

J. Rockström: Earth System Research for Global sustainability

Scientific evidence clearly indicates that Humanity has entered a new geological epoch, the Anthropocene, where humans constitute the largest driver of planetary change. In the Anthropocene humanity faces profoundly new challenges for economic growth and human development. Now, global sustainability is a prerequisite for human wellbeing from the local community to economic regions. This insight stems from major scientific advancements over the past 30 years on Earth system science and global environmental change research (to a large extent initiated and coordinated by the global environmental change research programs under ICSU and its co-sponsors; ESSP, WCRP, IGBP, IHDP and Diversitas). This research has provided a deeper understanding of how the Earth system operates; evidence of growing planetary risks associated with social-ecological interactions and non-linear abrupt change; and growing evidence and insights on impacts, vulnerabilities, and response options to bend the global curves of planetary pressures and build resilience in an era of rapid global change.

Despite these major scientific advances and insights, the world continues to develop along dangerous trajectories, undermining the life support systems that provide economic growth, and placing coming generations at risk of major regime shifts in the Earth system. Our scientific ability to forecast future Earth system risks and impacts from anthropogenic change remains associated with large uncertainties. We need a deeper integration of social and natural sciences to answer critical questions for future human development, related to our ability to adapt and deal with impacts, to respond and innovate, to confine risks of catastrophic thresholds. Bending the curves of global environmental change will require transformative change in societies, across scales and sectors. Global sustainability is a key to food security, energy access, freshwater availability, poverty alleviation, human health, etc., which requires new thinking on economics, governance, trade, equity and power relations.

It is in this context that ICSU and ISSC initiated the global visioning process in February 2009, where a more than two year process was undertaken, including consultations with scientists and stakeholders worldwide, on the research agenda for global environmental change research in the coming decade. The visioning process generated the Grand Challenges in Earth System Research for Global Sustainability (ICSU, 2010), providing the justification for an unprecedented global scientific endeavour to provide answers to the most pressing questions facing humanity in the Anthropocene. In parallel, and in close consultation, the Belmont Forum (the high-level body of the world's major donors of global environmental change research, established in June 2009), has advanced a similar vision on the future key scientific priorities for global environmental change research (the Belmont Challenge and Belmont White Paper) (Belmont Forum, 2011). With the end of the visioning process in June 2011, a significant decision was taken to establish a new Alliance, consisting of ICSU, ISSC, the Belmont Forum, and key co-sponsors and partners (e.g., UNESCO, UNEP, UNU) to lead the transition from visioning to implementation of a new Initiative on Earth system research or global sustainability. A first step is to integrate the ICSU/ISSC Visioning with the Belmont Challenge and White paper. A transition team has been established to lead the development of the new research and organizational framework for the Initiative, which is developed in close dialogue with the current GEC research programs and the wider global science community as well as other stakeholders. This presentation outlines in brief the justification for a new integrated science initiative, the journey so far, and focuses on the

future vision for, and transition to, a new global scientific initiative on global environmental change research for sustainable development.

References

ICSU (2010). Earth System Science for Global Sustainability: The Grand Challenges. International Council for Science, Paris.

Belmont Forum (2011). The Belmont Challenge: A Global, Environmental Research Mission for Sustainability

Johan Rockström, Professor, Stockholm University, and Executive Director, Stockholm Environment Institute and Stockholm Resilience Centre, Sweden



Professor Johan Rockström is an internationally recognized systems researcher on global sustainability issues and a leading scientist on integrated land and water resource management, with a particular focus on resilience and development. He has more than 15 years of experience in applied water research in tropical regions, and has more than 100 research publications in the fields of agricultural water management, watershed hydrology, global water resources, eco-hydrology, resilience and global sustainability. He serves on several scientific committees and boards, for example, as the vice-chair of the science advisory board of the Potsdam Institute for Climate Impact research (PIK), and he chairs the visioning process on global environmental change of the International Council for Science (ICSU). He was named “Swede of the Year” in 2009 for his work on building bridges to link science on climate change to policy and society.