The Sustainable Development Goals prioritize economic growth over sustainable resource use: a critical reflection on the SDGs from a socio-ecological perspective

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Abstract

The sustainable development goals (SDGs) were adopted in 2015, succeeding the Millennium Development Goals (MDGs). While the MDGs focused on improving well-being in the developing world, the 17 SDGs address all countries and aim at reconciling economic and social with ecological goals. We adopt a social ecology perspective and critically reflect on the SDGs' potential for monitoring, supporting, and bringing about a transformation towards sustainability. Starting from a literature review on the SDGs, we link empirical findings from social ecology with analyses of SDG targets and indicators. First, we find that the SDGs fail to monitor absolute trends in resource use and thus prioritize economic growth over ecological integrity. Second, we discuss the contradictions between economic growth and sustainable resource use in early and late stages of industrialization processes and show that they are responsible for important trade-offs among SDG targets. Third, we analyze the transformative potential of the SDGs with a focus on the actors and institutions addressed to bring about transformative change. We find that the SDGs rely mainly on those institutions responsible for unsustainable resource use, and partly propose measures that even reinforce current trends towards less sustainability. Despite ascertaining limited transformative potential to the SDGs from an analytical perspective, we conclude by stressing the strategic relevance of the SDGs for visions, research, and practices of states towards transformative change towards sustainability.

Keywords Sustainable development goals · Social ecology · Economic growth · Social–ecological transformation · Resource use

Introduction

Current global sustainability challenges such as climate change (IPCC 2018) or biodiversity loss (IPBES 2019) call for urgent action and lay grounds for international policy

initiatives. The most comprehensive global political effort towards achieving sustainable development is the UN Agenda 2030 and its 17 Sustainable Development Goals (SDGs), adopted in 2015 (UN 2015). The SDGs build on the Millennium Development Goals (MDGs) that were in place during 2000–2015 (Sachs 2012; Le Blanc 2015) and expand them in thematic and geographic scope. In contrast to the MDGs, they apply to all countries from the Global South to the Global North. In addition to economic and social goals, the SDGs also explicitly address ecological sustainability challenges (Gratzer and Winiwarter 2018). The “triple bottom line approach to human wellbeing” (Sachs 2012, p. 2206) gives the preservation of earth functioning the same priority as freeing the world from hunger and poverty (Biermann et al. 2017). While hunger, poverty and disease remain important challenges, in particular in the Global South, they were reduced significantly during the period of the MDGs (Sachs 2012). The SDGs now face the challenge inherent to

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sustainable development (Brundtland et al. 1987), that is, continuing the improvement of living conditions for those in need while at the same preserving the ecological integrity of the planet for future generations. This challenge is acknowledged by the headline “17 Goals to Transform Our World” on the SDG website.

In this contribution, we adopt a perspective rooted in social ecology (Haberl et al. 2016) to assess to which extent the SDGs are suited to monitor, support, and bring about a transformation towards sustainability. Social ecology integrates social and natural science approaches for the study of sustainability challenges, by analyzing the relationships of resource use and societal change (Fischer-Kowalski and Erb 2016). Resource use as one interaction between society and nature can create sustainability problems when natural source or sink capacities are exceeded to a level that threatens societal well-being. This line of research is compatible with an idea of strong sustainability arguing that sustainability needs to enable human well-being for all while respecting ecological integrity (Raworth 2017), accepting that planetary boundaries pose absolute biophysical limits to societal activities beyond which earth system functioning might change irreversibly (Rockström et al. 2009; Steffen et al. 2015). Given that some planetary boundaries are already being trespassed, an absolute reduction of unsustainable levels of resource use (extraction of natural resources as well as emissions to air, water or land) measured in physical terms is a key requirement for a sustainability transformation. This in particular is required for industrialized countries where resource use is high (Schaffartzik et al. 2014; Schandl et al. 2018).

