

How to make global assessments more effective: lessons from the assessment community

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In recent years, a range of international organizations have worked with the research community to produce a series of integrated assessments of key issues related to global environmental sustainability (e.g. the assessments of the Intergovernmental Panel on Climate Change (IPCC), the Millennium Ecosystem Assessment and the UNEP Global Environment Outlooks). More are planned for the coming years. While these assessments vary in their issue focus, governance structure, stated purpose and methodologies, they share a number of common characteristics. They generally review and synthesize existing knowledge and contribute to policy dialogues surrounding crucial environmental issues, in particular, climate change, energy, agriculture and water. They also face common challenges related to the diverse and sometimes diverging disciplinary and political perspectives that participants bring; the multi-scalar nature of the issues; the level of uncertainty in our understanding of many of the issues; the need to communicate to a range of audiences; and the need to walk a fine line between being policy relevant and policy prescriptive. There are additional challenges associated with the coordination across assessments, since issues overlap and, as a result, many contributors are involved in multiple assessments. In light of the scope and scale of these assessments and the challenges listed, there is now considerable reflection taking place on how the process of developing assessments and their content can be improved. The Integrated Assessment Society has brought together some of the main authors and chairs involved in these processes in order to transform these reflections into concrete recommendations for improving the process and the content of the assessments themselves. The objective of this exercise has been to support future assessments and to increase their impacts on decision-making. The results point to several areas requiring continued attention, including improvements in the design process to better achieve the respective goals of the assessments; coordination across assessments in order to share knowledge and improve outreach; improved communication of sources of uncertainty; the use and presentation of more qualitative data and knowledge; further exploration of the use of coupled global and sub-global assessments; careful management of participants, including stakeholders, in the assessment process; involvement of policy makers in the scoping and review processes; and the establishment and maintenance of an institutional home for the assessments.

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Introduction

The Integrated Assessment Society (TIAS) recently undertook a methodological review of major environmental assessments published in the past few years. These include, among others, the fourth Global Environment Outlook of the United Nations' Environment Programme (GEO4) [1]; the Fourth Assessment Report of the Intergovernmental Panel on Climate Change (IPCC AR4) [2]; the International Assessment of Agricultural Science and Technology and Development (IAASTD) [3]; the Organization for Economic Co-operation and Development's Environmental Outlook to 2030 (OECD EO) [4]; the Millennium Ecosystem Assessment (MA) [5]; and the third World Water Development Report (WWDR-3) [6].^a

The stated aims or goals of these global assessments are consistent to the extent that they all are explicit in their intention to provide policy-relevant scientific information and knowledge on the state of the world. They differ somewhat in their focus; for example, the IPCC has a particular emphasis on climate, the IAASTD on agriculture and the WWDR-3 on water, while UNEP GEO-4, the MA and the OECD EO take a somewhat broader look at environmental issues. UNEPs GEOs pay more explicit attention to capacity building than most of the other assessments. Meanwhile, the OECD EO and the IAASTD are more explicit in their examination of the potential effects of particular policy choices.

The focus of this review has been on the value of these assessments to, and their uptake by, policy in practice. Thus, the emphasis of the analysis was on process over product. As most of the assessments are updated at regular intervals, a periodical examination of the relationships between assessment design and effectiveness can support these processes in the future. In addition, new assessments are currently being planned or are at the early stages of their development, for example UNEPs Assessment of the State of the Marine Environment [7]. This review is also timely as the world approaches significant policy goals, such as the 2010 Biodiversity Target, the

^a Key documents from each of these assessments are included in our list of references. Additional information can be found at the assessments' websites: GEO4, <http://www.unep.org/geo/geo4/media/>; IPCC AR4, <http://www.ipcc.ch/>; IAASTD, <http://www.agassessment.org/>; OECD, <http://www.oecd.org/environment/outlookto2030/>; MA, <http://www.millenniumassessment.org/> and WWDR-3, <http://www.unesco.org/water/wwap/wwdr/>.

2015 Millennium Development Goal targets [8], and the current negotiations for an international climate treaty for the period after 2012, when the Kyoto Protocol is set to expire (see United Nations Framework Convention on Climate Change <http://www.unfccc.de>).

