

The Problematic of Transdisciplinary Sustainability Sciences

Esther Meyer

Introduction

Sustainable Development (SD) finds its discursive breakthrough in 1987 through the final report of the Brundtland Commission, *Our Common Future* (Vanhulst/Beling 2014; Sneddorn et al. 2006). The Brundtland report substantially conveys the regulative specification of a worldwide social and ecological national economic development, justified by the possibility of equal opportunities also for future generations (intergenerational justice). In addition, this development should be designed in such a way that equal access to resources for all living people is possible (intragenerational justice) (Hauff 1987; Dingler 2003). Reactions to the report reveal the nature of its global regulatory appeal, because intra- and inter-generational justice can only be defined according to political values (Vanhulst/Beling 2014; Grunwald 2011). In 2015, the United Nations set the *Sustainable Development Goals* (SDGs), differentiating and equating SD explicitly with peace and security, natural and cultural diversity, democracy, eradicating poverty, as well as equal rights and opportunities for women and men (SDGs 2015). SD simultaneously tends to be shaped by a *hegemonic discourse of SD* (Hajer 1995; Höhler/Luks 2004; Brown 2016; Vanhulst/Zaccai 2016; Albán/Rosero 2016)¹ that ultimately

1 Discourse understandings, or the different discursive analytical orientations of the authors who refer to the hegemonic discourse of SD, are not discussed here. My own, previously carried out, discourse-analytical research (Meyer 2020) is based on the understanding of critical discourse analysis. According to Adele Clarke (2012) critical discourse analysis pays special attention to the ways in which dominant theories emerge and, through their discourses, (re)produce power relations.

counteracts SD as it is envisaged by the SDGs. Around the 1990s, so-called *sustainability sciences* began to form and characterise themselves as inter- or transdisciplinary. Sustainability sciences are constituted by and respond to international sustainability politics and organisations, intertwined with hegemonic political interests. Transdisciplinary (td) sustainability sciences especially aim to generate topics and research questions in collaboration with representatives of diverse societal groups in order to identify pressing sustainability problems. Accordingly, questions arise concerning the entanglement with and positioning towards a superordinate hegemonic discourse of SD. Thus, transformative and interventionist approaches to exploring a sustainable cohabitation are being hampered. The questions arise, firstly, if, and, secondly, which theories towards societal transformation are missing in td sustainability sciences, and how may sustainability and td sustainability research be re-invented in order to explore and shape a sustainable cohabitation.

My contribution starts with my methodology, the problematisation of 'notions of problems' (Bowden/Kelly 2018: 3). After the introduction of the methodology follows an outline of the hegemonic discourse of SD and the consequences it produces. That leads to the introduction to td sustainability sciences. The objective is to analyze how problematisations in td sustainability sciences relate to concepts that have emerged through the hegemonic discourse of sustainability. In sustainability sciences, I suggest this is the concept of *challenge*. While the first part deals with the problematic of (td) sustainability sciences, the second part deals with the problematic in td sustainability research. The differentiated addressing of the problematic deals with methodological considerations and experiments for a td sustainability research that is aware of its entanglement of epistemological and normative dimensions. The aim of my research is to explicate reproducing discourses and constructions of handling problems in td sustainability sciences that suppress the subversive potential of radical transdisciplinary logics and comprehensions of a *generative problematic in td sustainability research*.

Methodology: problematisation of problem understandings

Transdisciplinarity and td sustainability research can gain significance as a counter project to the *hegemonic discourse of SD*. However, td sustainability sciences are partly interwoven with the hegemonic discourse. Being a relatively new phenomenon within the discourse, their efficacy is limited from the outset by existing power relations. It is here that the problematic unfolds itself as a possibility to work with. The problematic of td sustainability research can be found in its in between position amid distinct, inconsistent, contradictory paradigms. Td sustainability sciences are, as Michel Foucault would say, 'always inscribed in a game of power, but always also a limitation or rather: bound to the limits of knowledge, which emerge from it, but nevertheless condition it' (Foucault 1978: 123, in Bührmann/Schneider 2008: 53, my translation).

The concept of *problem* has a major bearing on td sustainability sciences. On the one hand, td sustainability sciences tend to be considered as ethical and intellectual revolutions or innovations in the mode of thought and, thus, as solutions to sustaining global social-ecological problems. On the other hand, these problems persist and accumulate due to another hegemonic economic-political level that is often overlooked in research practice. These problems then tend to be at the same time the condition of possibility for td sustainability sciences to be constituted, legitimised, and made possible. The meanings of problems and their function for td sustainability sciences therefore seem to constitute their problematic. Starting from a *problematic constitution of problems* 'offers heuristic notions that allow the reformulation of the manner in which problems are conceived' and, as Maria Kaika further writes concerning a radical political ecology, '[t]his inclusive approach does not place itself on "managerial" ground' (Kaika 2003, in Blanchon/Graefe 2012: 47), but on a philosophical movement to pose different research questions and other problems to be investigated (Bachelard 2012; Maniglier 2019). In which contexts of meaning are problems posed? What would be a different theorisation of the problem? With Foucault problematisation means to carve out conditions of possibilities that enable different solutions to symptomatic problems (Defert/Ewald 2005). By scrutinising supposed solutions in td sustainability sciences, I will first make the problem approachable.

The problematic of sustainability sciences

Hegemonic discourse of sustainable development

The hegemonic discourse of SD is aligned to neoliberal forms and goals of organising (environmental) policies towards profit maximisation of market enterprises (Castree 2002). A critical discourse analysis published in 2014 by Carol Kambites examines discourse strands of SD in the respective strategy papers of British governments in the 1990s and 2000s and comes to the conclusion: ‘sustainable development is presented from within the paradigm of neoliberalism and neoclassical economics’ (Kambites 2014: 345). In Germany the analysis by Johannes Dingler on SD shows that a ‘decrease in the stress of intragenerational justice’ (Dingler 2003: 255, my translation) can be seen. ‘Intragenerational justice is, thus, increasingly reduced to equality of opportunity and subsumed under market-based instruments’ (ibid, my translation). At the same time intergenerational justice is prioritised, which matches well with the normative goal of having the chance of private asset protection and its intergenerational transfer. These patterns of significations of SD neglect the discourses of social redistribution within one generation.

