

Framing social–ecological transformation as a geographical concept

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Abstract

Global challenges call for timely social–ecological transformation. There is a substantial amount of literature on social–ecological transformation, increasingly replacing and going beyond ‘sustainability’. However, the concept itself is used very inconsistently. This paper aims at identifying and systematizing the strains of argumentation that encompass the social–ecological transformation. Adding German-speaking literature to the Anglophone debate, we systematize as we follow the concept's genesis to its varieties of use within context-based (spatial, temporal, and societal) disciplinary, interdisciplinary, and trans-disciplinary debates. Building on the various strands of contemporary use, this paper aims at contouring the epistemologies of the concept. Lastly, we illustrate the roles of geographical research approaches and the assigned methodology. We argue that the strands tend to drift apart and cannot be seen nor used as a singular uniform approach. We identify the key dimensions of how scholars use social–ecological transformation, unearthing underlying epistemologies. To conclude, we delineate key elements that geographical research on social–ecological transformation must address, laying the foundation for further scholarly debate.

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1 | INTRODUCTION

Sustainability as the proclaimed goal of global governance processes has been on the agenda for 30 years. Policies and strategies for sustainable development were enforced through the Local Agenda 21 or the Millennium Goals in favor of poverty reduction in the Global South. The global agenda for poverty alleviation and environmental protection were later merged into the Sustainable Development Goals, a set of objectives to guide national policies (Brand, 2021). Bringing sustainability goals into a broad societal debate has led to applications in all kinds of sectors, economic fields, and local and regional development strategies. Individual consumption patterns are being aligned with sustainability, and social movements are advocating for sustainable mobility and food, among other things. The term sustainability is so prevalent in society, economy, and business, that it is increasingly criticized as “a feel-good term that is often used for promotion purposes by those whose actions run counter to sustainability” states Heimberger (2019, pp. 8–9).

In academic debates, the term is criticized for being too fuzzy, and unable to reflect the complexity of problems societies currently face (Brand, 2012, 2021, 2022). Thirty years after the Rio Earth Summit, environmental policy researchers regard the language used to call for environmental protection and precaution as a failure, as the remaining time span has been squandered (Biermann, 2021). Given the simultaneity and complexity of multiple crises in the Anthropocene era, researchers see difficulties in covering the problems of today's societies with the concept of sustainability (Benson & Craig, 2014; Blühdorn et al., 2019; Brand, 2012).

In this context, we observe that the concept of sustainability is increasingly being replaced by the concept of social-ecological transformation (Görg & Brand, 2002). The term is increasingly used in current, especially German-speaking, debates to refer to the multiple changes in society and societal relationships with nature under the growing impact of global change. Given that the concept of sustainability is losing significance, this article examines whether the term social-ecological transformation (SET) is replacing sustainability in the academic discussion. Second, we examine whether SET is an objective that needs to be approached with different concepts, or whether SET itself has already become a more or less elaborated concept.

To do so, in chapter 2 we assess different understandings of SET as a concept. To this end, we first outline the perspectives and strategies on sustainability before tracing analogies and points of criticism in different contributions that form the genesis of the term SET. In chapter 3, we delineate its applications and utilizations, taking temporalities and spatial ranges into account, and contour possible facets of SET as a research approach. Subsequently, in chapter 4, we discuss and challenge SET as a geographical concept. In chapter 5, we delineate common ground at the current state of concept development. Finally, we conclude by providing an outlook on geographical research on and with SET.

Within the scope of this paper, we take up the positioning of researchers in their writings and aim to summarize debates about terms and concepts as they evolve. In order to address the above-mentioned questions, we particularly consider the contributions from the German-language discussion, with a focus on and with high recognition in human geography. We take several theoretical propositions as a starting point that consider societal change towards sustainability in a wider sense. In particular, we examine contributions that refer to social-ecological transformation. Thus, the analysis moves us closer to the question of in what way the problem is defined when the term SET is used.

