

Sustainability science and the challenges of transdisciplinary research



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and the challenges of transdisciplinary research

Responding to the challenges of SD

- Sustainable development requires integrative work considering economic, environmental and social aspects in almost all policy domains.
- During the last ten years a growing number of initiatives for such an integrative science evolved, referred to, *inter alia*, as sustainability science, transdisciplinary research, integrative and implementation-oriented science.

Defining Sustainability Science

- Friibergh Manor, Sweden, October 2000
- Regional Workshops, 2001 – 2002
- Mexico City, May 2002
- WSSD, Science Forum, August 2002
- ICSU, TWAS, ISTS *ad hoc* Advisory Group
- <http://sustainabilityscience.org>

Sustainability Science (1)

...seeks to understand the fundamental character of interactions between nature and society

...and harness science and technology in the quest to achieve transitions to sustainable development

Sustainability Science (2)

- Core questions on the human-environment system
- Differs to a considerable degree in structure (e.g. problem-driven), methods (e.g. interdisciplinary and transdisciplinary), and content (action-oriented) from science that we are used to

Core Questions (1 - 4)

- How can the dynamic interactions between nature and society be better incorporated in emerging **models and conceptualizations** that integrate the Earth system, human development, and sustainability?
- How are **long-term trends** in environment and development, including consumption and population, reshaping nature-society interactions in ways relevant to sustainability?
- What determines the **vulnerability or resilience** of the nature-society system in particular kinds of places and for particular types of ecosystems and human livelihoods?
- Can scientifically meaningful **“limits” or “boundaries”** be defined that would provide effective warning of conditions beyond which the nature-society systems incur a significantly increased risk of serious degradation?

Core Questions (5 – 7)

- What **systems of incentive structures** – including markets, rules, norms and scientific information – can most effectively improve social capacity to guide interactions between nature and society toward more sustainable trajectories?
- How can today's operational systems for **monitoring and reporting** on environmental and social conditions be integrated or extended to provide more useful guidance for efforts to navigate a transition toward sustainability?
- How can today's relatively independent activities of research planning, monitoring, assessment, and decision support be better **integrated into systems for adaptive management and societal learning**?

Requires changes in the „demand“ and „supply“

- Increase public and political awareness of the nature and magnitude of the challenges posed by sustainable development
- Science must offer solutions to problems that society has identified, not more lists of problems that society should deal with

The challenges

- Transdisciplinary sustainability science implies that the problems to be solved are not predetermined by the scientific community and need to be defined cooperatively by science and society;
- This kind of science connects problem definition, searching for solutions, and implementation of solutions in a recursive (iterative) societal negotiation and learning process;

More challenges

Sustainability science involves participatory processes of negotiation in which interests and thus power constellations play a major role as well. Consequently, apart from expert and professional competence, transdisciplinarity requires a high degree of social competence and a willingness among scientists to be aware of the values inherent to scientific knowledge and to make values explicit.

Some (of the many) Questions

- Where does sustainability science fit in scientific institutions?
- How and by whom should it be funded?
- How can we design the collaboration between science and society in order to promote transitions to sustainable development?
- How can researchers build their careers in this field?

The way forward?

- Pioneers (e.g., TD-Net; some recent EU-projects; ISTS, PNAS „A room of its own“)
- Networks
- But are we moving fast enough, given the magnitude of the persistent problems of unsustainability that the world faces?