The research project ‘NEDS – Nachhaltige Entwicklung zwischen Durchsatz und Symbolik’ (‘Sustainable development between throughput and symbolism’) analyzes the Brundtland report regarding the economic construction of ecological reality. The research project identifies seven coherent theses – thereby differentiating the thesis of the unsustainability of modernity. They outline how ‘economic logic, natural and technological scientific expectations and juridical, administrative regulations intertwine and have contributed significantly to a discursive version of sustainability as a management problem’ (Höhler/Luks 2004, my translation). The authors see SD shifting from an understanding of nature and ecology to an understanding of mere economically manageable and controllable environments divided into scarce resources. The hegemonic economic conception of SD is reflected in the guiding principle of *weak sustainability* (Williams/Millington 2004; Ziegler/Ott 2011), which assumes only a few, isolable sustainability dimensions, as well as their interchangeability: economic, ecological or social goals should be integrated into behaviour and economic activity. In Germany, the final report of the Enquete Commission, ‘Protection of Man and the Environment’, proposes a subdivision into three pillars: ecological, econom-

ic, and social (Enquete Commission of the 13th German Bundestag 1997). In addition, multi-pillar models and one-pillar models have been developed ('from one dimension to eight dimensions', Tremmel 2003: 116, my translation). Also, the cultural, the institutional and the political are mentioned as important parts (Michelsen/Adomßent 2014). Moreover, in this discourse, not all authors speak of pillars, but instead, for example, of different dimensions, like Niranji Satanarachchi and Takashi Mino (2014) or the Preamble of the SDGs. The concept of *strong sustainability* (Ott/Döring 2004; Ziegler/Ott 2011), however, is not contained within the logic of the pillar-discourse: nature as an ecological basis of life is not considered substitutable. The relative approach via goals, pillars or dimensions of sustainability has different effects as to how social or ecological target dimensions are integrated into a discourse that is governed by a priori economic ratings.

What are the problems of the hegemonic discourse of sustainable development?

Human rights, which are valid for all current and future humans (Ott 2014; SDGs 2015), count as substantial minimal goals for sustainability and thus constitute the basis of normative sustainability ethics (Carnau 2011).² From a sustainability ethical perspective, human behaviour can therefore be assessed on the basis of whether it is *life-sustaining* (Carnau 2011; Olssen 2014). 'The hegemonic discourse of sustainable development is in the discursive tradition of [...] modernity' (Dingler 2003: 484, my translation). The social development indicated in the discourse, however, could have led to a crisis threatening the livelihoods of today's and future people's lives ('thesis of the unsustainability of modernity', *ibid.*: 493).³ SD strategies, as they refer to in the Brundtland report, aim at achieving economic growth that is desirable

2 This work is not concerned with the definition of a normative-prescriptive ethics of sustainability. Thus, the 'future', related to human rights and climate change, remains open. The work, however, is based on the premise that a normative-prescriptive ethics of sustainability is recognised.

3 The designation of an "ecological modernization" by Hajer (1995) counts as an origin in the German- and English-speaking discourse. Likewise, the criticism of Eblinghaus and Stickler from 1996 can be mentioned. Criticism of eurocentrism and the globalisation of occidental development theories, in this respect, comes from Arturo Escobar (1995) and Wolfgang Sachs (1993; 2002). Other authors grasp the thesis of the 'unsustainability of modernity'

for as many nation states as possible in order to establish both inter- and intra-generational justice. The unit in which national economic growth is measured is the quantitatively expressed gross domestic product (GDP). This means that the goal of SD is that all countries always achieve the highest possible economic parameter – sustainable growth or *green growth* (Höhler/Luks 2004; Brand/Wissen 2017; Acosta/Brand 2018). In economic theory, higher growth figures equate to more capital being available for the state to finance environmental protection or social compensation. However, in order to achieve these growth figures, nature, the environment, resources and people – life – are subordinated to economic development and consumed in life-destroying proportions (Moore 2016). This happens in an exponential way, because of the national-economic belief in higher growth numbers as a solution and in the complete governability of social-ecological problems at local and global level. Thus, national-economic theory of this kind and its politics are dysfunctional as they cannot meet the requirements of sustainability. An analysis of the SDGs shows that sustainability-relevant norms are attributed to the local and global levels, which in turn can have effects at the national-economic meso-level, ‘as the normative core and the focus of action and interventions’ (Schmiege et al. 2018). However, the non-sustainable norms of the meso-state level are not problematised in the UN documents (Parenti 2016). The transnational agenda of SD, emerging at the beginning of the 1970s from environmental and justice movements, has been incorporated into the neoliberal agenda, starting in the 1980s and 1990s with more and more success. Sustainability, therefore, under the roof of SD, serves to strengthen and spread neoliberal hegemony, leaving eco-political and human rights interests in marginalised positions. If sustainability was caught in a neoliberal hegemony, fractures within the latter are showing up and might change constellations (Brown 2016). This is also reflected in the SDGs, as important documents that aim to advance sustainability (Schmiege et al. 2018), and that differ from international sustainability documents of the late 1980s, 1990s and 2000s. And, as Julien Vanhulst and Adrián Beling write, ‘even if conservative understandings of SD remain dominant, they continue slowly to lose ascendancy over global debates in the discursive field of SD, as the growing emergence of alternative discourses (and their coalitions)

(Dingler 2003) or the “economic construction of ecological reality” (Höhler/Luks 2004) as a dispositive (Timpf 2000).

proves' (Vanhulst/Beling 2014: 61). The very question in and beyond this contribution is how td sustainability sciences have reacted to neoliberal history and present dynamics and, thus, relate to the hegemonic discourse of SD.

(Transdisciplinary) Sustainability sciences

Sustainability sciences themselves make up parts of complex dynamic sustainability contexts within the human-nature system and behave towards them in an evaluative and reflexive way (Satanarachchi/Mino 2014). In the constitution of sustainability sciences there are two strikingly parallel developments: on the one hand projects in the theory of science, such as transdisciplinarity, and on the other hand transnational negotiations. In both cases, it is a question of moving boundaries, in collaborations between scientific and non-scientific actors (Vilmsmaier 2018; Schmidt 2011), in order to pursue SD. The spectrum of discursive events that constitute sustainability sciences is wide. For the sake of systematics they can be represented on five interwoven levels: 1) political with the UN conferences⁴; 2) theory and politics of science with concepts such as transdisciplinarity (Klein et al. 2001; Osborne 2015), mode-2 (Gibbons et al. 1994; Gibbons 1999; Nowotny et al. 2001), or post-normal science (Funtowicz/Ravetz 1993; 3) publications such as from Robert Kates and William Clark et al. in *Science* in 2001 that present sustainability sciences as a programmatic scientific research field (Kates et al. 2001); 4) non-university institutes, NGOs, civil society, companies that strongly re-

