Science and Values in Policy-Relevant Assessments

Lessons from Global Assessments and PBL

5 October 2012 | Arthur Petersen
Funtowicz and Ravetz, Science for the Post Normal age, *Futures*, 1993
The challenge of post-normal science

- Expert advisers should be reflexive
- Methods for dealing with uncertainty should merely be considered as tools, not as the solutions
- Fear for paralysis in policy making should not be allowed to block communication about uncertainty
- Communication with a wider audience about uncertainties is crucial
Lessons from global assessments


Global assessments considered: GEO4, IPCC AR4, IAASTD, OECD EO, MA, WWDR-3

- Embrace uncertainty
- Embrace the diversity of knowledge
- Embrace the diversity of circumstances
- Enhance participation
- Enhance engagement with policy makers
- Establish an institutional home
Lessons from global assessments


Global assessments considered: GEO4, IPCC AR4, IAASTD, OECD EO, MA, WWDR-3

- Embrace uncertainty (example: IPCC)
- Embrace the diversity of knowledge (example: IR)
- Embrace the diversity of circumstances
- Enhance participation
- Enhance engagement with policy makers
- Establish an institutional home
THE GREAT GLOBAL WARMING SWINDLE
De leugens over het klimaat
HOE WETENSCHAP DOOR GEKNOEI MET FEITEN EN CIJFERS ALLE KREDIET HEeft VERSPEELD
PLUS: NIEUWE ONTHULLINGEN
IPCC 2001: taking into account all uncertainties (including model uncertainty): largest part of warming is ‘likely’ due to anthropogenic greenhouse gases.

Warning: take into account uncertainty in climate simulation.
IPCC 2007: taking into account all uncertainties (including model uncertainty): largest part of warming is ‘very likely’ due to anthropogenic greenhouse gases.
Shifting notions of reliability

- Statistical reliability (expressed in terms of probability)
  - How do you statistically assess climate predictions?

- Methodological reliability (expressed qualitatively in terms of weak/strong points)
  - How do you determine the methodological quality of the different elements in simulation practice, *given the purpose of the model*?

- Public reliability (expressed in terms of public trust)
  - What determines public trust in modellers?
Lesson learnt in uncertainty communication (I)

1. Conditional character of probabilistic projections requires being clear on assumptions and potential consequences (e.g. robustness, things left out)

2. Room for further development in probabilistic uncertainty projections: how to deal decently with model ensembles, accounting for model discrepancies

3. There is a role to be played for knowledge quality assessment, as complementary to more quantitative uncertainty assessment
Lessons learnt in uncertainty communication (II)

4. Recognizing ignorance often more important than characterizing statistical uncertainty

5. Communicate uncertainty in terms of societal/political risks
Example from the Intergovernmental Panel on Climate Change WG I (2007)

“Most of the observed increase in globally averaged temperatures since the mid-20th century is very likely due to the observed increase in anthropogenic greenhouse gas concentrations\textsuperscript{12}.” (SPM)

\textsuperscript{12} Consideration of remaining uncertainty is based on current methodologies.
Example from the IPCC WG I 2007 (continued)

“Very likely” means a chance >90%. But what kind of probability are we dealing with here?

“assessed likelihood, **using expert judgement**, of an outcome or a result”

Final SPM
A major advance of this assessment of climate change projections compared with the TAR is the large number of simulations available from a broader range of models. Which, taken together with new approaches to improved constraints derived from observations, these provide a quantitative basis for estimating likelihoods of expected warming. Model simulations consider a range of possible futures including idealised emission or concentration assumptions. These include SRES\textsuperscript{11} illustrative marker scenarios for the 2000–2100 period and model experiments with greenhouse gases and aerosol concentrations held constant after year 2000 or 2100. This Working Group I assessment does not consider the plausibility or likelihood of any specific emission scenario.
when palaeoclimatic information suggests reductions of polar
land ice extent and 4 to 6 m of sea level rise. {6.4, 10.7}
Importance of identifying high-confidence findings

A. Structure of the Fourth Assessment Reports

- Working Group I report
  The Physical Science Basis

- Working Group II report
  Impacts, Adaptation and Vulnerability

- Working Group III report
  Mitigation of Climate Change

The AR4 Synthesis Report

Table SPM 2
Example of some projected regional impacts (see Annex I)
Process: Openness, peer review, supervision

- Openness: PBL registration website for possible errors
  - 40 reactions in total; 3 of which relevant for our investigation

- Draw on IPCC authors to give feedback

- Internal and external peer review

- Independent supervision by KNAW Royal Netherlands Academy of Arts and Sciences
Quite some risk for losing uncertainty information
What can go wrong?

