

PRESS RELEASE

Thursday 11 November 2010

Scientific Grand Challenges identified to address global sustainability

Paris, France—The international scientific community has identified five Grand Challenges that, if addressed in the next decade, will deliver knowledge to enable sustainable development, poverty eradication, and environmental protection in the face of global change. The Grand Challenges for Earth system science, published today, are the result of broad consultation as part of a visioning process spearheaded by the International Council for Science (ICSU) in cooperation with the International Social Science Council (ISSC).

The consultation highlighted the need for research that integrates our understanding of the functioning of the Earth system—and its critical thresholds—with global environmental change and socio-economic development.

The five Grand Challenges are:

1. **Forecasting**—Improve the usefulness of forecasts of future environmental conditions and their consequences for people.
2. **Observing**—Develop, enhance and integrate the observation systems needed to manage global and regional environmental change.
3. **Confining**—Determine how to anticipate, recognize, avoid and manage disruptive global environmental change.
4. **Responding**—Determine what institutional, economic and behavioural changes can enable effective steps toward global sustainability.
5. **Innovating**—Encourage innovation (coupled with sound mechanisms for evaluation) in developing technological, policy and social responses to achieve global sustainability.

‘The challenges are a consensus list of the highest priorities for Earth system research and provide an overarching research framework. If we, the scientific community, successfully address these in the next decade, we will remove critical barriers impeding progress toward sustainable development,’ said Dr Walt Reid, who chaired the Task Team overseeing the first step of the visioning process.

‘Addressing these challenges will require new research capacity, especially the involvement of young scientists and scientists from developing countries, and a balanced mix of disciplinary and interdisciplinary research that actively involves stakeholders and decision makers,’ Dr Reid continued.

‘The existing global environmental change programmes—Diversitas, International Geosphere Biosphere Programme, International Human Dimensions Programme and the World Climate Research Programme—along with the Earth System Science Partnership have played an important role in our understanding of the Earth system,’ explained Professor Johan Rockström, the current chair of the visioning Task Team.

‘Their engagement has been an important part of the visioning process and the continued involvement of these global research networks is essential to the globally coordinated research effort needed to address the questions posed by the Grand Challenges,’ Professor Rockström said.

Now that the research framework has been identified the next step has begun: determining the organizational structure required to implement this framework.

Professor Deliang Chen, ICSU Executive Director, said: ‘A lot of integrated research is already happening but it does not constitute the concerted coordinated global effort that is needed to effectively respond to the Grand Challenges. ICSU, together with the ISSC and the Belmont Forum of

funders, are consulting with the existing programmes and related initiatives to determine what new structure(s) will be required.'

'The new structure(s) will need to deliver the science to answer the Grand Challenges more rapidly and more effectively than is likely to happen with the current arrangements,' Professor Chen concluded.

The full details of the Grand Challenges have been published in a report, which is available on the visioning website: www.icsu-visioning.org

A 'Policy forum' article on the Grand Challenges has been published in *Science* (Reid *et al.* Vol. 330, pp 916-917, 12 Nov 2010).

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About ICSU

Founded in 1931, ICSU is a non-governmental organization with a global membership of national scientific bodies (121 Members, representing 141 countries) and International Scientific Unions (30 Members). ICSU is frequently called upon to speak on behalf of the global scientific community and to act as an advisor in matters ranging from the environment to the conduct of science. ICSU's activities focus on three areas: planning and coordinating research; science for policy; and strengthening the Universality of Science. www.icsu.org

About the Visioning Process

The Visioning Process is spearheaded by ICSU in cooperation with the International Social Science Council (ISSC). It is a three-step consultation process, engaging the scientific community to explore options and propose implementation steps for a holistic strategy on Earth system research that will encourage scientific innovation and address policy needs. Step 1 focuses on identifying the urgent scientific questions, while step 2 focuses on the institutional frameworks needed to support the research strategy. The final step will examine how to make the transition from the current approach to the needed approach. The visioning process began in February 2009 and is guided by a Task Team. 'Earth System Science for Global Sustainability: The Grand Challenges' is the result of step 1 and represents input from many individuals and institutions. www.icsu-visioning.org