4 'United Nations Conference on Human Environment' in 1972, 'United Nations Conference on Environment and Development' in 1992. From these conferences emerged programmes, as the United Nations Environment Program (UNEP), the final report of the World Commission on Environment and Development and the Agenda 21, the World Climate Summits, international follow-up conferences such as the World Summit on Sustainable Development in Johannesburg in 2002, or the SDGs document in 2015. There were also counter-reactions to the European and North American 'global consensual positions on ecology and development' (Vanhulst/Beling 2014: 55). The Latin American Global Model (or Bariloche Model) (Herrera et al. 1976) replied in 1976 to the MIT report 'The limits to growth' (Meadows et al. 1972), and, in 1991, the report 'Nuestra propia agenda sobre desarrollo y medio ambiente' ('Our own agenda on development and environment') of the Development and Environment Commission of Latin America and the Caribbean was published in response to the Brundtland report and in preparation for Rio 1992 (Vanhulst/Beling 2014; Vanhulst/Hevia 2016: 178). See also Meyer/Vilmsmaier 2020.

acted to 5) global events that destroyed nature and called for environmental policy measures.

Joachim Spangenberg distinguishes the understandings of sustainability sciences as being between a ‘more traditional disciplinary-based science for sustainability and the transdisciplinary science of sustainability’ (Spangenberg 2011: 275). Td sustainability sciences fall in the category of science of sustainability. This emergent mode of research is aiming at the plurality of knowledges and perspectives, as well as process orientation combined with a normative orientation towards sustainability or SD. It is criticising modern institutionalised demarcations and understandings of research, such as scientific objectivity and progress (Vilmsmaier et al. 2017; Vilmsmaier 2018). Research in td sustainability sciences may open up a platform on which the boundaries that constitute research are shifted (Schmidt 2011). Relationships between the scientific and non-scientific emerge, for example in consideration of traditional or local everyday knowledge (Klein 2014).

According to Julie Thompson Klein’s analysis of discourses on transdisciplinarity, the dominant understanding of and lived research cultures in td sustainability sciences is attributable to the ‘discourse of problem solving’ (Klein 2014: 70; Schmidt 2011). The discourse is represented by the Swiss-based ‘Network for Transdisciplinary Research’ known as ‘td-net’, that was founded at a congress held in Zurich in 2000. Thus it is sometimes classified as a ‘Swiss or German school of TD because the approach was signaled in the late 1980s and early 1990s in Swiss and German contexts of environmental research’ (ibid: 74). The results of a collocation analysis focusing on the concept of problem in English-speaking articles of the journal *GAIa* published up to and including the year 2017 confirm that td sustainability sciences appeal to problem-solving as their normative target (Meyer 2020).

Exemplary problem understandings in transdisciplinary sustainability sciences

Controversial problem contents as justification moments for sustainability sciences

The first UN conference on the human environment in Stockholm in 1972, as a reference point for sustainability sciences, showed that what are regarded as sustainability-related societal problems is contested. The countries of the Global North in particular demanded measures to limit industrial pollution, while the countries of the Global South pushed for a catch-up of prosperity and brought forward medical and educational concerns. There were therefore different ideas about this conference, which resulted in a compromise to capture everything as environment and to conceptualise human progress with the label of SD in order to dissolve the contradiction or better emphasise the compatibility between economic growth and environmental protection (Hopwood et al. 2005; Sneddorn et al. 2006; Vanhulst/Beiling 2014).⁵

Challenge

The normative background against which problems are assessed is a functioning society as a prerequisite for SD. SD itself is equated with a societal challenge. The use of the concept of challenge points to the following developments: problems associated with sustainability are labeled as societal challenge(s), replacing so-called old social problems, like hunger, illness, and poverty (Rockström et al. 2009; Jerneck et al. 2011). The sustainability challenges, in their unlocalised rhetoric, refer to expected welfare losses or gains, are uncertain, speculative, and cannot be understood by social collectives from experiences (Jerneck et al. 2011). At the same time, they are communicated as alarming due to the irretrievability of unique opportunities with advancing time (Moore 2016). Within market economy thinking challenges are connoted positively as they simultaneously offer an opportunity for innovative advancement and progress for a sustainable society, if correspond-

⁵ The comprehensive *empirical* question about how the controversial problems found their ways into td sustainability sciences or were not assessed as relevant, must first be put aside.

ing – also positively connoted – risk-oriented performance is shown. The sustainability challenges thus fit without contradictions into the discourse of the freeing of the markets from socio-ecological policy regulations.

Sustainability challenge is a relative concept that does not diagnose any spatial and temporal limits or goals in view of future uncertainties to be speculated. Therefore the term describes the discourse of SD as a dynamic shift of boundaries or relative goal within the concept of weak sustainability. This is incompatible with the discourse on strong sustainability (Ott/Döring 2004; Ziegler/Ott 2011), which in turn *identifies* planetary boundaries (Rockström et al. 2009).⁶ Within these boundaries all human endeavor and striving, the mode of economic activity, has to happen. This discourse was stronger in *Limits to Growth* (Meadows et al. 1972) and in the environmental concerns at the beginning of the 1970s (Williams/Millington 2004). What is also striking is another development that goes along with the terms of the ‘problem’ and ‘challenge’: ‘dilemma’ is underrepresented as a concept in sustainability-related scientific publications.⁷ This term means that there is no solution that would be morally acceptable to all stakeholders – we remain terminologically in the discourse strand of the td sustainability sciences – to derive a conflict-free action. The concept of ‘dilemma’ indicates epistemological or ethical issues, namely, how to deal with manifold and conflicting epistemologies or moral norms, or which ethical legitimacy becomes accepted and how. These questions are not central in td sustainability sciences (Krohn et al. 2017). It therefore seems promising to work on the thesis of a repression of dilemma and conflict in discourses on sustainability and SD in light of the solution of familiar social problems with market economic strategies – rebranded as sustainability challenges. One hypothesis is that the prioritisation of intergenerational instead of intragenerational research questions and the marginalised theories dealing with differences and moral conflicts in td sustainability sciences explain each other.

After the naming of the problematic of td sustainability sciences, the next part of this chapter attempts to highlight theoretical-methodological

6 The Rockström et al. paper, however, leaves a space for discussion open by using the term challenge.

7 No search results (August 2018) came from the terms ‘moral dilemma AND sustainab*’ in the Web of Science, a relevant database of scientific publications (<https://login.webof-knowledge.com/>).

starting points, which answer to just that epistemic-ambiguous (Harrasser/Sohldju 2016) problematic, namely being taught to think in an even, sustainable way ‘that created today’s turbulence [and] is unlikely to help us solve it’ (Moore 2016: 1). In so doing, the figure of the problematic, as it is envisaged in French philosophy of the 20th century, is connected to td sustainability research for further development.