2 | BEYOND SUSTAINABILITY: THE GENESIS OF SOCIAL-ECOLOGICAL TRANSFORMATION

Sustainability research in human geography is unfolding along spatial-political origins in their contextualization, temporality, and scales. Mark Whitehead (2007) divides into three spatialities when researching sustainability, which is 'the West' with its focus on ecological modernization, the Global South in its development agenda struggling with pollution and poverty, and the post-socialist countries that differ due to their political transformation process. Although we take into account different global realities, in the following we focus on research perspectives evolving out of the industrialized and modernized Global North.

Temporalities concern the retrospective development or future view, the time span encompassed by the approaches, and the increasing urgency of the demanded social reaction. Scales of sustainability research unfold from local research on communities, regional development, to notions of global challenges and efforts recognizing inequalities. In the 1970s, calculations and measurements of carbon dioxide in the atmosphere, along with scientific evidence of links between polluting industries and local air, soil, and water pollution, led to the first policy reforms and regulatory measures to protect people's livelihoods. The accelerated processes of modernization and industrialization and the expansive dynamics of economic growth and globalization resulted in ecological problems and threats of the present. Forms of social adaptation and coping with them are thus a reaction to this (see Brand, 2017).

Starting with the definition of sustainability that "future generations should have access to the social and material conditions to live flourishing lives at least at the same level as the present generation", Eric O. Wright (2013, p. 5) declares sustainability as a fundamental "justice principle for people in the future". The quote links moral values of today's societies and their vision and goals for the future. The inherent temporal dynamics of these observations have most recently been approached in terms of intergenerational justice.

Whether future generations will find a livable planet essentially depends on being able to agree on a sustainable development model in the near future (Adloff & Neckel, 2020). Adloff and Neckel argue that today's practices determine whether the future will be more sustainable. In addition, a future-oriented perspective always entails imaginations that fundamentally influence current practices. We can divide into three imaginations of a sustainable future: sustainability as modernization, transformation, or as control (Adloff & Neckel, 2019). Modernization implies belief in the adaptability of existent structures, fundamental social change associated with new practices, technocratic ideals, and the governance of Earth systems (*ibid.*). Modern societies are thus "guided by different imaginations of sustainability" and it is key to investigate what vision is dominant or whether all three prevail (*ibid.*, p. 1018).

This can give rise to conflicts and paradoxes. As societies change, their institutional order and their relations with nature also change. Social conflicts currently become visible through social movements and climate activists demanding specific visions of a sustainable future. Business and politics are also committed to certain imaginations of the future (Beckert, 2016), often resisting radical transformations that call long-standing privileges into question.

The forward-looking view can be separated into knowledge about the aims, that is, where should the society head to; and transformational knowledge, that is, how can society get there? In sustainability research, the tripartite strategy of efficiency, consistency, and sufficiency (Schneidewind & Zahrnt, 2013), recognizes the overuse of material resources in industrial production and aims to reduce net fossil resource consumption to zero. Hence, they differ in their respective pathway. Although all three have their respective limitations and implementation difficulties, all three are necessary and complement each other (Linz, 2012): Efficiency relies on technological innovativeness, and aims at increasing profitability of production processes. Consistency targets avoiding emissions and waste, and the goal of a circular economy. Sufficiency aims at equilibrating the outcomes of economic growth, combining modesty and advantages in productivity, while foregrounding the quality of life (Schneidewind & Zahrnt, 2013).

Efficiency, consistency, and sufficiency also differ in their influence on changes of lifestyle and consumption patterns. The first two strongly fueled green-growth policies by creating the impression that decoupling resource use and growth is possible via technological innovation (Böcker et al., 2020). Efficiency reduces overall resource consumption. This is offset, however, by increases in production volumes and consumption, resulting in rebound-effects (Santarius, 2015; Schneidewind & Zahrnt, 2013) and the persistence of unsustainable structures (Blühdorn et al., 2019). Only the sufficiency pathway explicitly mentions societal transformation as necessity. Accordingly, organizational and socio-cultural everyday routines as well as consumption patterns need to be modified. Using different and using less also influences social conviviality and activities (Linz, 2012). Since sustainability in the sense of securing livelihoods for future generations cannot be achieved through technical innovations alone, sufficiency is an essential complementary strategy (Schneidewind & Zahrnt, 2013).