The why, how and what of this review

The impetus for this review began with the realization around mid-decade that 2007 was lining up to be a watershed year for the interface between science and policy in the area of the global environment. The IPCC, UNEP, the OECD and the IAASTD all originally planned to release their global assessment results in that year, at a time when people were still digesting the results of the Millennium Ecosystem Assessment [5]. The prospect of decision makers and funders having to deal with conflicting claims, mixed messages, or merely a sense of overwhelming numbness as these detailed, and often multi-volume, reports landed on their desks one after another focussed our attention on the need to reflect upon the general process of global environmental assessment. Anecdotal comments from colleagues involved in one or often more of these studies also highlighted the issue of 'assessment fatigue' within the research community itself.

In undertaking the review, we were influenced by the prior work of the Global Environmental Assessment Project, and in particular its emphasis on the concepts of relevance, legitimacy and credibility (see Box 1) [9^{••}, 10^{••}]. We recognized the work being undertaken at that time by the National Research Council in the United States [11^{••}]. Along the way, we also became aware of other personal (e.g. [12^{••}]), national [13^{••}] and international [8] reflections on these assessment processes.

The review consisted of three components: an exploration of the published and unpublished literature, including the reviews mentioned above; ad hoc discussions with various contributors to assessments; and, most importantly, two TIAS workshops convened in 2008 and 2009 (see Box 2). The focus was on drawing out insights and lessons learned from experts, primarily those have been involved in the setting up and the central deliberations of recent global assessments.

At the outset the defining questions for the review were as follows:

- How successful have assessments been?
- How have assessments tried to deal with the often disjunctive perspectives among those involved — in terms of interests, time horizon, culture, problem perception and so forth?
- Have assessment processes included efforts to build up or improve the capacity to undertake the assessment? If so, how?

Box 1 Relevance, Legitimacy and Credibility

Relevance: the ability of an assessment to address the particular concern of a user. *Legitimacy*: the political acceptability or perceived fairness of an assessment to a user. *Credibility*: the scientific and technical believability of the assessment to a defined user of that assessment, often in the scientific community [17].

- How have assessments tried to deal with the inherent uncertainties about the future?
- How have assessments tried to address the multi-scale character of worldwide developments and problems?

These questions served as a first step towards identifying the themes that required greater attention in the review; there was less concern about providing comprehensive answers to them. The first workshop and later discussions lead us to focus on the following themes:

- *Defining salient and credible actions for a sustainable future*: How can assessments best move from problem definition to action?
- *Diversity of purpose*: How can assessments best serve multiple audiences?
- *Improving the science in assessments*: How can assessments best deal with issues of multi-scale linkages, uncertainties and integration?
- *Coordination across assessments*: How many assessments should there be and how should they be linked?

These themes guided the discussions in the second workshop and thereafter. The next section presents the key observations and recommendations that resulted from these efforts.

Key observations and recommendations for global assessments

Enhancing the quality of the global environmental assessment is a challenge to be tackled during the full process from the selection of stakeholders and participants, to decisions about content, to communication and dissemination methods (especially directed at the policy sector). The most important of these are summarized below.

- *Embrace uncertainty*: Uncertainty is inherent in most issues addressed in global environmental assessments. This will probably not change in the near future. Natural systems will continue to be complex and unpredictable and our understanding of the behaviour of human systems, given their reflexive character, may never attain the level of certainty decision makers desire. As such, the sources and types of uncertainty need to be made more explicit in the assessment reports. In particular, assessments need to do a better job of clarifying the significance of specific uncertainties with respect to the purposes of the assessment.

Box 2 *The TIAS Expert Workshops*

In November 2008 and April 2009, The Integrated Assessment Society (TIAS), with support from the European Commission and the Netherlands Environmental Assessment Agency, held two expert workshops in Brussels, Belgium. The workshops brought together approximately 35 participants who have been involved in the setting up and the central deliberations of recent global assessments. In order to enable a frank discussion not only of successes but also of challenges and difficulties, both workshops adopted the Chatham House rules: 'When a meeting, or part thereof, is held under the Chatham House Rule, participants are free to use the information received, but neither the identity nor the affiliation of the speaker(s), nor that of any other participant, may be revealed.' The experts did, however, agree to being named in a participant list (see below).

