process that encompasses multiple rounds of draft production, revision and finalization. A long consensus-finding process is needed,

from multistep, worldwide reviews of report drafts to the preparation of a carefully worded summary for policy-makers that requires government approval. Headline statements generated by this process have made it verbatim into the decision documents of the international climate negotiations.

Yet scientists' work for the IPCC is voluntary, unpaid and mostly unassisted. And the burden on the scientists has become heavier with each cycle, leading some to question whether they can afford to work on future assessments.

This week, a task group on the future work of the IPCC will consider such issues at a meeting in Geneva, Switzerland

(16–17 September). Before the panel starts to formulate the timeline and structure of working groups in early 2015, ahead of the sixth assessment, scientists and governments need to consider how the process can be made less burdensome for those involved. The second half of 2015 will see the election of the new IPCC leadership, who will then flesh out and implement the panel's decisions.

During our work for the IPCC, we collected many views and suggestions from colleagues on ways to improve the process. As the latest cycle ended, we surveyed the authors who report on the physical-science basis of climate change. Here we summarize their responses and outline two approaches ▶

► for how we think the assessment could be improved. We call for careful evolution of the current comprehensive assessment system and greater support for participants from their host institutions. This would guarantee that the best and most robust scientific information will continue to be delivered to the climate-policy process and the public.

THE GROWING BURDEN

IPCC assessments are prepared by three working groups. The first reports on the physical-science basis of climate change; the second on impacts, adaptation and vulnerability; and the third on mitigation of climate change. To gauge climate scientists' opinions about the most recent assessment process, IPCC Working Group I surveyed its authors (see 'Author survey'). Questions focused on two issues: whether the scientific community is still able to carry out the volume of work required by the current system; and whether adjusted approaches might provide the information that stakeholders will need seven to ten years from now in a more accessible way.

More than 80% of the 172 respondents (66% of those polled) rated their overall experience as an author as very good to excellent, indicating that after 25 years physical scientists continue to strongly support IPCC assessment work. Difficulties in digesting the mountains of literature were flagged by more than 80%. More than 60% encountered hurdles when processing big data associated with the analysis of model simulations for climate projections and had trouble gaining timely access to model results¹.

We sought further opinions from participants in special sessions held at the American Geophysical Union annual meeting in December 2013 and the European Geophysical Union general assembly in April 2014. Two issues dominated: the work burden and difficulties in the transfer of assessment findings to the other IPCC working groups.

The volume of information challenges even the most enthusiastic and efficient scientists. For the fifth assessment report, Working Group I assessed more than 9,200 peer-reviewed articles and analysed more than 2 million gigabytes of numerical data². Authors did this on top of their regular jobs, mostly at universities or in research laboratories. Many relied on informal help from colleagues. A further 600 contributing authors and 1,000 expert reviewers made substantial contributions.

Governments and universities want their best scientists elected to the IPCC. But those scientists need support throughout the assessment process, not just at the election stage. Institutions should reduce the administrative and teaching load of authors to free up time for their IPCC work.

IPCC authors should not, in our view, receive direct financial compensation — that

AUTHOR SURVEY

In April 2014, the co-chairs of Working Group I (WGI) of the Intergovernmental Panel on Climate Change (IPCC) invited 259 WGI coordinating lead authors, lead authors and review editors to take an online questionnaire on their experiences. Of these, 172 responded.

1 Attitude towards, and willingness to serve, the IPCC

More than 90% rated their overall experience as good or better. Meanwhile, 68% would serve again; 20% would not. The role of review editor was widely criticized as having responsibility without power.

Please rate your overall experience.



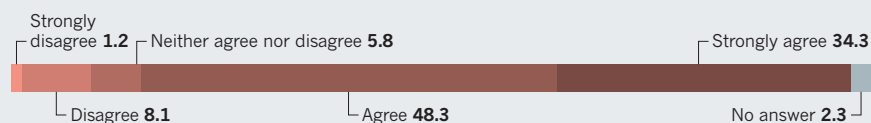
Assuming the IPCC process is unchanged would you be willing to serve again?



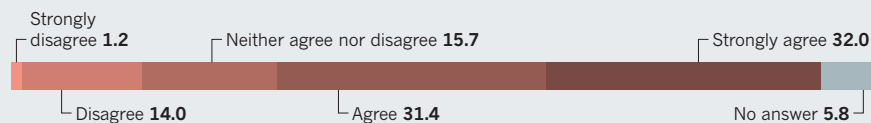
2 Workload

Since governments commissioned the first assessment report, published in 1990, the burden on the scientists has increased at an accelerated pace. A search for 'climate change' in the Thomson Reuters Web of Science yields 7,106 articles from 1900 to 2000, the time of the third assessment report. More than 110,000 articles published since 2001 include the term.

The amount of literature to be assessed was a challenge.



The amount of data to be processed was a challenge.



3 Assistance

The responses underline the importance of technical support units for IPCC working groups. About 80% of respondents felt that extra assistance was also necessary for those who coordinate a chapter team.

Please rate the overall support that you received from the WGI Technical Support Unit.



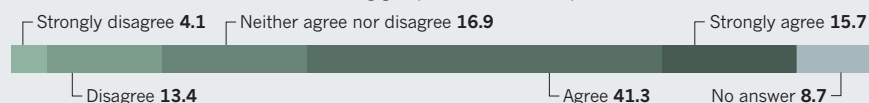
Dedicated assistance for chapter coordinators should be a standard approach in future assessments.



