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Sustainable Science in the Anthropocene

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Foreword

The anthropocene – the epoch of humankind – is currently a topic of great interest. What consequences does the idea of humanity as a geological force have for the undertaken path of sustainable development? What new questions are arising for sustainability science? Diagnosing contemporary society from an anthropocene perspective could change the relationship between natural and social sciences, as well as between society and science: science will be needed even more as a critical authority and must be organized to an even greater extent in a transdisciplinary manner. New forms of social participation in the process of producing scientifically legitimated knowledge are indispensable.*

More than ten years ago the Dutch chemist and Nobel laureate Paul Crutzen coined the term “Anthropocene” to describe the period during which humans have begun to significantly influence biological, geological and atmospheric processes, thus becoming a relevant geological force on planet Earth (Crutzen and Stoermer 2000, Crutzen 2002). In the earth sciences the anthropocene represents nothing less than a transition to a new epoch and is therefore being discussed intensively. Until 2016 data have been collected by geologists from the International Commission on Stratigraphy (ICS) to provide evidence that might help answer the question whether a turning point has been reached in the history of the Earth (Zalasiewicz et al. 2011). A decision will be made as to whether and when a new epoch in Earth history has begun.

The significance and consequences outside the geoscientific discourse of identifying an “epoch of humans” (Zalasiewicz 2013) has, so far, only been understood to a small extent. Yet this change of perspective is one of the most important in the last 100 hundred years, for it means society and nature have become so closely intertwined that they can no longer be studied independently of each other. Natural spheres and societal spheres have merged into one large system (Guillaume 2015, Becker und Jahn 2006). A well-founded acceptance of the concept of the anthropocene, however, has been lacking, especially where transitions to a sustainable development are being researched. It remains unclear whether the concept of the anthropocene will lead to a new fundamental understanding of the relationships between nature and society and, if so, what opportunities this new understanding might open for shaping these relationships in a more sustainable manner. And lastly, and equally importantly, it is still unclear whether science’s role and responsibilities will change in the course of developing visions of the future. With this article we hope to stimulate further discussions of these issues.

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Elements of the discourse about the anthropocene

The concept of an anthropocene is the object of various scientific and societal discourses. The geoscientific hypothesis that a new epoch called the anthropocene has begun asserts that humans have, from at least the beginning of highly industrialized development in the first half of the 18th century, left deep and visible traces of a kind seen only before as a result of events such as ice ages or meteor strikes (Zalasiewicz et al. 2011); in other words, the impact of human activity is, temporally and spatially, as serious as the geophysical forces that form the planet (Steffen et al. 2007). These geohistorical traces could, in fact, supply future geologists with evidence that humans existed. In this sense, the geoscientific discussion above all addresses the question whether, according to stratigraphical criteria, a new era beyond the Holocene has begun.

It seems undeniable that the traces humankind has left on the earth are for humans themselves an increasing global challenge. This view was taken when the original idea of the concept of an anthropocene was introduced (Crutzen 2002). It is the starting point of a discourse in which the anthropocene appears as a “scientifically minded” result of diagnosing the times. Such a diagnosis is the attempt to conceive of a certain stretch of time as a structured description of the present. The ambition here is, to represent the present’s (self-)consciousness with the aid of a powerful image. The discourse draws on the current state of the scientific – in particular climate science’s – knowledge of observed anthropogenic changes to the earth system. In the course of discussing these changes, the concept of an anthropocene has been widened. Instead of merely stating that human activities cause profound planetary changes, these changes are evaluated as a threat to the survival of humankind. In this wider sense, as a diagnosis of a crisis, the concept of an anthropocene points to a new understanding of the relationship between nature and society: societal action and natural processes are so closely intertwined that they can no longer be examined independently of each other. Instead, what is needed is a discipline spanning perspective on social-ecological systems (Becker 2012, Ostrom 2009, Schellnhuber et al. 2004). For a diagnostic discourse concerning social-ecological crises it is of secondary importance whether the anthropocene is recognized as a new epoch by the earth sciences. The focus should rather be on the identification of possible or desirable futures by means of an analysis of the past and the present.