Before the first workshop, participants with experience in specific assessments were asked to prepare brief reports from the perspective of their assessment, addressing a set of questions developed by the steering committee. These reports were presented at the workshop and provided the basis for an initial plenary discussion. Subsequently, the participants were divided into smaller groups, each of which considered one of the key questions in more detail from a cross-assessment perspective. The resulting insights of each group were then shared in a concluding plenary.

The conclusions of the first workshop served as input to the second workshop. Specifically, the following themes were used to structure the 2009 workshop. The second workshop was structured in much the same way as the first. Those who were unable to attend the first workshop were given the opportunity to present their experiences in global environmental assessments. After brief discussions, the rest of the first day was spent in small group discussions centred around the themes listed above. This was followed on the second day by plenary discussions in response to insights presented by each of the groups.

The following individuals contributed to the conclusions of this review through their participation in one or both workshops or bilateral meetings: John Agard, Joseph Alcamo, Jan Bakkes, Marion Cheatle, William Cosgrove, Jacques Delsalle, Volodymyr Demkine, Polly Ericksen, Hans Herren, Jill Jäger, Paul Jeffrey, Janice Jiggins, Kumi Kitamori, TJ Marcel Kok, Martin Kowarsch, Rik Leemans, Maite Martinez Aldaya, Beverly McIntyre, Leo Meyer, Bert Metz, Ruben Mnatsakian, Helen Mountford, Katrina Nakamura, Claudia Pahl-Wostl, Arthur Petersen, László Pintér, Dale S Rothman, Elena Santer-Veligosh, Mirjam Schomaker, Peter de Smedt, Serge Stalpers, David Stanners, Thomas Stocker, Rob Swart, Alexandra Vakrou, Caroline Van Bers, Detlef Van Vuuren, and Robert Watson.

Further details on the workshops, including workshop reports can be found at the TIAS website: <http://www.tias.uos.de/>.

Despite efforts such as those in the IPCC and MA to use specific terminology, the communication of uncertainty remains a challenge calling for greater attention.

- *Embrace the diversity of knowledge:* Knowledge presents itself in many forms and obtaining it requires a diversity of approaches. Quantification and quantitative models are fundamental to enhancing our understanding of natural and human systems, but too often these have been overemphasized to the exclusion of other ways of learning, knowing and communicating. This has been

to the detriment of providing truly integrated assessments. Thus, assessments need to continue to explore and extend the use of complementary methods in order to incorporate diverse sources of knowledge.

- *Embrace the diversity of circumstances:* Global environmental assessments, by definition, tend to adopt a global perspective on most issues. At the same time, most acknowledge substantial regional, national and local differences in how these issues, such as climatic change, play out, as well as the importance of inter-linkages across these scales. Still, this presents problems for many global assessments. In particular, there remains a tension between the desire for aggregated information and general insights and the reality of heterogeneity in time, space and the circumstances of different groups within society. Assessments need to develop better ways to separate those issues and facts that can be legitimately generalized from those that need to be kept disaggregated in order to maintain the integrity and diversity of the knowledge. There has been some movement towards the use of coupled global and subglobal assessments, but much remains to be done in this area.
- *Enhance participation:* The benefits of broadening participation in assessment processes almost certainly outweigh the costs. Participation in an assessment can serve multiple purposes. Participants can be sources of knowledge and insights, complementing that of the primary researchers. They can help to improve the relevance and legitimacy of the assessment. Perhaps most importantly, they can become ambassadors for the assessment. Still, participation needs to be carefully managed throughout the assessment process, beginning with the selection of participants. Their roles must be clearly defined and communicated in order to best serve the needs of the assessment.
- *Enhance engagement with policy makers:* The ultimate objective of most of the global environmental assessments is to contribute to policy making, if only to 'reduce the political risk of doing the right thing' [13^{••}]. It has become a general practice for assessments to state explicitly that their intention is to be policy relevant, but not policy prescriptive. Still, it is important that they do present policy makers with options for action and some indication of the likely outcomes of carrying out these actions. There is obviously the possibility of tension here, however, as the results may go against some closely held beliefs of powerful policy makers or groups within society. Thus, in order to help the assessment be accepted and land politically, it is vital that policy makers be closely involved in the assessment. This is most important in the scoping and review phases of assessments. This needs to be managed carefully, however, in order to maintain the independence of the assessment.
- *Establish an institutional home:* Tremendous amounts of knowledge and information are gathered in the process

