

International Capability to Address the Belmont Challenge

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Outline

- A study of the international research capability to meet the Belmont Challenge: background
- Working procedure of the study
- The Panel and contributors
- A summary of the report

The Belmont Challenge

- Regional Environmental Change: Human Action and Adaptation
 - The following require **regional and decadal prediction, advanced observing systems**, and inclusion of **social sciences**. They involve synergy of multiple stressors, including extreme events.
 - Coastal zone
 - Water cycle & resources
 - Carbon cycle
 - Ecosystem services – food security
 - Most vulnerable societies (geographic areas), with low capacity and high societal impact

Belmont project



ICSU was commissioned to conduct analysis of international research capability to respond to the Belmont Challenge. The analysis should focus on

- Solvability of problems
- Infrastructure and personnel

The panel members



Guy P. Brasseur (Chair) Melvyn Shapiro (advisor)
Philippe Bougeault Gilbert Brunet
Antonio Busalacchi Opha Pauline Dube
Congbin Fu Sandro Fuzzi
Anne Marie Izac Pavel Kabat
Jack Kaye Gernot Klepper
Gordon McBean Carlos Nobre
Adrian Simmons Julia Slingo
Martin Visbeck Deliang Chen (*Ex officio*)
Gina Adams (observer)

The contributors

Paulo Artaxo

Heide Hackmann

Rik Leemans

Hassan Virji

Robert Bishop

Jill Jaeger

Alexia C. Massacand

Oran Young

Procedures



- The panel was appointed in last December and its first meeting conducted on 4/12/09 in Paris, focusing on the working procedure and structure of the report.
- Some key international initiatives/programmes and individuals were contacted for input.
- The input outside the panel has been worked out by the panel members working in pairs.
- The second panel meeting held on 8-10 March outside Paris & the first draft report was ready on 8 April
- The draft report was be reviewed twice by a group of invited scientists (30+) in April-June
- Final report was approved by the ICSU EB in July and submitted to the BF in August.

Structure of the discussion and to some extent the report



- Global environmental observational system including socio-economic information. Access to data
- Multi-disciplinary research program on environmental changes including the need for supercomputing resources
- Environmental Service in support of mitigation and adaptation
- Environmental user interface mechanisms
- Capacity building

The Report

“Regional Environmental Change: Human action and adaptation – what does it take to meet the Belmont Challenge?”

- Readiness of the community
- Impediments
- Road Map to address the Belmont Challenge
- Instruments and Initiatives
- Conclusions

Readiness of the Community

The academic community is aware of the challenges, however

- The selection of research topics is often dominated by academic curiosity and disciplinary challenges, and much less so by societal needs
- Impressive disciplinary knowledge has been accumulated (data & models) but is not brought to full use for Belmont Challenge type questions
- The institutional structure and the incentives for integrated analyses of the Belmont Challenge are not sufficiently developed

Impediments



- **Funding Structure**
 - Academic funding often organized along disciplinary lines
 - Difficulties in coordinating international funding schemes
 - Lack of funding for local academics in the most vulnerable regions
- **Educational Systems**
 - The academic reward system does not support integrated research activities
 - At least Postdoctoral programs should emphasize interdisciplinary expertise
- **Infrastructure and Facilities**
 - Infrastructure for regional environmental issues has been developed along disciplinary lines – integration is necessary
 - Even more powerful machines are needed for “Earth System Prediction Models”

Road Map

- Key issues
 - Coastal zones in the 21st century
 - Water quality and water resources
 - Sustainable carbon based economy
 - Most vulnerable societies
 - Human behavior
- Some requirements

Understand the roots of human behaviour



- Top-down approaches featuring public policy making and implementation;
- Bottom-up approaches featuring the role of social movements;
- The role of institutions and, more specifically, governance systems;
- Decision-making under uncertainty
- The role of local or traditional knowledge, as well as religious or spiritual beliefs; and human security

Requirements

Addressing the issues requires

- enhanced understanding of multiple stressors and their impacts, and vulnerability of ecosystems and society
- better quantification of the rates of change, the controlling factors and feedbacks at relevant spatial and temporal scales;
- thorough assessment of the environmental and societal consequences of mitigation and adaptation strategies

Requirements

These in turn require more effective use and further development of four elements

- **Observation and monitoring (Socio-economic data)**
- **Analysis and prediction (Integrated Earth system analysis and prediction systems)**
- **Information and communication (Environment Service)**
- **Capacity building**

Instruments and Suggested Initiatives

- International Research and Educational Network for Earth System Science (IRNESS)
- Pilot Studies
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Main conclusions

- To integrate and coordinate our efforts in a single framework (Establish an international research and educational network for Earth system science)
- Science needs to provide answers that are pertinent to the questions posed by society
- Encourage natural and social scientists to work together (Conduct a study focusing on issues associated with the integration)
- Nurture the new generation of experts
- Encourage diverse approaches

Thanks to NSF
for support!



Regional Environmental Change: Human Action and Adaptation
What does it take to meet the Belmont Challenge?