Finally, another view on the anthropocene can currently be observed: in popular science publications, by using the term in the context of museum exhibitions¹, in art and in literature, the meaning of anthropocene has grown into a cultural idea – an idea, which has taken on an aura comparable to that of climate change (see Ebert

1 A good example of this is the exhibition in Berlin’s House of World Cultures, The Anthropocene Project. Kulturelle Grundlagenforschung mit den Mitteln der Kunst und der Wissenschaft (Cultural Basic Research using Art and Science). 2013/2014: http://www.hkw.de/de/programm/projekte/2014/anthropozaen/anthropozaen_2013_2014.php.

and Zell 2014). In this understanding, questions concerning cultural identity, especially that of the Western industrialized societies, and new forms of aesthetic expression, are integrated into the interpretive models of the anthropocene. What was originally a purely scientific discourse takes on political relevance within the debates on the question of how we want to live in the future. Due to this development, the concept of the anthropocene is beginning to compete with the discourse of sustainable development. To what extent this competition will be productive, or whether it will mean “the end of sustainability” (Benson and Craig 2014), is not yet clear. Finding common ground between anthropocene and sustainability discourses is therefore an important and rewarding task for research.

Which issues and topics to concentrate on is not something we can conclusively decide in this context but the following considerations hopefully provide an indication. The discourse on sustainable development was strongly influenced by images and metaphors of harmony, or “cohabitation,” between nature and society – or of humanity’s destruction if it does not take the right path. On the other hand, discussing the anthropocene can steer this discourse towards the question: What kind of nature do we want to create for ourselves? In other words, while “sustainable development” is the idea of society and nature relating to each other in a durable way, “the Anthropocene” can become the idea of creating new relationships between society and nature. Following Ulrich Beck’s dictum, “Nature can no longer be conceived without society, society no longer without nature” (Beck 1986: 107), we can say that the debate about sustainable development is an answer to the second part while the Anthropocene answers the first.

Anthropocene or sustainable development?

The recognition of the close interdependence of societal and natural processes raises the question of whether we are entering into an era of irreversible destruction of the conditions of life on our planet or into a time marked by the conscious shaping of the relations between society and nature. The idea of shaping, however, always brings up fantasies of power and control, or at least feeds them, as can be seen in the debate on geoengineering (Ginzky et al. 2011). On the other hand, the insight that human action has become a form of planetary dominance can also trigger feelings of helplessness, leading to a “psychological condition ... that exacerbates human-induced damage – a certain pessimism about humanity that leads us to accept humans as a geologic force and destruction as inevitable” (Jacquet 2013: 898). To move beyond this dilemma of fear of catastrophe or fantasies of control will require major changes in culture and consciousness, which will amount to asking the question: “Can humanity adapt to itself?” (Toussaint et al. 2012). How difficult carrying out such a transformation will be can be seen in the debate on economic models outside the growth paradigm (see Welzer and Wiegandt 2013, Seidl and Zahrnt 2012).

But there are also voices that do not share such concerns: “One of the key developments in moving from a problem definition to solution formulation is the concept of the Anthropocene.” (Steffen et al. 2011: 741) This optimism, shared by Paul Crutzen, is based on the idea that there are a limited number of parameters which can be used to describe the essentials of the earth system on a global level. Human activities affect these parameters in such a way that they are pushed beyond their natural variability, catapulting the earth system from the relatively stable interglacial period – the Holocene – into the anthropocene, the latter being significantly warmer, poorer in biodiversity, with fewer resources, etc. (Rockström et al. 2009). On this view of “planetary boundaries” (Rockström et al. 2009), the way towards a solution consists of targeted measures such as geoengineering, which influence the key parameters of the planet in a way that allows to sustain a Holocene like state, “the state of the earth system that we know for sure can support contemporary society.” (Steffen et al. 2011: 739)

In this view, the idea of a sustainable social development in the anthropocene seems, by definition, impossible. What is needed instead is “planetary stewardship” (Steffen et al. 2011), that is, an acceptance of responsibility for the whole in order to create a “safe operating space for humanity” (Rockström et al. 2009), within which sustainable development will be once again designable and thinkable. This raises the question of responsibility, as well as that of the subjects and processes of political decision-making, in a new way (Lewis 2012).

The claim that in order to achieve sustainable development we must preserve the conditions necessary for the Holocene may miss an important point because it ignores the new potentials of human action articulated within the diagnoses of the anthropocene, both in terms of empowerment (We can and we want to!) and in terms of powerlessness (We could have but it’s too late). However, if what is new and important about the anthropocene is just this potentiality, then we cannot return to the holocene. If it is not already too late, we could just ensure (temporarily) that certain relevant parameters that are relevant for the earth system do not exceed or fall below certain thresholds. Given that, it would be no more than an academic question whether future geologists will view the tracks we leave on the planet as clear proof of our existence.

