

Socially responsible research processes for sustainability transformation: an integrated assessment framework

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Assessing the manner in which research is conducted is a key mechanism for leveraging a transformation in sustainability. Scientific answers to current sustainability threats are reliant on research design, conduct and dissemination. Thus, the research process itself merits a full consideration of its responsibility toward societal goals and values. Although the responsibility of research to society has recently been raised in scientific discourse, a systematic framework to guide such considerations that can be applied in a self-reflective manner across disciplines is lacking. Informed by a literature review that revealed an emerging discussion, this paper suggests an assessment framework for socially responsible research processes that integrates eight criteria: (1) approach to complexity and uncertainty, (2) ethics, (3) interdisciplinarity, (4) integrative approach, (5) reflection on impacts, (6) transdisciplinarity, (7) transparency and (8) user orientation. These criteria, including their respective linkages and ambivalent meanings, are elucidated. Implementation challenges, application trade-offs and opportunities with respect to an enhanced shift toward societal responsibility in research processes are discussed.

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Current Opinion in Environmental Sustainability 2016, 23:1–11

This review comes from a themed issue on **Open issue**

Edited by **Eduardo S Brondizio, Rik Leemans** and **William D Solecki**

<http://dx.doi.org/10.1016/j.cosust.2016.09.004>

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Introduction

We seek to promote that one mechanism leveraging sustainability transformation is the reflection on and

assessment of research processes from the perspective of societal responsibility. We generally understand sustainability transformation as a fundamental long-term development of society toward enhanced human well-being built on environmental accountability and protection [1,2], as recently agreed on in the Sustainable Development Goals of the United Nations [3] and addressed in the Future Earth Initiative [4] and the EU's Grand Challenges [5]. Research processes or research conduct are defined as all activities involved in the execution of research and generation of knowledge. Research can be structured in different phases, including setting agendas, selecting research topics, designs and methods, analyzing and communicating data and results and generating adapted research agendas and research questions based on previous research results.

A reflection on how research processes affect societal development and goals such as sustainability transformation is at the core of science's responsibility to society [6–12]. The customary scientific integrity of research processes [13–15], which focuses on, for example, competence and honesty in the treatment of scientific methods, generation of accurate and reliable data and fairness in the publication process faces additional requirements and requests. For example, the epistemologically valid generation of research results might have either expected or unexpected socially reprehensible consequences, such as research on genetic modifications or the development of new technologies and materials mainly used for economic or military purposes [16]. The results of such research may also be misused or exacerbate societal concerns. Scientific reflection concerning how a particular type of research could benefit or harm society would help identify the best solutions to societal challenges. Thus, discussions on the scope and content of social responsibility and moral accountability by researchers have been facilitated in the literature and by international research networks [17–20].

Within the emerging scientific debate on opening up established knowledge systems and implementing new research standards from the perspective of societal responsibility, two scientific fields are notable. First, the field of sustainability science aims at making knowledge usable within science and society to secure human needs while preserving the life-support systems of the earth [21,22]. By definition, this scientific field has a strong

societal perspective and a commitment to societal responsibility. Studies have also called for more reflexive inquiry and a change in the research process itself. This must be immersed in the processes of decision making for societal transition and adaptation to build socially robust knowledge [23–27]. Second, originating from the scientific field of technology assessment, the Responsible Research and Innovation (RRI) initiative emphasizes planning, justification and impact assessment of implemented technologies in light of societal responsibility (e.g., [28,29]).

Despite these progressive approaches from sustainability science and RRI to frame relevancy and characterization of socially responsible research processes, a framework that integrates discussions of societal responsibility from all scientific disciplines remains to be developed. For example, the demands of sustainability and societal responsibility have not been fully merged into other disciplines, as for example Scheirer and Dearing criticize in public health research [30**]. In addition, a common knowledge or understanding among scientists of how to address societal responsibility in research processes and assessments has not been made explicit [12]. Therefore, this study addresses this research gap by (1) identifying relevant literature that elaborates the characteristics of societal responsibility in research processes. On the basis of this literature review, this study (2) develops an integrative framework based on criteria that enable scientists to systematically reflect and assess societally

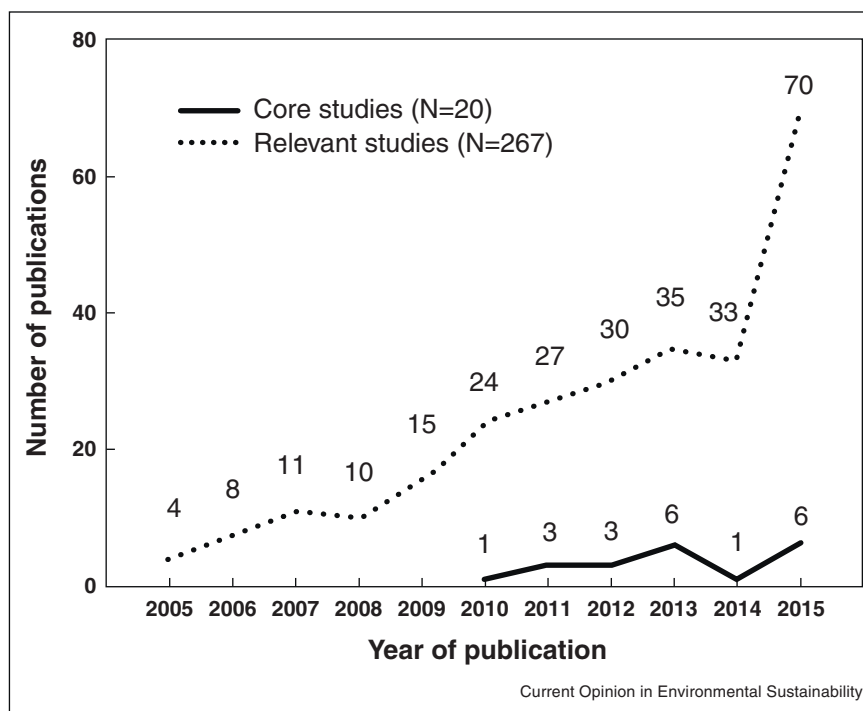
responsible research processes. We also discuss the framework's potential to trigger scientific discussion and a transformative turn in research processes supporting sustainable development.

This work is also motivated by a request of three German non-university research organizations, the Fraunhofer Gesellschaft, the Helmholtz Association and the Leibniz Association, which combined represent approximately 80,000 staff members, to develop a framework for socially responsible research processes [31]. The purpose of this framework is to awaken and enhance awareness and self-reflection among researchers and research managers about the impacts of research processes on societal development. The framework aims to (a) be integrative (i.e., merges criteria from scientific discussions on socially responsible research processes from all research fields and disciplines) and (b) support the evaluation and assessment of research processes in these research organizations on a gradient from basic to applied research projects. The three research organizations are currently discussing the framework and a roadmap for implementation is under development.

Methodological approach

We searched the ISI Web of Science database to identify peer-reviewed relevant literature from 2005 to 2015 that discussed the characteristics of socially responsible research processes (Figure 1). This database was selected to

Figure 1



Chronological order of publication years of relevant studies and core studies.

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