The problematic *in* transdisciplinary sustainability research

In td sustainability research, moral and epistemological dimensions are interwoven. Reading about the problematic in twentieth-century French philosophy⁸ raises the question of an *epistemology of the problematic* that can supplement the basic normative coordinates in sustainability and sustainability research – change and adaptation – with basic questions. Such as, how does td sustainability research understand, explain and perform relationships between and through the form of research itself, concerning individuality, collectivity, subjectivity, and objectivity? In the following, I take up Gilbert Simondon, because his thinking of the problematic can enrich conceptual approaches in the process- and change-oriented td sustainability research (Engbers 2020) that orient beyond hegemonic discourses and practices of SD.⁹ With his conceptualisation of dynamics and change through close studies of the modes of functioning of the living, Simondon is able to offer a ‘radically transdisciplinary’ (Scott 2014: 3) alternative to a mechanical concept of *development* covered in the hegemonic discourse of SD. In contrast, the problematic becoming, or individuation, as he calls the dynamics as dimensions of the living, keeps moving in permanent relation to particular, multi-layered, multi-dimensional, interior and exterior (Voss 2018: 101) environments. Individuation describes the inventive finding of a partial own in the conditional higher social dimension, by transindividual participation (Simondon 1964/2007: 31; Voss 2018: 96, 104). The psychic and the collective

8 The interdisciplinary research project ‘Complexity or Control? Paradigms for sustainable development’, in preparation for the workshop ‘Thinking the Problematic’, read together several philosophical texts.

9 I have worked with a few existing translations into German and English of his work as well as secondary literature.

are constituted by individuation (Simondon 1964/2007: 36).¹⁰ Individuation, as a structural description of the dynamics and vectors of change, is neither to be understood as a sole adapting to the specific higher social dimension, nor to be understood in such a way as to be based solely on the change of the higher social dimension. Rather, individuation is explained by inventing internal structures (Voss 2018: 95), in accordance with the changed exterior structures, and, thus, inventing a new metastable, participative and symbiotic relationship state between exteriority and interiority (Simondon 1964/2007: 35). The problematic arises through resonating the exterior in the interior (Voss 2018: 94). Individuation is an ever-inventing of new problematics and always necessary dynamics of living (Simondon 1964/2007: 36). For sustainability research the recognition of Simondon's structure of individuation would provide the ability to interweave with an awareness of environmentality, the interior, the exterior, as well as with a different awareness of temporality, such as of the previous, and the future. The political-normative of sustainability is manifested in the dynamics of change, whereby these are to be thought of as, in different strengths, mutually conditional interwoven starting points: the interior, the relations and the exterior (Harrasser/Sohldju 2016; Voss 2018: 98). The problematic is generative and sustainable, because it cannot be resolved by an optimistic detachment from material conditionalities for the living such as the externalisation of the global dimensions of our modes of production and consumption, for example.

Sustainability sciences are based on ethics, because of their explicit normative orientation towards sustainability. Which policies of change, which collective normative movements (such as those contained in a normative-prescriptive sustainability ethics or in the SDGs), can we deduce from the dynamics of life described in this way? Where do I find the normative momentum with regard to sustainability? A normative momentum that is not assessing or defining the uncertainty of a problem-transformation with regard to fixed outcomes, nor talking of sustainability problems or challenges, but of sustainability-related events that provoke social changes to challenge sustainability research with the question: Why and how may sustainability researchers shape these social changes? Which normative movement can be invented in concepts 'such as ecological economics, polit-

10 Just as little is said of an initial psyche confronting an initial collective, epistemologically an initial juxtaposition of subject and object can be used (Maniglier 2012).

ical ecology, de-growth, ecosocialism, ecofeminism, environmental justice' (Vanhulst/Beiling 2014), i.e. for the preservation of life and how to work in td sustainability research?

Methodological problematic

How can we think of methodologies for td sustainability research that are coherent with *epistemologies of the problematic* (Maniglier 2019)? How to shape conditions for transdisciplinary possibilities to unfold the problematic? How can we activate an ethical practice in td sustainability research that allows for the speculative and failure and, thus, arrive at an ecology of practices that create spaces of opportunities beyond a cling to computable decision nodes (Stengers 2010)?

The problematic in td sustainability research may be addressed by situational, contextualised decision-making and responsiveness, 'local values, traits, beliefs, and arts for action' (Fals Borda 1995), entrepreneurial creativity, humor (Savransky 2018), attitude and ethics (Meckesheimer 2013), as well as an (algorithmic) learning, which recognises temporally and spatially related, multiple different sustainability contexts and continues the resulting decisions as limiting moments, instead of universal, methodical programs (Harrasser/Sohldju 2016). Methodological approaches that go in this direction are oriented along 'a questioning perspective that does not rush for direct straightforward solutions to problems, [...] an appeal to imaginative possibilities and especially subversive imagination; a hands-on approach to experimentation which is not limited to linear logico-deductive processes [...], spaces of possibilities to play and experimentally and aesthetically engage with.' (Kagan 2015: 2) In search for a 'particular methodology in transdisciplinarity' through his Deleuze reading, Patrice Maniglier calls for 'the introduction of comparative methods across the disciplines': 'To compare consists in experiencing, within one's system of categories, a variation of the very type that functions as the heading that makes the comparison possible' (Maniglier 2019).

There are diverse and recent methodical examples and experiments that can be interpreted as problematic and transdisciplinary methodology, or that have even been designed as such: design methods (Jonas 2015; Peukert/Vilsmaier 2019), generative picturing (Brandner 2020), transformative scenario planning (Freeth/Drimie 2016), case-based mutual-learning sessions

(Vilismaier et al. 2015), mutual listening (Meckesheimer 2013), story-telling salons (Richter/Rohnstock 2016), and remembrance work (Haug 1999). With a ‘thinking practice of problematic designing’, Daniela Peukert and I recently attempted to open an epistemological perspective in and for td sustainability research. It is designed to methodologically capture the experience of a problematic (Meyer/Peukert 2020) and for a multi-dimensional methodology allowing Simondon’s approach to be interwoven with the complexity that sustainability and td sustainability sciences demand. In addressing questions of how we can include the conditions of our research into the research itself, we can work out dimensions in and for the respective research situation. The epistemological concept of problematic designing, as a thinking practice, together with the methodological design canon, is an invitation to expand the methodological canon of td sustainability research.¹¹

Epistemologies of the problematic start at the relation to uncertainties, be they the past, the other or the future (Vilismaier et al. 2017) and regard ‘the effects themselves (as) the cause of the world’s development’ (Aicher 1991: 186, my translation; Harrasser/Sohldju 2016; Moore 2016). The (future as) playful-speculative remains tied back to its conditions, namely (preservation of) life itself and its ‘pre-individual nature’ (Voss 2018: 96).