What are the implications of the anthropocene as a diagnosis of the times for the sciences?

It is only partially clear what the implications would be for a sustainable science in the 21st century if the anthropocene was accepted as a diagnosis of the times (see Van der Leeuw et al. 2011). From our perspective, however, three clear trends are emerging:

First of all, sustainable science under the dictum of the anthropocene must pursue an integrated approach, one that deals adequately with the consequences of describing humanity as a geological force. Where human action is decisive for biogeophysical processes the natural, engineering and social sciences, along with the humanities, must cooperate on an inter- and transdisciplinary basis.

Secondly, science must be understood as a “participant observer” (Becker 2012: 39), which means that, as an active part of the earth system, science can only make observations from an internal perspective. And this also means that when describing, for example, social-ecological systems, science must ascertain what impact scientific progress itself has on these systems. Science has to find out to what extent it has taken part in humankind becoming a geological force and what that means for the problem description and the demands on solution perspectives. Likewise, science must also understand the assignment of value intrinsic to problem descriptions as equally being a part of the observed reality – the earth system is “self-describing and self-referential” (Becker 2012: 39).

Finally, science must not only raise questions about “planetary boundaries”; it must also go beyond the definition of the “anthropos” and determine what social, cultural and political boundaries (and potentials) there are, thus casting a more discriminating look at production, gender and power relations. It is important to understand what power and impotence mean for the intention of “designing the world”, what effects the appreciation of being a geological force has socially and individually, and for what purposes the anthropocene is mentioned in the political, civil society, cultural and scientific arenas. Social sciences and humanities take on a new importance as loci of critical analysis of contemporary society. They must, in particular, examine the social and ecological dimensions of the material and mental factors that have caused the historical dynamics of a world-creating or world-destroying “anthropos” in the first place.

The relationship between science and society in the anthropocene

More than ever, science is in demand as a critical authority (Jahn 2013). But it can assume this role only if it also accepts the challenges mentioned above by investigating the social and ecological dimensions of the anthropocene. Otherwise there is a danger that talking about the anthropocene will be reduced to generating keywords for technological solutions to the paramount problems of survival. In this regard, the discourse on the anthropocene can lead either to the scientification of society or the socialization of science.

If deliberations on the anthropocene are focusing on issues and options with regard to the intention of reorganizing society’s interaction with nature, then science must open up to new forms of dialogue with society.

Conversely, society has to develop new forms of participation in the production of scientific knowledge. Transdisciplinary cooperation –that is, the interdisciplinary collaboration among the academic disciplines coupled with the integration of the knowledge, values and interests of social actors – becomes the norm for the production of scientific knowledge in the anthropocene. This, however, raises political questions about the inclusiveness, legitimacy or fairness of such forms of participation. Similarly, the question arises whether we need new places in the anthropocene where science, politics, business and civil society will meet to discuss solutions for or questions of shaping the present and the future.

In addition, society must develop a new concept of ‘shaping’. Especially with a view to the demands placed on science, it should be a concept which takes seriously the fact that development is an open process, controllable only to a limited degree. In other words, the discourse on the anthropocene has to be culturally – including artistically – digested. This means that both the fantasy of omnipotence and fear of impotence found in the current debate must be turned into an acceptable understanding of possibilities and limits.

Exploiting the potentialities of the discourse

It was proposed on several occasions, including the conference “Lost in the Anthropocene? Sustainable science in the epoch of mankind” organized by ISOE – Institute for Social-Ecological Research in November 2014 to reject the notion of the anthropocene. It was argued that it contained nothing new, and only distracted from the fact that the destructive consequences described by the term had been caused by the practice of modern production and reproduction in a globalized world. Although we take this objection seriously, we plead nonetheless for a more discriminating view and a critical confrontation with the concept of the anthropocene. Not only does it offer the possibility of adding new perspectives to the sustainability discourse; it also has the potential of raising the question of the responsibility of science and its relationship with society with a new urgency.

This text reflects the discussions that were lead in ISOE – Institute for Social-Ecological Research during preparations for the “Lost in the Anthropocene? Nachhaltige Wissenschaft in der Epoche der Menschheit (Sustainable science in the epoch of mankind)” meeting. Conference documents are available at www.isoe.de/medien/25-jahre-isoe/dokumentation (in German language).

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