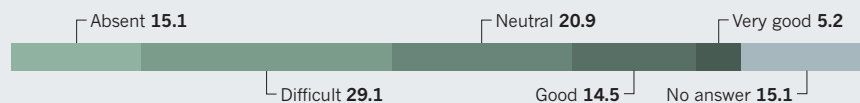
4 Working Group structure

The majority see no need to change the structure of the three IPCC working groups. They do, however, identify a deficit in collaboration between groups.

The current IPCC structure with three working groups is still the best option.



How do you rate cross-working-group collaboration?



Not all values add up to 100% because of rounding.

would risk creating conflicts of interest. But those with significant responsibilities, such as lead authors who coordinate chapter teams, work on cross-cutting issues or serve in more than one working group, should be provided with the means to hire a science assistant or postdoc for the duration of their IPCC service. The benefits justify the extra cost: the author's scientific productivity could be maintained and younger scientists can learn on the job.

The interaction between IPCC working groups has long been challenging. Different communities have differing philosophies, approaches and terminologies, and mismatched time constraints regarding, for example, the availability of model simulations for impact assessment and regional analysis. However, what has been encouraging is the experience with the recent joint-working group Special Report³, and cross-working-group expert meetings on, for example, greenhouse-gas metrics or attributing climate change and impacts to the increase in greenhouse-gas concentrations. The structured process of a joint report requires the authors to find common ground across disciplines.

TWO OPTIONS

Here we propose for discussion two approaches for future IPCC assessments that have emerged from exchanges with colleagues, at professional meetings and from our personal experience. A requirement for any approach is that the IPCC assessment must remain rigorous, robust, comprehensive within its scope, and transparent^{4,5}. Any compromise on these qualities will reduce the usefulness and jeopardize the impact of future assessments.

Extend the cycle and reduce parallel efforts. The period for an IPCC assessment could be lengthened to eight to ten years, from six. The freed-up time could be invested in collaborative work on issues that cut across working groups, such as the water and biogeochemical cycles, greenhouse-gas metrics, risk of abrupt climate change and irreversibility, ocean acidification, or regional climate change and impacts. Currently, such overlap issues are dealt with separately, resulting in parallel efforts that risk inconsistencies and the doubling up of work.

Jointly scoped 'topical assessment papers' could be written by teams collaborating across working groups. Each paper would undergo a separate expert-nomination process and a formalized expert and government review. Their length would correspond roughly to what now constitutes a chapter, about 80 pages, and they would form the building blocks of the comprehensive assessment. Production time could be flexible. Each working group would weave the topical assessment papers into its

comprehensive report as it went along.

A longer cycle would also allow the working groups dealing with impacts and mitigation to start later than the others. This way, much more of the most recent results from climate-model projections would be ready for impact assessment than was the case in the fifth assessment report published in 2013–14. Towards the end of the cycle, these reports would be synchronized so that the three working groups could prepare a final, succinct synthesis report.

IPCC reports would become leaner and the topical assessment papers could respond to emerging issues. But the production process would be more complex to coordinate and thus would require careful and more extensive scoping at the start.

Cut across working-group boundaries.

Collaboration between the disciplines could be intensified by a series of 'special reports' that cut across IPCC working groups. Around five such reports could be conceived for the next cycle, on topics such as observed climate change and impacts, on projections and their impacts, on scenarios and climate targets, and on the costs of climate-change adaptation and mitigation.

Each special report would be developed under the joint responsibility of two working groups, with one leading, and include a regular scoping and expert-nomination process. Timings would be set by the availability of scientific material, for example, analysis of relevant satellite observations or climate-model simulations. A summary for policy-makers would be approved for each special report with an overarching, joint technical summary and policy summary.

The downsides of this approach include the risk of not being comprehensive and the increased management burden for the IPCC and governments.

CAREFUL EVOLUTION

Many other opinions and suggestions have been aired. Regionalization of IPCC assessments is sometimes called for to give policy-makers and practitioners more and better regional information. In our view, this approach would undermine the global character of the climate-change problem exemplified by the IPCC.

Wiki-type assessments have a modern and transparent appeal, but they lack the robustness of the formal IPCC process. Comprehensive assessments done only every ten years, but alongside annual updates on the ongoing anthropogenic climate change, would duplicate well-established

efforts by others, including the American Meteorological Society⁶.

All such proposals would require fundamental changes to the established and successful IPCC assessment process that has been in place since 1988. And many of these changes would, in our view, reduce the scientific rigour and comprehensiveness and thus threaten the essence of an IPCC assessment.

Ongoing negotiations on a new international climate-change agreement within the United Nations Framework Convention on Climate Change, its implementation and future adjustments, call for a continuation of comprehensive climate-change assessments by the IPCC.

Our preference is the first of the approaches presented here. Topical assessment papers would increase the responsiveness of the IPCC to emerging issues that are relevant for policy-makers, while keeping the comprehensive nature of the full assessment.

To respond to growing regional needs, the Working Group I Atlas⁷ could also be extended to include quantities that would be relevant for humans and ecosystems, for example, maps of exposure and vulnerability. Ultimately, this could result in global maps of projected risks for a plethora of global-scale climate processes. Such information might be used by emerging national climate services, offering regional analyses for decision-makers, which could supplement the assessed information with their own products and databases.

Irrespective of the IPCC products — classical or new — enhanced support for scientists in responsible positions is essential for the next cycle. For the sixth assessment, the IPCC needs to consult widely and design an approach that is useful for policy-makers and feasible for scientists. ■

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