That calls for an ethical research practice, protected against neoliberal re-enclosure (Meckesheimer 2013; Strong et al. 2016) to enable td researchers to make decisions without competitive pressure and not to set numerical optimal solutions but an ‘ecology of practices’ as a standard (Stengers 2005; 2010). The speculative is therefore no challenge to climb the highest mountain but to invent other mountain worlds. Td sustainability research must distinguish itself from a concept of science that evaluates the progress of knowledge, as well as researchers on the basis of an impact factor (Schmidt 2011) and that always excludes other forms of research (Meckesheimer 2013), as well as unpredictable insights – which, however, are relevant to sustainability research and, thus, to sustainability. As Andreas Kläy et al. ask in the journal *Futures*: ‘Science for sustainable development is, thus, confronted with a fundamental contradiction arising from this double normative framing of science policy: can scientists really live up to their role of contributing to sustainable development, while at the same time helping societies achieve

11 Daniela Peukert is currently working on this topic as part of her PhD, see <https://www.danielapeukert.de/>.

only greater economic growth, at the expense of equity and the environment?’ (Kläy et al. 2015: 73)

Conclusions

The idea of sustainability allows us to reflexively refer to different ways of life on planet Earth with regard to our own behaviour and at the same time renegotiates the material conditionality for these ways of life. Being normatively oriented towards sustainability, td sustainability sciences appeal to problem-solving as their sole target. At the same time, they are characterised by a critical stance towards modern institutionalised demarcations and understandings of research, such as scientific objectivity and progress.

This contribution highlights epistemologies of the problematic for td sustainability research against the background of the problematic constitution of the hegemonic discourse of SD as a critical, problematising discourse-analytical approach towards problems in td sustainability sciences. The hegemonic discourse of SD is aligned to a neoliberal economic-political interpretation of organising a modern way of life (Castree 2002). Sustainability, thus, under the roof of SD, might serve to strengthen and spread neoliberal hegemony and is the product of a culture, based on a ‘Eurocentric Cartesian worldview’ (Vanhulst/Beling 2014: 59; Meyer/Vilismaier 2020), that has a specific relationship, namely a separating, between the individual and the collective, humanity and nature (Moore 2016). Ecological interests, as well as the concern that ‘no one will be left behind’ (SDGs 2015: Preamble) are then left in marginalised positions. The hegemonic discourse on SD likewise requires the unsustainability of modern ways of life and economy (Dingler 2003) and does not deal with the unsustainable state of the national economy in transnational markets (Parenti 2016).

Thus, the project of td sustainability research offers a problematic opportunity for its own restructuring. A sustainability (research) ethics of the problematic will on the one hand react to (historically conditioned) dependencies and asymmetries (such as hegemony) (Harrasser/Sohldju 2016; Acosta/Brand 2018), thus recognising a true materialistic core of sustainability. But on the other hand be dynamic – as a backwardness to the dynamics of life itself – and open. Then, td sustainability research engages with its problematic of hegemonic structures in science, characterised by a ‘double normative

framing' (Klây et al. 2015), founded in liberalism itself. But the problematic is just as well a force to initiate a transdisciplinary and ethical way of relations between entities, which can unfold according to the hegemonic conditions. Reviewing Judith Shklar's 'Liberalism of Fear', Seyla Benhabib and Hannes Bajohr write that we will have to ultimately draw 'a clear line between liberal market capitalism and the political essence of liberalism' (Benhabib 2013: 67, my translation), namely the 'ability to place oneself in the position of the victims' (Bajohr 2013: 145, my translation). In terms of td sustainability research, this means engaging 'not in the back but in the face' (Harrasser/Sohldju 2016: 86, my translation) of social change (Meckesheimer 2013), and 'studying with, and not only about social groups, or at least studying the hegemonic articulations of power' (Mato 2000), namely of ourselves (Freire 2007 [1968]; Fals Borda 1995).

Problems in the context of SD are conceptualised and essentialised differently, as the UN conferences, based on the need to decide between poverty reduction and environmental protection, show. This, in turn, testifies to their relative momentariness. Sustainability thus demands a problem definition of a case-based singularity (Maniglier 2019), in which the internal and external references in the way of individually becoming are recognised, shaped and assessed. Td sustainability research can therefore be understood as complex insofar as we see ourselves as part of the problem (van der Leeuw/Zhang 2014) and do not confront a research topic as a problem. If we reinforce this research paradigm, td sustainability research can process the interweaving of epistemological and normative dimensions. Further work towards epistemologies of the problematic, and a sustainable future, ways of life and cosmologies, beyond the European, should be explored against the background of European perspectives and theories on the concept of the problematic (Vanhulst/Beling 2014; Maniglier 2019).

References

- Acosta, Alberto/Brand, Ulrich (2018): *Radikale Alternativen: Warum man den Kapitalismus nur mit vereinten Kräften überwinden kann*, München: oekom.
- Aicher, Otl (1991): *Die Welt als Entwurf*, Berlin: Ernst & Sohn.

