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Inhalt

Foreword

Science is under pressure. In times when it is a matter of nothing less that a transformation toward sustainable development, society and politics are demanding not just reliable knowledge but above all useful knowledge. In order to be able to produce such knowledge science must change its structures and ways of working. A renewed understanding of critique can provide guidance to the process of change that must be actively shaped by science itself.*

The "Great Transformation" in the direction of sustainable development is a global challenge for society (WBGU2011). All involved have stressed that this transformation, if it succeeds, will lead to profound changes in all parts of society (see PIK 2007). This applies to science as well, which after all is a part of society (WBGU2011, pp. 341 f.). For in view of an unprecedented social-ecological crisis science is coming increasingly under pressure to provide knowledge that is not only methodically reliable but also useful for dealing with the challenges ahead. It is obvious this pressure can strike at the very core of the scientific project: Any orientation toward non-scientific criteria with respect to what is to count as relevant knowledge threatens to undermine the reflexive and cooperative search for "true knowledge."

In this situation we believe it to be crucial that science does not allow itself to become a plaything of calls for change, but rather that it itself shapes its own response to the new historical challenges. In the following, we argue that a renewed understanding of critique should be the starting point for such an endeavor.[1] We will illustrate what a renewed understanding of critique might look like by posing nine theses.[2] We see these theses as a contribution to the ongoing discourse on sustainability science or research for sustainable development.

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1 The methodical criticism of errors and false statements has always been the essence of science. However, current methods of criticism are largely frozen in institutionalized forms, such as peer review or evaluation by excellence. But these forms alone cannot do justice to the new tasks and roles science is being asked to perform and assume in the context of sustainable development.

2 The theses were developed in a discursive process that included all scientists at the Institute for Social-Ecological Research (hereafter: ISOE). They were discussed by participants from the fields of science, business, civil society and policy making at a conference, *Really Useful: What is Critical Sustainability Research*, organized by ISOE. Conference documentation is available at www.isoe.de.

Science under pressure to change

First we need to look at the nature of the pressure to change that science is currently facing. Key here is the particular structure of the problems that societies' transition to sustainable development raises. These problems cannot be situated within established departments or disciplines; rather they find their place in overlapping areas between these, or, in some cases, beyond them entirely. In other words, exploring issues of sustainable development is a matter for science as a whole. This means that sustainable development is not only of concern for the social sciences or the humanities; it also concerns the natural and engineering sciences as well. In short: sustainable development is, by its very nature, the subject of interdisciplinary research (Kates et al. 2001). Moreover, what characterizes these problems is their – in the scientific sense of the word – complexity and the fact that one is not able to break them down into isolable sub-problems (Jahn 2012, Lazarus 2009, Ludwig 2001). For such complex problems there are usually no solutions in the form of technological innovations. In this sense knowledge can no longer be produced and validated alone in the "laboratory" and then passed on to society to be used in negotiations about solutions. Rather, the creation of "Gestaltungswissen" (i.e. knowledge for how to shape the future) and its immediate testing in the course of implementing social transformation strategies are tightly coupled innovation processes (Krohn 2011, p 3).

In addition to this new epistemological perspective another cause of the pressure for change is the fact that problems in the context of sustainable development arise from what might be called "social-ecological crises." Examples of such crises are anthropogenic climate change and loss of biodiversity. Sustainability science's research objects thus are historically situated. With that the individual case gains in importance (Krohn 2008, Latour 2004). Gaining a comprehensive understanding of such an individual case – quite analogous to the well-established case study method found in medicine, economics or in Anglo-American jurisprudence– is the prerequisite for recognizing what the particular problem is and thus be in a position to provide concrete responses to the pressing issues of sustainable development.

Finally, if science opens itself to the growing calls for useful knowledge, pressure for change will also arise from encounters with the experiences of very different stakeholders and actors in everyday life and with the very different expertise of specialists from business, organized civil society, administration and policy making. A plurality of forms of knowledge thus arises. How the relationship of this non-scientific knowledge to scientific knowledge is to be constituted and what should be accepted as relevant knowledge are questions that are for the most part unclear and controversial[3].

[3] Other examples of the pressures on science to change are the "replacement of a written culture by a multimedia culture" (Rauch, 2000, p 26) and the demands for the economic exploitability of research results.

What is important for us here is that it is both a matter of the changing relationship between science and society, as well as a question of the "nature of things" when we consider the claim that science must take a new path if it is to understand, evaluate and design sustainable development. In the following section, we will explain why a renewed understanding of critique should stand at the beginning of this path.