This contribution comprises three major parts: first, we focus on the ecological dimension of the SDGs, which was identified as the main area for development in industrialized countries (Biermann et al. 2017). We critically investigate SDG targets and indicators against the recognition of the planetary boundaries as biophysical limits, and show that the SDGs put more focus on economic growth than on ecological integrity and fail to address an absolute reduction of resource use, both of which is in part due to a lack of theoretical foundation (Le Blanc 2015). Second, we demonstrate that functional contradictions exist between economic growth and sustainable resource use by showing examples from early and late stages of industrialization processes. Hence, increased economic growth and efficiency gains will not suffice to support a transformation towards sustainability. Therefore, we argue, overcoming observed trade-offs among SDGs (Nilsson et al. 2016; Pradhan et al. 2017) will require transformative change beyond existing growth trajectories. Third and consequently, we investigate the transformative potential of the SDGs by reflecting on the actors and institutions addressed and the type of change envisaged in targets and indicators. Unlike mere technological and managerial

solutions, *transformative change* requires political, socio-economic, and cultural changes that go beyond incremental changes and challenge the current modes of production and living on a more fundamental level involving multiple actors and institutions (Stirling 2015; Brand 2016; Pichler et al. 2018; Schot and Steinmueller 2018). We conclude that implementing the SDGs will not likely suffice to “transform our world”, which is the self-proclaimed goal of the SDGs. Nevertheless, we acknowledge their strategic merit as a global agreement and reference point that enhances debate over sustainability in research, policy, and practice.

Methodologically, our analysis investigates the strengths and shortcomings of the SDGs for a sustainability transformation by linking existing literature on the SDGs with theoretical and empirical contributions from social ecology, and an evaluation of selected SDG targets and indicators. Existing scientific literature on the SDGs was collected and set in context to theoretical and empirical contributions from social ecology. We pursue three approaches in the three sections: (1) to study the suitability of SDGs for monitoring ecological integrity, we categorize and quantify targets and indicators across all SDGs according to their respective focus on an absolute reduction of resource use vs. efficiency indicators or indicators fostering economic growth. (2) To highlight the functional interdependence of economic growth and environmental degradation, we discuss empirical research from social ecology against selected SDG targets, distinguishing processes during industrialization (focus on SDGs 2, 7, 8, 9, 15) and recently observed decoupling of income from resource use in industrialized countries. (3) To assess the transformative potential, we discuss targets in SDG 17 against literature on social–ecological transformations, as this goal is most explicit when it comes to the implementation of the SDGs.

The SDGs’ failure to monitor trends in absolute resource use and the resulting prioritization of economic growth over ecological integrity

We first turn to the question of which trends the SDGs actually monitor and if these are suitable to induce absolute reductions in resource use, thus enabling us to impede potential transgression of critical environmental thresholds. To do so, we build on one of the most critical limitations of the SDGs raised from a strong sustainability perspective, that is, the lack of a conceptual foundation or theoretical integration (Hák et al. 2016; Janoušková et al. 2018). Le Blanc (2015) argues that the SDGs “are not based on any particular interpretation of the world, nor does it reflect a specific, coherent systemic view on how the socio-economic engine works” (p. 23). This lack of coherence allows for

conflicts among and even within goals (Griggs et al. 2013). Most prominently, this problem is illustrated by the particular challenge of reconciling economic growth with sustainable resource use (Robert et al. 2005). With no hierarchy among goals, the number of targets that address each of the conflicting aims, and the focus of indicators monitoring progress towards them, provides grounds for assigning a factual prioritization to those aims addressed by more numerous targets and indicators. A bias towards economic growth could contradict the need for respecting absolute limits to physical growth (Rockström et al. 2009; Steffen et al. 2015), which is particularly relevant in industrialized countries of high levels of well-being and high levels of resource use. To detect such potential bias, we investigate how many targets and indicators refer to economic growth and how many relate to ecological integrity in relative, and more importantly, in absolute terms.