- Albán, Adolfo/Rosero, José (2016): 'Coloniality of the natural world: imposition of technology and epistemic usurpation? Interculturality, development and re-existence.' In: *Nómada*, 45, pp. 27-41.
- Bachelard, Gaston (2012): 'Corrationalism and the problematic.' In: *Radical Philosophy* 173, pp. 27-32.
- Bajohr, Hannes (2013): 'Am Leben zu sein heißt Furcht zu haben: Judith Shklar's negative Anthropologie des Liberalismus.' In: Bajohr, Hannes (ed.), *Der Liberalismus der Furcht*, Berlin: Matthes & Seitz, pp. 131-168.
- Benhabib, Seyla (2013): 'Judith Shklar's dystopischer Liberalismus.' In: Bajohr, Hannes (ed.), *Der Liberalismus der Furcht*, Berlin: Matthes & Seitz, pp. 67-86.
- Blanchon, David/Graefe, Olivier (2012): 'Radical political ecology and water in Khartoum: A theoretical approach that goes beyond the case study.' In: *L'Espace géographique* 1/41, pp. 36-50. <https://doi.org/10.3917/eg.411.0035>
- Bowden, Sean/Kelly, Mark (2018): 'Problematizing problems.' In: *Angelaki* 23/2, pp. 2-7. <https://doi.org/10.1080/0969725X.2018.1451457>
- Brand, Ulrich/Wissen, Markus (2017): *Imperiale Lebensweise: Zur Ausbeutung von Mensch und Natur im Globalen Kapitalismus*, München: oekom. <https://doi.org/10.3726/JP2017.21>
- Brandner, Vera (2020): *Generative Bildarbeit. Zum transformativen Potential fotografischer Praxis*, Bielefeld: transcript. <https://doi.org/10.14361/9783839450086>
- Brown, Trent (2016): 'Sustainability as Empty Signifier: Its Rise, Fall, and Radical Potential.' In: *Antipode* 48/1, pp. 115-133. <https://doi.org/10.1111/anti.12164>
- Bürrmann, Andrea/Schneider, Werner (2008): *Vom Diskurs zum Dispositiv: Eine Einführung in die Dispositivanalyse*, Bielefeld: transcript. <https://doi.org/10.14361/9783839408186>
- Carnau, Peter (2011): *Nachhaltigkeitsethik. Normativer Gestaltungsansatz für eine global zukunftsfähige Entwicklung in Theorie und Praxis*, München: Rainer Hampp Verlag.
- Castree, Noel (2002): 'False Antitheses? Marxism, Nature and Actor-Networks.' In: *Antipode* 34/1, pp. 111-146. <https://doi.org/10.1111/1467-8330.00228>
- Clarke, Adele (2012): *Situationsanalyse: Grounded Theory nach dem Postmodern Turn*, Heidelberg: Springer.

- Defert, Daniel/Ewald, Francois (2005): Michel Foucault, Schriften in vier Bänden, Dits et Ecrits, Band IV, 1980-1988, Frankfurt/Main: Suhrkamp.
- Dingler, Johannes (2003): Postmoderne und Nachhaltigkeit: Eine diskurstheoretische Analyse der sozialen Konstruktionen von nachhaltiger Entwicklung, München: oekom.
- Dow, Sheila (2007): 'Variety of Methodological Approach in Economics.' In: *Journal of Economic Surveys* 21/3, pp. 447-465. <https://doi.org/10.1111/j.1467-6419.2007.00510.x>
- Eblinghaus, Helga/Stickler, Armin (1996): Nachhaltigkeit und Macht: Zur Kritik von Sustainable Development, Frankfurt: IKO-Verl. für Interkulturelle Kommunikation.
- Engbers, Moritz (2020): Kultur und Differenz: Transdisziplinäre Nachhaltigkeitsforschung gestalten (Wahrnehmungsgeographische Studien 29), Oldenburg: BIS-Verlag der Carl von Ossietzky Universität Oldenburg.
- Enquete-Kommission des 13. Deutschen Bundestages (1997) Schutz der Menschen und der Umwelt: Konzept Nachhaltigkeit, Fundamente für die Gesellschaft von morgen.
- Escobar, Arturo (1995): *Encountering Development: The Making and Unmaking of the Third World*, Princeton: Princeton University Press.
- Fals Borda, Orlando (1995): Research for social justice: Some North-South convergences, Plenary Address at the Southern Sociological Society Meeting, Atlanta, April 8. <http://comm-org.wisc.edu/si/falsborda.htm> (accessed July 22, 2018).
- Foucault, Michel (1978): *Dispositive der Macht: Michel Foucault über Sexualität, Wissen und Wahrheit*, Berlin: Merve.
- Freeth, Rebecca/Drimie, Scott (2016): 'Participatory Scenario Planning: From Scenario "Stakeholders" to Scenario "Owners".' In: *Environment: Science and Policy for Sustainable Development* 58/4, pp. 32-43. <https://doi.org/10.1080/00139157.2016.1186441>
- Freire, Paolo (2007 [1968]): *Pedagogy of the Oppressed*, New York: Continuum.
- Funtowicz Silvio/Ravetz Jerome (1993): 'Science for the post-normal age.' In: *Futures* 25/7, pp. 739-755. [https://doi.org/10.1016/0016-3287\(93\)90022-L](https://doi.org/10.1016/0016-3287(93)90022-L)
- Gibbons, Michael et al. (1994): *The New Production of Knowledge: The Dynamics of Science and Research in Contemporary Societies*. London: SAGE.

- Gibbons, Michael (1999): 'Science's new social contract with society.' In: *Nature* 402, pp. C81-C84. <https://doi.org/10.1038/35011576>
- Grunwald, Armin (2011): *Conflict-resolution in the Context of Sustainable Development: Naturalistic versus Culturalistic Approaches*, Karlsruhe: KIT Scientific Publishing.
- Hajer, Maarten (1995): *The Politics of Environmental Discourse: Ecological Modernization and the Policy Process*, Oxford: Oxford University Press.
- Harrasser, Karin/Solhdju, Katrin (2016): 'Wirksamkeit verpflichtet – Herausforderungen einer Ökologie der Praktiken.' In: *ZfM* 14/1, pp. 72-86.
- Hauff, Volker (1987): *Unsere gemeinsame Zukunft: Der Brundtland-Bericht der Weltkommission für Umwelt und Entwicklung*, Greven: Eggenkamp.
- Haug, Frigga (1999): *Vorlesungen zur Einführung in die Erinnerungsarbeit*, Hamburg: Argument-Verlag.
- Herrera, Amilcar et al. (1976): *Catastrophe or New Society?: A Latin American World Model*, Ottawa: International Development Research Centre.
- Höhler, Sabine/Luks, Fred (2004): *Die ökonomische Konstruktion ökologischer Wirklichkeit*, NEDS Working Papers Nr. 5.
- Hopwood, Bill et al. (2005): 'Sustainable development: mapping different approaches.' *Sustainable Development* 13, pp. 38-52. <https://doi.org/10.1002/sd.244>
- Jerneck, Anne et al. (2011): 'Structuring sustainability science.' In: *Sustainability Science* 6/1, pp. 69-82. <https://doi.org/10.1007/s11625-010-0117-x>
- Jonas, Wolfgang (2015): 'Social transformation design as a form of research through design (RTD): Some historical, theoretical, and methodological remarks' In: Jonas et al. (eds.), *Transformation Design Perspectives on a New Design Attitude*, Berlin: De Gruyter, pp. 114-133. <https://doi.org/10.1515/9783035606539-010>
- Kagan, Sacha (2015): 'Artistic research and climate science: transdisciplinary learning and spaces of possibilities.' In: *JCOM: The Journal of Science Communication* 14/1, p. C07. <https://doi.org/10.22323/2.14010307>
- Kaika, Maria (2003): 'Constructing scarcity and sensualising water politics: 170 days that shook Athens.' In: *Antipode* 3/5, pp. 919-954. <https://doi.org/10.1111/j.1467-8330.2003.00365.x>
- Kambites, Carol J. (2014): "'Sustainable Development": the "Unsustainable" Development of a Concept in Political Discourse.' In: *Sustainable Development* 22/5, pp. 336-348. <https://doi.org/10.1002/sd.1552>