According to Alcott (2008), however, the avoidance of non-sustainable products could also lead to a rebound-effect, as this would reduce their prices, which in turn stimulates consumption. Similarly, the post-growth idea in economics shows that attempts to reduce resource consumption will be unsuccessful without a more far-reaching transformation of the economy (Jackson, 2021). These approaches reveal that we refer to 'transformation' as a process that goes beyond minor changes in individual sectors and instead considers a more profound, structural and radical realignment concerning lifestyles and economy to be necessary.

We define social-ecological transformation as comprehensive, far-reaching, or radical changes to societal relationships with nature. This includes both the social metabolism of a society, defined as the material metabolism between society and nature mediated by economy as well as the symbolic and cultural perception of nature. These changes fundamentally challenge the dominant social order, including the economic system, and are often accompanied by conflicts, crises, and resistance. The governance of social-ecological transformation thus focuses on societally just, inclusive, democratic, or participative approaches that acknowledge current inequalities and power relations. Hence, social-ecological transformation encompasses a negotiated process, theoretically infinite but aiming at an elusive, utopian vision in which a good life for all is attainable, regardless of their geographical localization on earth.

However, the notion of social-ecological transformation has not always existed. There seems to be no single identifiable starting point, but rather several scholars reasoning about society's relationships with their environment. In his remarkable book *The social-ecological transformation of the world*, Karl-Werner Brand (2017) goes back into human history and states that environmental problems led to the decline of several cultures and societies. However, in the Anthropocene era the dimensions of human interference with the Earth system are much more far reaching (Malm, 2020; Wainwright, 2020). Consequently, the intensity, spatial expansion, and sheer amount of (over)use of natural resources have led to "complex, spatially, and timely staggered ecological reactions" (Brand, 2017, p. 15). This has not only impaired the livelihoods of humans, plants and animals but also increased the vulnerability of societies.

This underlines that the term social-ecological transformation addresses a more profound dysfunction in society's relationship with nature than the concept of sustainability. The latter rather concentrates on transitioning a stable situation into an optimized future stable situation in which economy and society relate more sustainably. For sustainability transitions, the upscaling of alternative niches and innovations into the dominant economic 'landscape' is central (see exemplarily Hansen & Coenen, 2015).

Scholars dealing with crises analyze the current problems in the relationships between society and nature (Görg et al., 2017; Hickel, 2020; Malm, 2020). In general, we can divide into a retrograde-oriented analysis of the history of societies in times of industrial modernity and environmental history, on the one hand, and statements about the current state of human-nature relationships and social change, on the other. These two are interrelated, as the latter builds on the analysis of the former. However, the question arises whether societies are in the midst of a transformation or whether transformation is something necessary or even inevitable to minimize crises in the future.

2.1 | Inter-generational focus of social–ecological transformation

In the debate, there are considerable differences regarding the starting points that form the analytical framework of SET. One strand of literature refers to a cross-generational perspective with a longitudinal analysis of the problem (Brand, 2017, 2018; Fischer-Kowalski, 2007). Karl-Werner Brand analyzes a long history of societal, technological, and regulatory conditions that formed the relationships with nature. From a constructivist perspective, environmental problems are understood as inseparable from the dominant social order and its conflict situations (Brand, 2017). SET can therefore only be understood by reconstructing these underlying complex interconnections. Brand explains that strategies for solving environmental problems primarily reflect rationalities of action that exist at the time. They do not cover the entire complex matter in its interwoven contexts. This results in paradoxical situations, rebound-effects and ever new controversies, conflicts and side effects for social groups—or their geographical displacement to other parts of the world.

Brand argues that we can observe long-term economic upswing phases that are linked to what Konratieff described as long economic waves of the capitalist world economy. These phases consist of the dissemination of new basic technologies and presuppose the hegemonic implementation of new societal regulation models. For example, the innovation of the railway and steel constituted a phase with the regulation model of liberal capitalism with British hegemony and coal as its energy base. Another phase is characterized by computer and information technology as innovation, with the regulation model of neoliberal capitalism and US hegemony. Coal and nuclear energy provided the energy basis. In cyclical patterns, these upswing phases alternate with downturns and crises with social and political conflicts that can result in wars, revolutions, or geopolitical changes in power structures. According to the author, we are currently in the midst of a decline of one hegemonic global order structure, which favors the resurgence of conflicts of hegemony, while established regulatory models are collapsing. Current debates and conflicts of SET prove that we are in a decline between earlier and a yet unknown future upswing phase, which will generate new regulation models (Brand, 2019).