of developing a global environmental assessment. This includes, but goes well beyond the collection of quantitative data, literature and contacts. Access to this information during an assessment and its maintenance afterwards is key to improving the effectiveness of individual assessments, enhancing the interaction between assessments and preparing the groundwork for future assessments. Some assessments (e.g. the IPCC and GEO) benefit from having an institutional home. We recommend that more attention be paid to this in other assessment processes. The time and effort needed to relearn old lessons and rebuild institutional memory only detract from the effectiveness of assessments.

All of the above recommendations imply that those undertaking future assessments need to take more care in the design of assessment processes. This includes clearly defining the objectives, purpose, scope, audience and boundaries of the assessment. While the process will always require a certain amount of evolution and adaptation as the assessment proceeds, correcting problems in the design can be costly in terms of money and time, both of which are often quite constrained. Furthermore, it is important that proper evaluation and documentation of the assessment process and the effectiveness of the assessment's results be planned for at the outset. This includes specifying measurable indicators of successful achievement of the objectives of the assessment and allocating funds for evaluation, both during and after the production of the main products. Too often this is left as an afterthought, resulting in the loss of significant opportunities for learning.

Finally, we suggest that a more formal, albeit 'light', coordination across assessments should be sought. First, this would provide opportunities for greater learning and sharing of knowledge across the assessments. Second, such coordination would be valuable in the outreach and communication aspects of assessments, particularly when multiple assessments are delivered in a short time frame. This would assist in reinforcing common messages where they exist, and explaining differences where assessments reach different conclusions.

Conclusions

The observations and recommendations made here are not all new. But those that are repeated deserve reiteration. Many recommendations have been considered by the developers of the assessments of the past decade but have not, for a variety of reasons, been fully implemented by all assessments. Through this review, some of our intuitions are confirmed, our views are backed by others with similar experiences, and we are better able to anticipate the requirements of and identify desirable elements in future assessments. These recommendations are a synthesis of the concluding reports published by TIAS during and after completion of its review [14,15,16].

As organizations at the interface of science and policy embark on a new round of global environmental assessments, many of the challenges faced in previous efforts are likely to increase, particularly as assessments move from problem definition to action, which can be expected to generate increased scrutiny and controversy. The recommendations that emerged from these workshops stress the need to reconsider the design and execution of these assessments in order to better meet the needs of those who request and support them, as well as to ensure the sustainability of those who develop them.

Now is the time for concerted action to deal with the constraints and barriers that have thus far prevented these and other recommendations from being addressed previously. It is time to tackle issues like the lack of resources (time and money) devoted to design and coordination, an overemphasis on scientific expertise and processing factual knowledge to the exclusion of skills related to facilitation and processes of social learning, and the presence of political pressure from a variety of interest groups. Overcoming these is a prerequisite to improving the content and development process of future assessments in such a way that they better contribute to the quality of decision-making and thus make better use of the tremendous amount of time and resources that are invested in their production.

Acknowledgements

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References and recommended reading

Papers of particular interest, published within the period of review, have been highlighted as:

- of special interest
- of outstanding interest

1. United Nations Environment Programme (UNEP): *Fourth Global Environment Outlook: Environment for Development* Nairobi: United Nations Environment Programme; 2007.
2. Intergovernmental Panel on Climate Change (IPCC): *Climate Change 2007 – Synthesis Report: Contribution of Working Groups I, II and III to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change* Cambridge, UK: Cambridge University Press; 2007.
3. International Assessment of Agricultural Knowledge, Science and Technology for Development (IAASTD): *Agriculture at a Crossroads: Synthesis Report* Washington, D.C.: Island Press; 2009.
4. Organization for Economic Co-operation and Development: *OECD Environmental Outlook to 2030*. Paris: OECD; 2008.
5. Millennium Ecosystem Assessment (MA): *Ecosystems and Human Well-Being: Synthesis* Washington, D.C.: Island Press; 2005.
6. World Water Assessment Programme: *The United Nations World Water Development Report 3: Water in a Changing World* Paris/London: UNESCO/Earthscan; 2009.
7. United Nations Environment Programme (UNEP), Intergovernmental Oceanographic Commission of the United Nations Educational, Scientific and Cultural Organisation (IOC-UNESCO): **An**