Out of the 17 SDGs, five goals directly refer to the natural environment (SDGs 6 “Clean water and sanitation”, 7 “Affordable and clean energy”, 13 “Climate action”, 14 “Life below water”, and 15 “Life on land”). These include 49 indicators, representing 20% of all SDG indicators. Four more SDGs also address resource use at the target and indicator levels (SDG 2 “Zero hunger”, 8 “Decent work and economic

growth”, 9 “Industry, innovation and infrastructure”, and 12 “Responsible production and consumption”). At the level of indicators, we find a total number of 29 indicators directly referring to the natural environment measured in physical units in 9 SDGs (Table 1), i.e., 13% of all 232 SDG indicators (note that nine indicators repeat under two or three different targets; thus, the total number of indicators is 244).

Among the 29 indicators that address the natural environment, only two represent absolute indicators that monitor total trends in resource use. Absolute indicators measure total volumes of physical flows as an interaction between the socio-economic system and the environment that indicate the total scale of societal intervention into natural processes, i.e., biogeochemical cycles and ecosystem functioning. We argue that for adequately monitoring progress towards sustainability, the absolute, rather than relative, amounts of resource use, wastes and emissions and their impacts on ecosystem functions need to be assessed (Fischer-Kowalski and Weisz 1999; Fischer-Kowalski and Erb 2016; Haberl et al. 2016). Understanding these socio-economic interventions into natural processes in their absolute scale is a prerequisite for identifying where environmental source and sink functions are overused and ecosystems are depleted. With absolute physical indicators, we can identify the pressure

Table 1 Sustainable Development Goals, targets, and indicators addressing ecological integrity and economic growth

SDG		Indicators addressing planetary boundaries					
		abs	p.cap	ratio	GDP, eff	mon	prog
1	No poverty						
2	Zero Hunger			2	1		
3	Good health and well-being						
4	Quality education						
5	Gender equality						
6	Clean water and sanitation			3	1	1	3
7	Affordable and clean energy			3	1	2	
8	Decent work and economic growth	(2)	(2)		(2)		
9	Industry, innovation, and infrastructure				1		
10	Reduced inequalities						
11	Sustainable cities and communities		2	1			
12	Responsible consumption and production	2	3	2	2		5
13	Climate action					2	5
14	Life below water			4		2	4
15	Life on land			7		1	4
16	Peace, justice and strong institutions						
17	Partnerships						
		2	5	22	6	8	21

abs physical indicators referring to absolute values; *p.cap* physical indicators in per capita values; *ratio* indicators referring to physical quantities, measured in percentages, indexes, or other ratios; *GDP, eff* indicators addressing a planetary boundary by using efficiency indicators, i.e. indicators that put a physical quantity in relation to GDP; *mon* indicators referring to a planetary boundary but measured in monetary values; *prog* indicators referring to governmental programs addressing a planetary boundary the two numbers in brackets (SDG8) indicate that these indicators are the same as in SDG12 and thus are only counted once

onto the natural environment that potentially induces change of the natural state (see the DPSIR concept, for example, described in UN IRP 2019a). To monitor societal pressure or impact on the natural environment and any proximity or transgression of a planetary boundary, physical indicators in absolute terms are needed.

Another five indicators refer to physical amounts in per capita values, and another 22 indicators address planetary boundaries using other intensive indicators such as percentages or other ratios. Physical flows as intensive indicators allow for understanding, e.g., the share of renewable energy among total energy use, or the share of ecological agriculture in relation to total agricultural land. In this way, intensive indicators enable monitoring changes in socioeconomic structures or the composition of production and consumption. However, intensive indicators do not allow for monitoring total amounts of land under agricultural use or total energy used by societies or total emissions emitted into the atmosphere.