2.2 | Present generation as conceptual starting point of social–ecological transformation

Ulrich Brand's and Markus Wissen's (2017) concept of the *imperial mode of living* (IML) provides a more current perspective. The IML is a Marxist analysis of our world in crisis. By tracing the political economy of environmental and social change, it illustrates the tragedy of modern capitalism: while capitalism's contradictions plunge the world into ever deeper multiple crises, there is no organized opposition and no alternative model. The IML combines an analysis of economic structures—focusing on externalization—with a perspective of hegemony, that is, the everyday reproduction of unsustainable lifestyles. Brand and Wissen (2017, pp. 39–40) define the core idea of the concept stating that “everyday life in the capitalist centers is essentially made possible by shaping social relations and society–nature relations elsewhere, that is, by means of (in principle) unlimited access to labor power, natural resources and sinks (...) on a global scale” (ibid.).

SET builds conceptually, explicitly but also implicitly, on the meta-conceptual framings that accompany the Anthropocene narrative, framing the Anthropocene through the “conceptual lens of a pluriverse, making room for overlapping views and multiplicities of entry, mid, and exit points of and for a geological epoch” (Hafner, 2022, p. 150; Hoelle & Kawa, 2021). Central to this perspective is the fact that humans are at the core of social–ecological change (anthropocentric view) and that those multiplicities of interwoven discourses go beyond the age-old “declensionist tale of falling Man destroying nature” vis-a-vis “heroic Man saving nature” (Instone, 2019, p. 364). Originally a stratigraphic discussion (Crutzen & Stoermer, 2000), it has gone viral to the point that the debate of whether a new geological epoch has been established stretches towards increasingly normative framings of who is responsible for the (negative) effects of social–ecological change. This means the Anthropocene as a dystopian discourse culminating in an

“ecological anxiety disorder” (Robbins & Moore, 2013), ultimately reaching a fear-based response to bad Anthropocene materializations. Alternative to the dystopian perspective, the ecomodernist utopian thinking of the Anthropocene allows for social–ecological transformation beyond planetary boundaries that “demands that humans use their growing social, economic, and technological powers to make life better for people, stabilize the climate, and protect that natural world” (Asafu-Adjaye et al., 2015, p. 6). In order to go beyond the utopian–dystopian divide, new forms of thinking combine positive and negative futures towards “a more differentiated picture of spatio-temporal anchoring and praxis driven narratives” (Hafner, 2022, p. 157).

The examples above illustrate a small range of how SET can be framed, re-framed, and anchored in a multi-generational, ex-post, or ex-ante way of thinking and acting. One core feature, however, is the normative and future-oriented focus. There are a number of questions that are particularly relevant for geographical research: what paths can be taken towards a transformed future? Which spatial–economic sectors should be focused on, also taking into consideration rural–urban divides and interlinkages, particularly when thinking of energy and food regimes, mobilities, and translocalities? Such transformations must also address questions of democracy, new policies, and politics to foster (environmentally) just actions (Biermann, 2021), including in a North–South inter-relation (Bauriedl, 2022). It is therefore not surprising that activist research or research activism gains traction, as shown, for example, by Brand & Wissen's *Imperial Mode of Living* (2017), Christian Zeller's *Revolution for the Climate* (2020), or Brunnengräber and Dietz (2016) *climate justice*.

3 | OPERATIONALIZATION OF SOCIAL–ECOLOGICAL TRANSFORMATION

A vital debate around SET has moved German social science over the last years. Especially, scholars from sociology, political science, and human geography—here especially scholars of human–nature relations research, political ecology, as well as sustainability and development studies—engaged in the debate on problem definition, research questions, and approaches.