Critique as a social practice within science

Science, as we have seen, is going through a profound transformation process (WBGU 2011). Where this process is leading to is not clear at the moment. However, we see a risk that pressures arising from self imposed truth claims, on the one hand, and societally imposed utility claims, on the other, could attenuate the potential science has for promoting and maintaining sustainable development. For the tendency to reduce the complexity of individual cases to the narrowly defined objects of the causally arguing, disciplinary sciences remains unbroken. At the same time, there are continuing efforts to shape research results into forms of explanation that are seen as socially or politically desirable by given existing interests and power relations. If science is just one among many stakeholders, it cannot, where due to high uncertainties and ignorance definitive answers are no longer possible, automatically claim more hearing for its views than any of the other members of an e*xtended peer community* (Funtowicz and Ravetz 1993).

Science is supposed to contribute through research and education to the self-enlightenment of society. The critical attitude is an essential means to fulfilling this responsibility. The concept of critique has a long and eventful history in both philosophy and science which we will pass over here (cf. Celikates 2009, Jahn and Schramm 2006). Instead, when we speak of critique we are referring initially to something that can be described as an interest common to scientists working on sustainability research of any kind – namely, to understand oneself as a scientist working on current social-ecological crisis phenomena. This understanding allows one to focus on the empirical reality of individual cases without thereby losing sight of the general structures contained within the particular cases.

The by no means new, suggestive etymological connection between crisis and criticism enable us, moreover, to use criticism in the original Greek meaning of the word. Crisis situations are decision-making situations. In such situations what is needed at the beginning is the most accurate understanding possible of the different aspects of the state of affairs in crisis. Then the individual aspects can be assessed and weighted as to their significance – with the intention and hope that it is possible to bring these different aspects into a new set of relations that make visible a way out of the crisis situation.

Various forms of critique are needed together. We speak first of all of critique as a method of descriptive *distinguishing* (a movement of differentiation). Complementary

to this we see critique as a method of normative assessment of differences and the *deciding* for new connections between what previously was distinguished (a movement of integration). Such decisions are the daily staple of policy making, business and civil society. They are called for in scientific practice as well whenever it is a question of deciding on the aims, methods, objects of research, or of deciding which collaborative research projects one should enter into, or which division of labor is appropriate or how new syntheses of knowledge are to be produced and legitimated.

In the following we will fill out this general understanding of critique with reference to the specifics of sustainability science. In this context we regard critique as a sequence of steps in a method-directed, open-ended research process. Critique in this sense we see as a "social practice" within the field of science (Celikates 2009). However, we will first explain our understanding of sustainable development – which is what supplies the background to the nine theses on the role of critique in a sustainable science we have developed.

Understanding of sustainability

The concept of sustainability was able to celebrate its 300th anniversary in 2013. In 1713, Carl von Carlowitz, chief inspector of mines, wrote a text called ***Sylvicultura oeconomica***, *or Economic Report and Instructions for Wild Tree Breeding Appropriate to Nature* (von Carlowitz 2013). According to von Carlowitz's forestry economics, a stable balance must be created between the use and the renewal of natural resources. This state is considered desirable and it, in a certain sense, projects a closed future, one that is achievable by technical and organizational means – an idea which still finds many advocates within sustainability discourse. However, as is already clear from the basic laws of physics a stable system is one no longer capable of development. But the capability to develop is a fundamental condition of human existence and social cohesion. At the latest since the Brundtland Report (WCED 1987), therefore, the model of societies' sustainable development has become a normative principle informing sustainability discourse (Jahn 2012, pp. 55 ff.).

This principle contains both of the core elements of the historical understanding of sustainability – maintenance and renewal – in the idea of process. According to this idea, sustainable development is a social process that does not come to a deadlock in a state of equilibrium but rather one, which is designed for long term endurance. More precisely, sustainable development refers to processes which are continuable in the long term and which are able continuously maintain and renew their natural resources and cultural preconditions (Becker 2012, p 32). This understanding of sustainable development forms the basis for the following.

Theses on the role of critique in a sustainable science

By presenting these theses we hope to initiate a discussion process that takes seriously the tension between the orientation to truth – truth taken to mean knowledge that is recognized as true, justified and coherently classified – and the orientation to utility. With this tension as background we understand critique as a creative process and as an important resource which every science that renews itself by research must both use and maintain instead of weakening it. The theses should broaden the discussion of the role of critique in sustainability science by asking: What has to be retained in the ongoing processes of change within the sciences so that in the future a form of research is possible whose results are both true and useful?

In this sense, we also see the theses presented in the following as a fundamental contribution to the current debate on the development of quality standards and quality criteria for sustainability research.

