The Earth system

Our current "Western" patterns of consumption and production entail billions of interventions in the Earth system day by day. That is why we must examine how this system works: we must be able to truly understand the consequences of our actions and find the proper starting points for the transformation toward sustainability.

Mankind as a driving force in the Earth system

Geologists call the current epoch—the roughly 12,000 years since the end of the most recent ice age—the Holocene. Broad segments of the scientific community have recognized that mankind has become the strongest driving force on Earth and that this marks the beginning of a new geological epoch called the "Anthropocene." A global increase in atmospheric greenhouse gas concentrations since the end of the 18th century can be demonstrated by analyzing the air trapped in polar ice. This could be the basis for defining this point in time as the onset of the Anthropocene. The growing number of people and the increasing resource intensity of their lifestyle are accelerating the transformation of the Earth's land areas, the changes in the atmosphere, and the interventions in the oceans (Crutzen 2002).

Boundaries and tipping elements in the Earth system

Because of the complex interlinkages between the Earth system's components, interventions in the system impact not only one of its parts, but cause interactions with other parts of the system. Climate change, loss of biological diversity, water scarcity, soil degradation, and the accumulation of pollutants are environmental changes that intensify one another, sometimes substantially, so that the total effect of global environmental changes is greater than the sum of individual effects (WBGU 2011). Positive feedback loops can further intensify the effect of an action via the feedback it triggers—one example: ice-covered surfaces melt at warmer temperatures, reducing the albedo of the Earth's surface and in turn resulting in further warming. Temporal and spatial lags are particularly tricky, as consequences of our actions are perceived late and countermeasures take effect only with long delays. Certain processes can bring about abrupt behavior of the system if a certain threshold is exceeded (Jäger 2009).
In the case of such processes, the danger is that the Earth system enters a new state that is not beneficial for the existence of human societies. An analysis of the current situation demonstrates that we have already considerably overstepped the "safety margins" in the Earth system in at least three areas, namely climate change, biodiversity loss, and our interventions in the nitrogen cycle (Rockström et al. 2009). Within the Earth system, a number of tipping elements have been identified whose fate will be decided by human activities in this century, for example melting of the Greenland ice sheet, the collapse of the Amazonian rainforest, the bistability of the Indian summer monsoon, or the loss of boreal forests. Many of these tipping elements are linked to significant positive feedback loops, especially concerning increasing global warming. We should assume, however, that we are not yet aware of all the tipping elements relevant for our societies' political action (Lenton et al. 2008).

Socioeconomic processes and the Earth system

As the Earth system services are faced with increasing pressure around the globe due to mankind's transforming forces, humans have become an important component of the Earth system. The most recent phase of the Anthropocene is characterized by the "great acceleration," which began roughly in 1950, following World War II: Statistics on the most diverse topics document impressively the rapid multiplication of economic activities and consumption, driven mostly by the economic activities in the Western industrialized countries. There is evidence for changes in the Earth system parallel to these developments: the concentrations of the greenhouse gases carbon dioxide, laughing gas, and methane, overfishing of the oceans, or loss of tropical forests display similar "growth rates." All social and economic processes are coupled to other parts of the Earth system, such as the climate and the oceans. In this regard, one can certainly speak of a social-ecological—geophysical system at the global level. The consequence is that the social and economic processes at the global scale—which manifest themselves in globalized trade, the financial world, and global communication, among other areas—have significant effects on other parts of the system, such as the atmosphere and the biosphere (Steffen et al. 2011).

Changes in living conditions have significant social consequences. Climate change deepens inequalities in the conditions for living and survival, both internationally and in many cases also within individual countries. Climate change often exacerbates the situation in regions already suffering from depleted soils and water scarcity, unavoidably leading to migration and refugee flows. Intensifying competition for resources such as land and water is always a potential cause of violence. Fragile societies in which climate changes can lead to domestic violent conflicts, civil wars, and genocides are at particularly high risk: here, ecological problems intensify and accelerate the structural grounds for conflicts, such as denationalization, emergence of markets of violence, and the marginalization of population groups (Welzer 2008).

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In early 2013, the volume "Wege in die Nachhaltigkeit" (Pathways to sustainability) was published in the series "forum hlz" of the Hessian State Centre for Civic Education, with the support of Forum für Verantwortung. This volume emphasizes aspects of the sustainability debate that are particularly relevant to society; some are the subject of controversial debate.

forum hlz: Wege in die Nachhaltigkeit.
Die Rolle von Medien, Politik und Wirtschaft bei der Gestaltung unserer Zukunft (Pathways to sustainability. The role of the media, political, and business communities in shaping our future)
Wolfram Huncke, Jürgen Kerwer, Angelika Röming (eds.), 2013
"What we definitely seek to achieve with this book: an animated discussion about the necessity of sustainable transformation with a value system in which concepts such as moderation, frugality, and "having enough" attain meaning again. Perhaps the vision of the often discussed "city of the future" will deliver new points of reference for new social venues and new marketplaces where citizens discuss things and lay open their plans for their lives." (The editors)

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