Alongside the two dominant strands, namely K.-W. Brand and U. Brand, the debate was flanked by numerous themed issues drawing on different disciplines and perspectives, including publications in *ZfP*, *Leviathan* and *Die Erde*, among others. In addition to monographs, anthologies and lectures at universities, one particular characteristic of the debate is the large number of events that are co-organized with environmentally active civil society groups and social movements.

However, it remains difficult to deal with the historical–social nature of the problems, their diversity, and complexity. To put it differently, research on and with social–ecological transformation often remains conceptual–theoretical; hands-on empirical grounding (in a similar fashion as attempted for IML from a geographical perspective, c.f. Dorn, Hafner, & Plank, 2022) and an analytical framework of social–ecological transformation(s) has yet to be operationalized for and from geographical perspectives.

3.1 | Social–ecological transformation as a strategy to overcome multiple crises

There is widespread consensus about the present's profound multiple crises. While corporate strategies and policymakers tend to consider technological innovations as the cornerstone for the sustainability transition, scholars foregrounding social structures and power relations in analyzing environmental degradation critically refuse technological solutions as insufficient to cope with socio–ecological problem constellations (Dorn, Hafner, & Plank, 2022; Görg et al., 2017; Svampa, 2019). From this perspective, the guiding principle of sustainable development would steer answers to socio–ecological problems in a certain ‘modernization-theoretical-institutionalist’ direction and block ‘more radical’ solutions (Brand, 2022).

In German-language literature, the focus on sustainable societal relationships with nature has given rise to the debate on a holistic social–ecological transformation (e.g., Brand et al., 2020; Görg et al., 2017, 2020). Brand (2016, p. 277, translation by the authors) defines social–ecological transformation as follows: “Ecological questions are social questions and thus closely connected to power and domination. The perspective of socio–ecological transformation addresses necessary social changes in order to adequately deal with the ecological crises. It takes into account distribution issues, but also what and how is produced in society under which social and ecological conditions in order to enable a good life for all”.

This definition demonstrates the importance of social change being oriented to the common good. SET considers transitions as inherently political. With references to questions of inter- and intragenerational justice as well as procedural and distributive justice (Bauriedl, 2022), SET highlights unsustainable human–environment relations, and foregrounds power relations and conflicts. SET strives to unite research and social activism, and to shape the debate in an intertwined supportive strategy. SET explicitly engages with social movements on ‘Buen Vivir’, but also with international development, global justice, anti-imperialist, feminist and anti-globalization movements, and environmental justice initiatives (see Acosta, 2014; Acosta & Brand, 2018; Brand & Wissen, 2017). It is a strategy consistent with post-growth and degrowth approaches, and interventionist methods in radical geography (Schmid, 2020).

3.2 | Social–ecological transformation as an analytical tool

There is plenty of research on how to use social–ecological transformation as an analytical framework for social change. Although addressing interlinkages between social change and relationships with nature, these debates seem hardly linked to each other. In the following, we point out three key analytical approaches and link these conceptions to methodological approaches.

(a) System approach of Marina Fischer-Kowalski

Fischer-Kowalski (2007) introduced a system approach to global change: the social metabolism. She thoroughly analyses material flows (especially energy or geo-resources in relation to technology development) over eras, pointing out a multi-generational, longitudinal diagnosis of socio-ecological relationships with nature. Her social–ecological approach focuses on apolitical flow analysis and largely neglects power structures or financial flows.

(b) SET-approach by Karl-Werner Brandt

Brand (2019) separates the socio-political transformation debate from the research debate, since the former is increasingly radicalized. The SET research perspective is empirically oriented and sheds light on the causal dynamics of ecological problems, including historical patterns, their corresponding social regulation models, and societal implications. This approach allows for insights into the possibilities and limitations of more far-reaching, radical transformations.

Brand further identifies the non-scientific debate as normative and problem-driven with the potential to mobilize. This debate discursively determines the causes, aims, and visions as well as suitable strategies to tackle societies' crises. From his point of view, both debates can be justified but only if “normative objectives and social conceptions are not mixed with analytical research perspectives” (Brand, 2019). He thus understands SET as an analytical research tool that does not intervene in political or activist debates, and therefore differs from the strategic use (in I).