- **E1** Inaccurate statement
  - E1a Errors that can be corrected by an erratum (5)
  - E1b Errors that require a redoing of the assessment of the issue at hand (2)
- **E2** Inaccurate referencing (3)
- **C1** Insufficiently substantiated attribution (1)
- **C2** Insufficiently founded generalization (2)
- **C3** Insufficiently transparent expert judgment (10)
- **C4** Inconsistency of messages (2)
- **C5** Untraceable reference (3)
- **C6** Unnecessary reliance on grey referencing (2)
- **C7** Statement unavailable for review (1)
Errors and shortcomings in AR4 WG II (8 chapt.)

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The IPCC: science or politics?

- Assessments are social constructs that contain both scientific and political elements
- Successful? Depends on ability to connect to climate science and policy
- Generally voiced criticism: IPCC not open enough to skeptics
The IPCC: science or politics? (II)

- Practice: procedures ensure inclusivity; skeptics do have influence; reflexivity on dissensus is moderate (neither low nor high)
- Still, the communication of uncertainty can be further improved
- The IPCC acts as a Latourian “Parliament of Things” – if only the actors would admit…
Scenarios, modelling and social science

There is a *growing imbalance* between:

- the increasing technical sophistication of modelling elements of scenarios and

- *continued simplicity* of our understanding of the social origins, linkages, and implications of the narratives to which they are coupled.

(Garb, Pulver and VanDeveer, 2008; p.1)
Research challenge for scenario analysis

- To strengthen scenario analysis from an international relations point of view

- ‘To make the required speculation in scenarios more disciplined, more anchored in relevant scientific knowledge when available and more transparent’

(Parson, 2008; p.1)
Scenarios

- A scenario is a consistent set of assumptions about possible future developments

- Includes worldview, underlying logic, storyline and model implementation

- Contrasting scenarios to explore long term developments
  - unstructured problems: many uncertainties, different value judgements, high stakes
Many scenario exercises... with similar scenario categories...

- MA, IPCC, IAASTD, UNEP GEO, OECD EO

- Scenario categories
  - Conventional markets
  - Reformed markets
  - Global sustainable development
  - Competition between regions
  - Regional sustainable development
Worldviews approach as entry-point to strengthen international relations contributions

- Worldviews considered as stylised, normative points of view about how the world functions
- Each scenario embodies a specific worldview
- Help to structure debate by positioning different perspectives
- To test different strategies in different possible worlds and identify robust strategies
Linking theoretical schools in IR to worldviews

- Realism
- Institutionalism
- International Political Economy
- Constructivism
Using formalization of IR knowledge
“Worldviews” further defined by PBL as...

...ideal types of societies and corresponding ways to solve societal problems (decision-making processes)

**Four examples of “worldviews”**
1. Global markets (A1)
2. Competition between regions (A2)
3. Global sustainable development (B1)
4. Regional sustainable development (B2)
Four worldviews

- **Global action**
  - B1: ‘Our common future’
    - Regulation & treaties
    - Rio 1992
    - UN

- **Regional action**
  - B2: ‘Small is beautiful’
    - Civil responsibilities
    - Seattle 2000
    - Local communities

- **Market**
  - A1: ‘End of history’
    - Free trade
    - Berlin 1989
    - WTO

- **Government**
  - A2: ‘Clash of Civilizations’
    - Protection of rights
    - NY 9/11 2001
    - NATO

Four worldviews are: A1, A2, B1, B2.

- A1: ‘End of history’
  - Free trade
  - Berlin 1989
  - WTO

- A2: ‘Clash of Civilizations’
  - Protection of rights
  - NY 9/11 2001
  - NATO

- B1: ‘Our common future’
  - Regulation & treaties
  - Rio 1992
  - UN

- B2: ‘Small is beautiful’
  - Civil responsibilities
  - Seattle 2000
  - Local communities
Climate policy

Global action

A1

‘End of history’
Efficiency, innovation

A2

‘Clash of Civilizations’
Adaptation, protection

B1

‘Our common future’
Emission ceilings, limit values

B2

‘Small is beautiful’
Non-technical changes

Market

Regional action

Government
Pitfalls

Global action

A1
‘End of history’
Efficiency, innovation
Technological optimism

B1
‘Our common future’
Emission ceilings, limit values
Bureaucracy

Market

A2
‘Clash of Civilizations’
Adaptation, protection
Social conflicts

B2
‘Small is beautiful’
Non-technical changes
Social dilemma

Regional action
IR and scenarios: conclusions

- Institutional and governance component in scenarios is still relatively limited
- Scenario analysis will move from analysing problems to directions for problem solving
- Increasing role for international relations
- Trade off between simplicity and robust knowledge
- Challenge to also address ‘deeper values’
IR and scenarios: next steps

- Establishing links between IR and scenario communities, by working together on “Shared Socio-economic Pathways” (new generation of scenarios for climate research)
- Tokyo, January 2013: launch of Task Force on Methodology for Earth System Governance Research (co-chairs: Arthur C. Petersen, Ronald B. Mitchell and Norichika Kanie)

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