

Re-shaping global change science for the 21st century: young scientists' perspectives

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1. Research question

Pondering the crisis that faced humanity following the unleashing of the atom, Einstein remarked, “a new type of thinking is essential if mankind is to survive and move towards higher levels”. Now, well into the 21st century, humanity is faced with even more grand challenges, currently culminating in a multi-faceted global crisis involving the economic and financial system, the climatic system and other ecological dimensions, the energy system, and the distribution of wealth and capabilities.

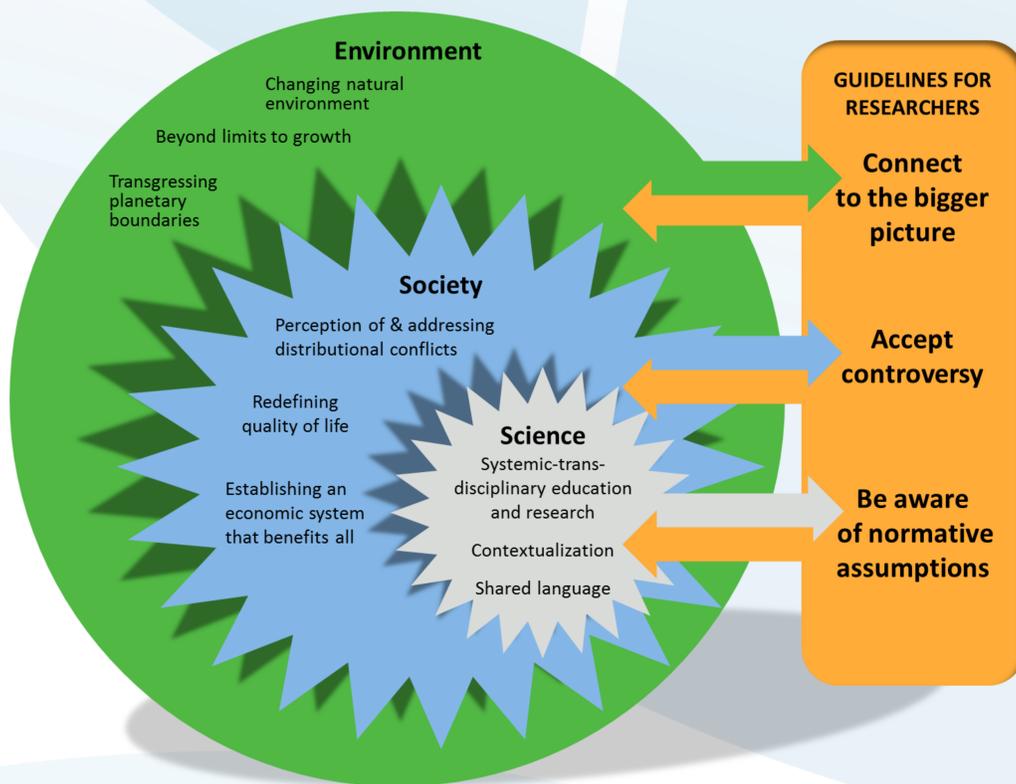
It was during our time as participants of the 2014 Young Scientists Summer Program (YSSP) at the International Institute for Applied Systems Analysis (IIASA) that our reflections, on **what we regard as the ‘big questions’ facing humanity and on what kind of science is needed to tackle these grand challenges**, began to take shape.

2. Method

Following a survey of approximately fifty PhD researchers from a wide range of cultural and disciplinary backgrounds, on what they considered to be the most contentious issues facing humanity in the years ahead, we were able to collate and consolidate their responses into four big questions:

- 1) **Planetary boundaries and resource constraints:** (How) will we manage to live within planetary boundaries and resource constraints?
- 2) **Adapting to changing environments:** Who will be affected and to what degree?
- 3) **Dealing with conflict:** What are likely to be the causes of future conflicts and how can they be overcome?
- 4) **Re-defining quality of life:** (How) can humanity prosper without conventionally defined economic growth?

In a further step we then tackled these questions in a worldcafé setting with a group of about twenty young and senior scientists in the summer of 2014.



3. Results

The outcome of the workshop was not a list of answers but the realization that global change science and research are only a part of the larger socio-environmental system. Three specific guidelines emerged, which we suggest researchers should consider if they want to conduct global change research that really matters for the future of humanity:

- 1) Be aware that your research is part of the larger socio-environmental system - **connect and relate to the bigger picture!**
- 2) Accept that controversy is a given and that it is essential for reaching robust science-based solutions – **engage with tensions within the societal system!**
- 3) Be more reflective about the normative assumptions underlying your research – **you are part of the socio-environmental system and you have a specific view on it!**

4. Discussion

- **We propose a systems view of science:** research is seen as only one aspect of the socio-environmental system, that is connected through a multitude of feedback loops directly and indirectly to other aspects of the socio-environmental system.
- Implementing a systems view of global change science would require **moving from interdisciplinarity to transdisciplinarity to real-systemic-transdisciplinarity.**
- This **demand a radical shift in global change scientists' mindsets and practices** towards a more transdisciplinary, holistic and systemic understanding of their research.

- 1) **Is your research inter-, trans- or systemic-transdisciplinary?**
- 2) **Do you see a need for a radical shift in global change science?**
- 3) **How can we get there and what are barriers to change?**