(c) Analysis of spatial aspects in the relation of society and nature

Another analytical approach is found in geography, that is, the normative inclusion of actors and framework conditions in the analysis of territorial configurations. For example, alternative practices are being intensively researched among agri-food researchers (Maxey, 2007; Rosol, 2018) and in alternative or value-based value chains (Dorn, Hafner, & Plank, 2022; Kister, 2019). How normative standpoints and different goals and intentions can form alternative spaces for markets, production, and finance is also described in Fuller, Jonas and Lee (2010). Attempts in this vein include, the SET framework by Sievers-Glotzbach and Tschersich (2019), grounded through analysis in the field of agri-food systems (Tschersich et al., 2023), South American resourcescapes (Coy et al., 2017), in the realms of gendered energy (Kanning et al., 2016), or violent place-making in Kenya (Lang & Sakdapolrak, 2015). In addition, perspectives on environmental and climate-related problems can be observed, including aspects such as societal responsibility for and the social construction of environmental problems (Klepp & Hein, 2023), but also geographical debates on just paths towards SET (Bauriedl et al., 2023).

With regard to the spatial dimension, these research projects empirically focus on the local level, but in the contextualization, the processing of global challenges is woven into local practices, from which other spatial effects then arise. The reference to a specific normative standpoint of the actors or, in other words, a future-oriented imagination that anticipates a socio-ecological transformation, thus produces empirically tangible spatialities. Some of these are located in completely different parts of the world, which stresses the strong interdependence of today's economy.

3.3 | Socio-ecological transformation as a discursive killer argument

Beyond academic knowledge production (but also among academic scholars), we also observe the use of the term 'social-ecological transformation' when referring to society's multiple, almost monumental, problems. These problems have become too large and complex to develop adequate solutions: In the context of the climate crisis, for example, there is often a sense of resignation. This is due in part to the difficulty of communicating knowledge about the connection between the problems and the Earth system. More importantly, however, it is due to the perceived societal consensus that prevents radical change.

In political debates, the rhetoric figure of a 'Herculean task' is often used to describe the necessary changes in society's approach to the environment. Hercules is a demigod in Greek mythology. The reference to him signals that superhuman power and strength is a precondition for solving the problems. In other words, this is an excuse to remain inactive and carry on as usual.

3.4 | Social-ecological transformation as nexus among existing concepts

While science and society alike set the target of 'more sustainability,' there is still a great dispute as to how this goal could be achieved. Quite fundamentally, one should distinguish here between capitalist alternatives and alternatives to capitalism (Gudynas, 2016; see Table 1). The former aims at reformist solutions, propagating minor societal adjustments and keeping the modern human-environment dichotomy untouched. These are market-based approaches that use the existing system (market economy) to integrate new value systems. Reformist approaches rely on technological progress to decouple economic growth from carbon dioxide emissions, including the green economy, the bioeconomy, ecosystem service trading, climate-smart agriculture, or geo-engineering, to name only a few. However, scholars point out that these socio-technical approaches cause an increased material demand and green extractivism in many extraction regions (Dorn, Hafner, & Plank, 2022; Kalt et al., 2023; Voskoboynik & Andreucci, 2022). Resource extraction in the name of climate protection provides new legitimacy to mega-mining

TABLE 1 Approaches from the Global South and Global North within the transition and transformation literature.

	Global South	Global North
Capitalist alternatives (reformist solutions)	Green extractivism	Circular economy
	Decarbonization consensus	Green economy
		Energy transitions
		Ecosystem service trading
Alternatives to capitalism		Geo-engineering
	Post-extractivism	Degrowth
	Buen vivir (good living)	Economy for the common good
	Rights of nature	Eco-socialism
	Epistemologies of the South	
	Pluriverse	

projects. This discourse is managed across the political spectrum, leading Dorn, Hafner, and Plank (2022) to speak of a green commodity consensus. Along similar lines, Bringel and Svampa (2023) have recently coined the 'Decarbonization Consensus', describing the new wave of energy colonialism that relies on 'renewable energies', but condemns peripheral countries as sacrifice zones, without changing the society's metabolic profile.