- Kates, Robert et al. (2001): 'Sustainability science.' In: *Science* 292, pp. 641-642. <https://doi.org/10.2139/ssrn.257359>
- Kläy, Andreas/Zimmermann, Wolfgang A./Schneider, Flurina (2015): 'Rethinking science for sustainable development: Reflexive interaction for a paradigm transformation.' In: *Futures* 65, pp. 72-85. <https://doi.org/10.1016/j.futures.2014.10.012>
- Krohn, Wolfgang/Grunwald, Armin/Ukowitz, Martina (2017): 'Transdisziplinäre Forschung revisited: Erkenntnisinteresse, Forschungsgegenstände, Wissensform und Methodologie.' In: *GAiA* 26/4, pp. 341-347. <https://doi.org/10.14512/gaia.26.4.11>
- Lury, Celia (2020): 'Compositional methodology: on the individuation of a problematic of the contemporary.' In: Leistert, Oliver/Schrickel, Isabell (eds.), *Thinking the Problematic. Genealogies and Explorations between Philosophy and the Sciences*, Bielefeld: transcript.
- Maniglier, Patrice (2019): 'Problem and Structure: Bachelard, Deleuze and Transdisciplinarity.' In: *Theory, Culture & Society*, online July 15th. <https://doi.org/10.1177/0263276419878245>
- Maniglier, Patrice (2012): 'What is a problematic?' In: *Radical Philosophy* 173, pp. 21-23.
- Mato, Daniel (2000): 'Studying with the Subaltern, not only about the Subaltern Social Groups, or, at Least, Studying the Hegemonic Articulations of Power.' In: Nepantla (ed.), *Views from South 1.3*, Durham, NC: Duke University Press, pp. 479-503.
- Meadows, Donella et al. (1972): *The Limits to Growth: A Report for the Club of Rome's Project on the Predicament of Mankind*, New York: Universe Books. <https://doi.org/10.1349/ddlp.1>
- Meckesheimer, Anika (2013): 'Decolonization of social research practice in Latin America: What can we learn for German social sciences?' In: *Transcience* 4/2, pp. 79-98.
- Meyer, Esther (2020): 'Solvable problems or problematic solvability? Problem conceptualization in transdisciplinary sustainability research and a possible epistemological contribution.' In: *GAiA* 29/1, pp. 34-39. <https://doi.org/10.14512/gaia.29.1.8>
- Meyer, Esther/Peukert, Daniela (2020): 'Designing a Transformative Epistemology of the Problematic: A Perspective for Transdisciplinary Sustainability Research.' *Social Epistemology*, online. <https://doi.org/10.1080/02691728.2019.1706119>

- Meyer, Esther/Vilismaier, Ulli (2020): 'Economistic discourses of sustainability: determining moments and the question of alternatives.' In: *Sustainability in Debate* 11/1, pp. 98-110. <https://doi.org/10.18472/SustDeb.v11n1.2020.26663>
- Michelsen, Gerd/Adomßent, Michael (2014): 'Nachhaltige Entwicklung: Hintergründe und Zusammenhänge.' In: Heinrichs, Harald/Michelsen, Gerd (eds.), *Nachhaltigkeitswissenschaften*, Berlin/Heidelberg: Springer Spektrum, pp. 3-60. https://doi.org/10.1007/978-3-662-44643-0_1
- Moncayo, Víctor (2009): *Fals Borda, Orlando, 1925-2008: Una sociología sentipensante para América Latina*, Bogotá: Siglo del Hombre Editores/CLACSO.
- Moore, Jason (ed.) (2016): *Anthropocene or Capitalocene? Nature, History, and the Crisis of Capitalism*, Oakland: PM Press.
- Nowotny, Helga et al. (2001): *Re-thinking Science: Knowledge and the Public in an Age of Uncertainty*, Cambridge, UK: Polity Press.
- Olssen, Mark (2014): 'Discourse, Complexity, Normativity: Tracing the elaboration of Foucault's materialist concept of discourse.' In: *Open Review of Educational Research* 1/1, pp. 28-55. <https://doi.org/10.1080/23265507.2014.964296>
- Osborne, Peter (2015): 'Problematizing Disciplinarity, Transdisciplinary Problematics.' In: *Theory, Culture & Society* 32/5-6, pp. 1-33. <https://doi.org/10.1177/0263276415592245>
- Ott, Konrad (2014): 'Institutionalizing Strong Sustainability: A Rawlsian Perspective.' In: *Sustainability* 6, pp. 894-912. <https://doi.org/10.3390/su6020894>
- Ott, Konrad/Döring, Ralf (2004): *Theorie und Praxis starker Nachhaltigkeit*, Marburg: Metropolis.
- Parenti, Christian (2016): 'Environment-Making in the Capitalocene: Political Ecology of the State.' In: Jason Moore (ed.), *Anthropocene or Capitalocene? Nature, History, and the Crisis of Capitalism*, Oakland: PM press, pp. 166-184.
- Peukert, Daniela/Vilismaier, Ulli (2019): 'Entwurfsbasierte Interventionen in der transdisziplinären Forschung.' In: Ukowitz, Martina/Hübner, Renate (eds.), *Wege der Vermittlung – Intervention – Partizipation*, Wiesbaden: Springer-Verlag. https://doi.org/10.1007/978-3-658-22048-8_10
- Richter, Ralph/Rohnstock, Nepomuk (2016): 'Der Erzählalon als Verfahren strategischen Erzählens: Konzeptionelle Voraussetzungen und em-