1. **Sustainable development as a normative principle of critical research:** Sustainable development is a normative principle. Research committed to this principle begins with a concrete conception of what "non-sustainable development" is (Jahn 2012, p 52). Then it asks: Under what conditions is societal development possible in a way that maintains and renews society's natural and cultural preconditions?

2. **Societal relations to nature as research object:** Social and natural processes can no longer be described separately in the Anthropocene (Crutzen 2002). The object studied by sustainability science, therefore, is the set of relations between the social and natural side of a complex process. Such a science produces the knowledge needed to recognize non-sustainable developments within these relations, to understand them in terms of their linked social, political, cultural, economic and ecological causes and to intervene in a (re)configuring manner. In this way sustainability science creates the decision-making conditions needed for a successful integration of knowledge.

3. **A critical manner of dealing with the diversity of knowledge:** Scientific knowledge is central to shaping societies' transformations toward sustainable development. However, knowledge from other areas is also necessary when it is a question of formulating goals for a societal transformation process and of deciding on the possible range of actions to reach those (Roux et al. 2006, Jahn et al. 2012, p 8f.). Critique, in the sense of a descriptive distinguishing, creates the preconditions for recognizing the diversity of societal knowledge and making the respective limits of knowledge visible. Critique makes clear how a particular body of knowledge is produced, evaluated, made available, secured and used in the societal process of negotiating means and ends.

4. **Self criticism as the basis for responsible configurative interventions:** Social and technological innovations can produce unintended effects or new problems. Sustainability science also documents and analyzes such "second order problems"

early on (Becker and Jahn 2006, p 58, Miner et al. 2010, pp. 68 ff), identifies critical thresholds beyond which interventions in social-ecological systems are no longer reversible, works out strategies for action that support learning and adaptation processes, and reflects on its own role and responsibility in societal innovation processes. It remains at all times critical of its own results.

5. **Critique as a resource for successful collaboration:** Sustainable development can only succeed if science and society work together more closely. Specifically, this means that, on the one hand, relevant social groups formulate their expectations of science and, on the other, that they can bring their own knowledge to bear within the research process. For research that opens itself up to this challenge critique is a powerful resource for collaborative work. Such critique is directed at both the methods used for, as well as the forms of participation in, the research process. Sustainability research understands itself as a critical partner in a common learning process undergone in the course of an interaction between science and society.

6. **Critique as a prerequisite of a democratic knowledge society:** Negotiation processes concerning the means and purposes of societal transformation processes are determined by interests and power relations (Mobjörk 2010, S. 870).Critical sustainability research examines these relations and interests and shows where they lead to the exclusion or marginalization of social groups, their needs or their knowledge. It also reflects on its own position within a given set of power relations and how it, given its position, pursues as its priority the societal goal of producing useful knowledge.

7. **Thinking in alternatives to overcome limits to knowledge:** Sustainability research's objects are, in the scientific sense of the word, complex: questions asked from the perspective of sustainable development seldom have definite answers accepted by all. Critical research identifies and examines these areas of ignorance and contested knowledge. It supports procedures that help to deal with the consequent uncertainties in development and implementation of transformation strategies, and thus opens up room for thought about alternative development paths.

8. **Transparent processes for critical research:** A critical sustainability science produces usable and compatible strategies for a sustainable development of society and, at the same time, provides new, transferable knowledge for science (Jahn et al. 2012, p 4). To this end it is necessary to disclose to all actors participating in the research the processes of production, integration, and evaluation of sustainability knowledge used, and to design them in a way comprehensible to everyone involved.

9. **Room for thought for a new culture of critique:** Critique as a prerequisite for sustainability science must itself be viewed from a critical perspective. It has to constantly question its own procedures, methods and practices, and evolve in the face of continuously new challenges. For dealing with these tasks, as well for providing

for a fruitful exchange across boundaries of knowledge and for the handing down of knowledge through education and teaching, the practice of critique needs places where a dynamic culture of critique can be specifically created.

Conclusion and outlook

It seems to us that the science system has so far been reluctant to confront the profound conceptual and structural changes and challenges that arise when the principle of sustainable development is applied by science not only to other areas of society but to science itself. In this context it becomes necessary to ask what must be preserved and what must be changed in science in order for it to remain viable in the future – a question that arises in principle for anyone who thinks seriously about problems related to sustainable development.

The theses presented above are meant to be a contribution to the clarification of what sustainability science and its objects are, and to the discussion of just how the research process should be designed so that it meets both the demand for scientific excellence and the demand for societal utility without degenerating into arbitrariness.

The theses should open the way, therefore, in addition to a "both-and" form of discourse, to a "neither-nor" form as well: *neither* the continuation of scientific business as usual *nor* a "submission" of science and research to the dictates of utility.

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