Following critical social scientists' findings that empirical evidence does not support green growth theory (Hickel & Kallis, 2020), demands for alternative strategies increase: These can be grouped together as alternatives to capitalism, having in common the goal of a profound and holistic change, including an emancipatory transformation of society and human–environment relations (Pachoud et al., 2022). Several concepts have been shaped by the relation between Global North and Global South so that many concrete proposals come particularly from the Global South or have emerged in dialogue with the Global South. For example, drawing on South American indigenous cosmovisions, the concept of Buen Vivir pursues a reciprocal relationship with nature, an economy based on solidarity, and a pluralistic democracy with spaces for civil society participation (Acosta, 2014). While the idea of reciprocity also characterizes the Rights to Nature (Zaffaroni, 2011), the decolonial approach is also reflected in the notion of the pluriverse. The latter aims to create a world in which many worlds can coexist (Blaser & de la Cadena, 2018; Escobar, 2018), by empowering different worlds on an epistemological–ontological level. The idea of the Epistemologies of the South also aims in the same direction (Sousa Santos, 2016). From the perspective of the Global North, the debates on degrowth could be added at this point (Latouche, 2009; Schmid, 2019).

We are aware that a bipolar classification has limitations and leaves out gray areas. These grey areas include, for example, eco-socialism (Piketty, 2020), or the Economy for the Common Good (Felber, 2018), depending on the respective author's interpretation. The relevant point, however, is that the German-speaking debate on a social–ecological transformation brings together the various strands calling for substantive change. SET authors often have backgrounds in political ecology, social ecology, or critical agrarian studies, among others. They consider "the social relations of production, power and property relations as the root causes of ecological degradation" (Dietz, 2021, p. 601), and recognize that transformations towards sustainability are usually politically and socially contested. On the one hand, reformist approaches consider technological progress as a cornerstone for the sustainability transition, and are usually driven by dominant actors and their (hegemonic) interests. On the other hand, SET scholars foreground sustainable societal relations with nature, and focus on how social structures and power relations allow for, respectively, limit change (Görg et al., 2017; Hackfort & Burchardt, 2018). In this context, the necessary dialogue between North and South is also emphasized repeatedly (Acosta & Brand, 2018), making SET a relational concept. At this point, it should be emphasized that SET scholars do not reject technological progress per

se, but they do consider it in the context of its social-ecological embedding. Thus, the conceptual approach is intendedly opening up the perspective to a critical reflection on power structures, values, and contextual social conditions constituting places as well as it is respecting heterogeneous epistemologies going beyond Eurocentric knowledge production.

4 | CHALLENGING SOCIAL-ECOLOGICAL TRANSFORMATION FROM A GEOGRAPHICAL PERSPECTIVE

The arguments presented in the previous chapters lead to the question of how geography should position itself in relation to SET. While some consider SET as just another buzzword, others refer to SET as a far-reaching 'new sustainability' that also includes a change in human-environment relations. In the following, we examine three directions for further human-geographical research. In general, SET connects to existing approaches such as political ecology and societal relationships with nature in its spatial interrelations. One example is the vital debates on post-growth geographies and post-colonial reflections.

Firstly, if we understand SET as a society heading towards an uncertain future, then the spectrum of directions lies within a range of transformation 'by design or by disaster'. This quote describes that, due to global challenges, every society on the planet is forced to act in order to prevent harm to livelihoods. Beyond the limited availability of fossil resources, this includes external effects of burning fossil fuels on soil, water, and air. Changing lifestyles and economic practices can be done proactively by examining future-oriented scenarios and deciding on different directions. Or—if society is unable to take decisions—global change processes will sooner or later force societies to act. However, responses to disasters are more cost-intensive and must be made within short time frames (not to mention the damage caused itself).

Presuming that society has to act and will transform anyway, we see scholars' role as contributing to the design of an ideal utopia together with civil society movements (e.g., by envisioning real utopias, see Wright, 2013). Research then explores general conditions, develops guidelines, and describes transition pathways towards a desirable future. Accompanying democratic decision-making processes, social scientists can evaluate social alternatives for different societal groups in terms of ecological and moral goals such as justice, fairness, and responsibility (*ibid.*). For the evaluation, Wright (2013) emphasizes three criteria, namely desirability, viability (non-viable and viable alternatives) and achievability (unachievable and achievable alternatives).