- pirische Gestalt am Beispiel des Projektes Lausitz an einen Tisch.' In: DIEGESIS: Interdisciplinary E-Journal for Narrative Research 5/2, pp. 84-100.
- Rockström, Johan et al. (2009): 'Planetary boundaries: exploring the safe operating space for humanity.' In: *Ecology and Society* 14/2, p. 32. <https://doi.org/10.5751/ES-03180-140232>
- Sachs, Wolfgang (2002): *Nach uns die Zukunft: Der globale Konflikt um Gerechtigkeit und Ökologie*, Frankfurt/Main: Brandes & Apsel.
- Sachs, Wolfgang (1993): *Wie im Westen so auf Erden: Ein polemisches Handbuch zur Entwicklungspolitik*, Reinbek: Rowohlt.
- Satanarachchi, Niranji/Mino, Takashi (2014): 'A framework to observe and evaluate the sustainability of human-natural systems in a complex dynamic context.' In: *SpringerPlus* 3/618. <https://doi.org/10.1186/2193-1801-3-618>
- Savransky, Martin (2018): 'The Humor of The Problematic: Thinking with Stengers.' In: *SubStance* 57/1, pp. 29-46.
- Schmidt, Jan C. (2011): 'What is a problem? On problem-oriented interdisciplinarity.' In: *Poiesis Prax* 7, pp. 249-274. <https://doi.org/10.1007/s10202-011-0091-0>
- Schmiege, Gregor et al. (2018): 'Modeling normativity in sustainability: A comparison of the Sustainable Development Goals, the Paris Agreement, and the Papal Encyclical.' In: *Sustainability Science* 13/3, pp. 785-796. <https://doi.org/10.1007/s11625-017-0504-7>
- Scott, David (2014): *Gilbert Simondon's Psychic and Collective Individuation: A Critical Introduction and Guide*, Edinburgh: Edinburgh University Press.
- Simondon, Gilbert (2007): 'Das Individuum und seine Genese.' In: Blümle, Claudia/Schäfer, Armin (eds.), *Struktur, Figur, Kontur: Abstraktion in Kunst und Lebenswissenschaften*, Zürich: diaphanes, pp. 29-46.
- Sneddon, Chris et al. (2006): 'Sustainable development in a post-Brundtland world.' In: *Ecological Economics* 57, pp. 253-268. <https://doi.org/10.1016/j.ecolecon.2005.04.013>
- Spangenberg, Hans Joachim (2011): 'Sustainability science: a review, an analysis and some empirical lessons.' In: *Environmental Conservation* 38/3, pp. 275-287. <https://doi.org/10.1017/S0376892911000270>

- Stengers, Isabelle (2005): 'Introductory Notes on an Ecology of Practices.' In: *Cultural Studies Review* 11/1, pp. 183-196. <https://doi.org/10.5130/csr.v11i1.3459>
- Stengers, Isabelle (2010): *Cosmopolitics I*, Minneapolis: University of Minnesota Press.
- Strong, LaToya et al. (2016): 'Against Neoliberal Enclosure: Using a Critical Transdisciplinary Approach in Science Teaching and Learning.' In: *Mind, Culture, and Activity* 23/3, pp. 225-236. <https://doi.org/10.1080/10749039.2016.1202982>
- Thompson Klein, Julie (2014): 'Discourses of transdisciplinarity: Looking back to the future.' In: *Futures* 63, pp. 68-74. <https://doi.org/10.1016/j.futures.2014.08.008>
- Thompson Klein, Julie et al. (2001): *Transdisciplinarity: Joint Problem Solving among Science, Technology, and Society: An Effective Way of Managing Complexity*. Basel: Birkhäuser.
- Timpf, Siegfried (2000): *Das Dispositiv der zukunftsfähigen Entwicklung*, Hamburg: Doctoral thesis HWP.
- Transforming our world: the 2030 Agenda for Sustainable Development (SDGs), Resolution, A/RES/70/1.
- Van der Leeuw, Sander/Zhang, Yongsheng (2014): 'Are We Part of the Solution or Part of the Problem?' SantaFe Institute, Working Paper.
- Vanhulst, Julien/Beling, Adrián. (2014): 'Buen vivir: Emergent discourse within or beyond sustainable development?' In: *Ecological Economics* 101, pp. 54-63. <https://doi.org/10.1016/j.ecolecon.2014.02.017>
- Vanhulst, Julien/Hevia, Antonio (2016): 'Los Senderos Bifurcados del Desarrollo Sostenible: Un Análisis del Discurso Académico en América Latina.' In: Floriani, Dimas/Helvia, Antonio (eds.), *América Latina: Sociedade e Meio Ambiente. Teorias, Retóricas e Conflitos em Desenvolvimento*, Curitiba: UFPR.
- Vanhulst, Julien/Zaccai, Edwin (2016): 'Sustainability in Latin America: An analysis of the academic discursive field.' In: *Environmental Development* 20, pp. 68-82. <https://doi.org/10.1016/j.envdev.2016.10.005>
- Vilismaier, Ulli et al. (2015): 'Case-based Mutual Learning Sessions: knowledge integration and transfer in transdisciplinary processes.' In: *Sustainability Science* 10/4, pp. 563-580. <https://doi.org/10.1007/s11625-015-0335-3>

- Vilsmaier, Ulli et al. (2017): 'Research in-between: The constitutive role of cultural differences in transdisciplinarity.' In: *Transdisciplinary Journal of Engineering & Science* 8, 169-179. <https://doi.org/10.22545/2017/00093>
- Vilsmaier, Ulli (2018): 'Grenzarbeit in integrativer und grenzüberschreitender Forschung.' In: Heintel, Martin et al. (eds.), *Grenzen: Theoretische, konzeptionelle und praxisbezogene Fragestellungen zu Grenzen und deren Überschreitungen*, Wiesbaden: Springer VS, pp. 113-134. https://doi.org/10.1007/978-3-658-18433-9_6
- Voss, Daniela (2018): 'Simondon on the notion of the problem.' In: *Angelaki* 23/2, pp. 94-112. <https://doi.org/10.1080/0969725X.2018.1451471>
- Williams, Colin/Millington, Andrew (2004): 'The diverse and contested meanings of sustainable development.' In: *The Geographical Journal* 170, pp. 99-104. <https://doi.org/10.1111/j.0016-7398.2004.00111.x>
- World Commission on Environment and Development (1987): *Our Common Future*, Oxford: Oxford University Press.
- Ziegler, Rafael/Ott, Konrad (2015): 'The quality of sustainability science: A philosophical perspective.' In: Enders, Judith/Remig, Moritz (eds.), *Theories of Sustainable Development*, London/New York: Routledge, pp. 43-64. <https://doi.org/10.5771/9783845258430-15>