Assessment of Assessments: Findings of the Group of Experts. *Start-up Phase of a Regular Process for Global Reporting and Assessment of the State of the Marine Environment including Socio-economic Aspects.* Valletta, Malta: Progress Press Ltd; 2009

8. United Nations Department of Economic and Social Affairs (DESA): *The Millennium Development Goals Report 2009.* New York: United Nations; 2009.
9. Farrell AE, Jill Jäger (Eds): *Assessments of Regional and Global Environmental Risks: Designing Processes for the Effective Use of Science in Decision Making.* Washington, D.C.: RFF Press; 2005.
 The book presents the results of the five-year Global Environmental Assessment study launched by William C Clark of the impacts of environmental assessments. It is aimed at practitioners and looks specifically at what makes one assessment more effective than the other in influencing decision-making and ultimately societal change.
10. Mitchell RB, Clark WC, Cash DW, Dickson NM (Eds): *Global Environmental Assessments: Information and Influence.* Cambridge: MIT Press; 2006.
 The final book in the Global Environmental Assessment project series examines how scientific knowledge presented in assessments is generated, organized and disseminated. It is intended for the academic community and those involved in institutional design.
11. National Research Council (NRC): *Analysis of Global Change Assessments: Lessons Learned. Committee on Analysis of Global Change Assessments* National Research Council, Washington, D.C.: The National Academies Press; 2007.
 The book presents the results of a comparative analysis of eight major global change assessment processes by a committee of individuals who have been involved in these assessments, as a guide for those who are conducting them. The committee concludes by providing recommendations for those conducting assessments
12. Leemans Rik: **Personal experiences with the governance of the policy-relevant IPCC and millennium ecosystem assessments.** *Global Environ Change* 2008, **18(1)**:12-17.
 The author reflects on and compares two major assessment processes, IPCC and the MA, drawing upon his personal experience and a literature review. He identifies an array of differences such as scale of the analyses, and the type of information and knowledge used (IPCC is highly quantitative while the MA is more qualitative). Ultimately, he draws conclusions about the effectiveness of the assessments and the direction in which they could be going with respect to process, policy relevance and communication.
13. Kok TJ, Bakkes JA, Bresser AHM, Manders AJG, Eickhout B, van Oorschot MMP, van Vuuren DP, van Wees M, Westhoek HJ: *Environment for Development – Policy Lessons from Global Environmental Assessments.* Netherlands Environmental Assessment Agency. the Netherlands: Bilthoven; 2009.
 The authors have analysed four major global assessments: IPCC Climate Change 2007, UNEP Global Environment Outlook 2004, OECD Environmental Outlook to 2030 and the IAASTD Agricultural Assessment. The analysis focusses on the consistency among and policy implications of these assessments. It identifies two areas requiring the most attention: 'agriculture, food and biodiversity' and 'energy, climate and air pollution'.
14. **Global assessments: bridging scales and linking to policy.** *GWSP Issues in Global Water System Research, No. 2. Report on the joint TIAS–GWSP workshop held at the University of Maryland University College, Adelphi, USA, 10–11 May 2007.* Edited by Van Bers C, Petry D, Pahl-Wostl C. *GWSP IPO, Bonn: 2007.*
15. Bakkes Jan, Rothman Dale S: *A Methodological Review of Recent Global Assessments: Summary Report of Workshop Outcomes* Osnabrück: The Integrated Assessment Society; 2008.
 The report summarizes the perspectives of the invited experts on how the business of developing, conducting and delivering the major integrated global assessments has evolved in recent years. Specific attention is given to uptake of assessment results by the policy sector
16. TIAS: *The Integrated Assessment Society (TIAS) Experts Workshop II: A Methodological Review of Recent Global Assessments Report of Workshop Outcomes Brussels, 21–22 April 2009.* Osnabrück: The Integrated Assessment Society; 2009.
17. European Environment Agency (EEA): *Designing Effective Assessments: The Role of Participation, Science and Governance, and Focus* Copenhagen: European Environment Agency; 2001.