Secondly, crises are seen as 'spaces of possibility' and 'windows of opportunity' for (accelerated) transformation. This has resulted in fruitful work on niches and niche pioneers in human geography in recent years (Kister, 2019; Rosol, 2018). Closely related is the work on post-growth geographies (Schmid, 2020), which focuses on alternative, diverse, and heterodox economies.

Thirdly, utopia can be used as a research object. Utopias have a performative effect: a dense description of utopian places and societies may promote a broad social willingness and openness to 'the new'. Visions and imaginations about the future of places might be used intentionally to pursue practices.

5 | SOCIAL-ECOLOGICAL TRANSFORMATION: COMMON GROUNDS

After analyzing the emergence of the term SET and tracing the debate back to its origins, we delineated the various applications of SET as an approach. To conclude, we will look at common grounds within the development of the concept and demonstrate that the SET is more than an elusive cloud. To start with, 'social-ecological transformation' is always understood as more profound and substantial than 'sustainability' in its effects on social and economic structures. It describes a comprehensive processual change that re-measures, re-orders, and shifts the

relationships between the parameters of society-nature-economy. Since this process questions longstanding privileges and challenges power structures, the outcome of this process is still open.

We see common grounds in the following characteristics, as social-ecological transformation

- i. Inevitably describes a process, rather than a status.
- ii. Delineates complex interrelationships.
- iii. Refers to processes of global change and its local manifestations, thus includes multi-scalar reflections. Empirical examples may differ in scales but always refer to the global scale.
- iv. Includes uncertainties in the analysis.
- v. Incorporates permanent alteration in relationships, meanings and attributions of meaning to materialities.
- vi. Indicates change in practices, which are related to relationships, meanings, and materialities.
- vii. Focuses on power relations and power structures, and thus also on forms of participation.
- viii. Asks for democracy and justice and rather distinguishes itself from autocratic and hierarchical transformation efforts.

While no uniform approach has emerged so far, operationalizations from geography could offer the possibility for further refinement and substance. In this context, a multi-method approach with a strong empirical component is probably best suited for geographical research on SET. In summary, SET approaches are expanding the field to include a process-oriented perspective on social change in its interactions with nature in all its complexity, researched in the areas of agri-food, energy, mobility, housing, leisure, health and well-being. However, it is still uncertain whether we can speak of a conceptual evolution or revolution.

6 | CONCLUDING REMARKS

In this paper, we have shown that the sustainability concept is criticized for being too broad. Given the increasing use of the term social-ecological transformation, especially in the German-speaking debate, and the growing influence of related ideas in geography, we have outlined the starting points of this debate. In various geographical subfields, such as agri-food studies, environmental justice, societal relationships with nature, and in research on climate change, energy, and mobility, among others, the term social-ecological transformation (SET) is replacing sustainability. Furthermore, a number of existing concepts from the Global South are fruitfully integrated into the debate and sometimes used simultaneously. These could be helpful to guide scholars looking for more precise and refined terms and concepts, that is, to point out global inequalities or profound and radical changes in society.

Our contribution reveals common grounds of SET as a geographical concept and could be useful for human geographers and other scholars interested in integrative perspectives of physical and human geography, or social sciences, including politics, sociology, and environmental humanities. The SET concept might be particularly useful for scholars seeking a process-oriented perspective that links complex interrelations at the actor and scale levels.

In this regard, SET could be useful for scholars to explore the spatiality of power relations and societal relationships with nature in their evolving process from modernist industrial societies into future configurations. So far, there is little empirical research and few internationally recognized contributions on the topic. This reveals desiderata and shows that SET is still not recognized as a concise concept. An empirical grounding in specific geographical contextualization could contribute to the understanding of SET as a concept. This is another reason why we note a lack of criticism of SET. This article aims to contribute to this debate and to further—also critical—discussions.

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