The 29 indicators addressing planetary boundaries in physical units are complemented by six indicators measuring efficiencies in relation to GDP, referred to as resource productivity, resource efficiency or their inverse, resource intensity. Such efficiency indicators are in frequent use in policy-making, because they allow for addressing two issues in one, which is a prospering economy at reduced pressure on the environment. But the nature of intensive indicators is the loss of information of the two underlying absolute quantities. Resource efficiency may grow regardless of whether resource use is increasing or declining, as long as GDP grows at a higher rate. Given the biophysical limits of natural resources and global sink capacities, efficiency indicators alone do not adequately monitor progress towards ecological sustainability.

Finally, another 29 indicators indirectly address planetary boundaries by focussing on environmentally harmful socioeconomic structures and activities. There we find indicators on environmentally targeted financial aid to developing countries or the number of programs etc., inducing environmental progress. These measures indicate societal action in response to and with the aim of reducing environmental problems. But such indicators are not suitable to monitor environmental improvement. Only physical indicators in absolute terms could achieve that.

The two absolute indicators addressing the natural environment refer to Domestic Material Consumption (DMC) and Material Footprint, and are mentioned twice as parts of the indicator sets in SDGs 8 and 12. Both indicators refer to the materials used within socioeconomic systems (measured in metric tons; Krausmann et al. 2017), one from a production-based perspective (DMC) and the other from a consumption-based perspective (material footprint). They are formulated as absolute indicators and accompanied by

per capita and efficiency indicators, without mentioning which indicator is to be used in the implementation process. However, the respective target refers to resource efficiency only. By comparison, six indicators refer to efficiencies as a relation between resource use and economic growth (expressed as GDP), 27 indicators apply other intensive physical measures (per capita indicators, percentages, or indices), and another 29 indicators use other than physical units and indirectly address planetary boundaries by focussing on environmentally harmful socioeconomic structures and activities. That is, only two targets (measuring only one issue, i.e., material use, from two perspectives) adequately monitor the absolute impacts of socio-economic activities on ecosystems. These two indicators stand next to six indicators that address economic growth.

Although there is no explicit prioritization of economic growth, the selection of targets and indicators favors economic growth over ecological integrity. Socioeconomic development and increasing income are important aspects of the SDGs in several countries, regions, and social groups. However, industrialized countries of already high levels of well-being but at the same time high levels of resource use have to put priority on an absolute reduction of environmental burden to preserve ecological integrity.

Contradictions between economic growth and sustainable resource use: evidence from different stages of industrialization processes

We argue that a strong focus on economic growth not only results in relative weakening of sustainable resource use but also actually counteracts the aim to reduce the total amount of resource use. The fundamental contradictions between economic growth and sustainable resource use are a key issue in the literature on “SDG interactions”, describing the trade-offs and synergies among and within SDG targets and indicators (Nilsson et al. 2016). In a systematic analysis of trade-offs and synergies among and within SDGs across all countries, Pradhan et al. (2017) find that synergies among SDGs largely outweigh trade-offs in many countries, but negative and non-classified correlations are also observed in all SDGs. Analyzing interactions of four specific SDGs (2 Zero Hunger, 3 Good Health and Well-being, 7 Affordable and Clean Energy, and 14 Life Below Water) with all others, the International Council for Science (2017) identifies 238 positive and only 66 negative interactions. Negative interactions are considered as entry points for science-policy dialogs aiming at increased policy coherence (Obersteiner et al. 2016; International Council for Science 2017).

Increasing policy coherence may not be sufficient to overcome those trade-offs among SDG goals and targets that

reflect the fundamental conflicts of sustainable development (Robert et al. 2005). Many (not all) of the social goals have been, and continue to be, achieved in the context of economic growth, while some came at the expense of declining ecological integrity (Schmidt-Traub et al. 2017; Spaiser et al. 2017; Eurostat 2019). Arguing that long-term economic growth is structurally incompatible with sustainable resource use (Hickel and Kallis 2019), we present empirical examples from social ecology studies on long-term industrialization processes, as well as from recent trends in decoupling economic growth from resource use. By structuring this evidence to match specific SDG indicators, we highlight that some negative interactions among SDGs are linked to economic growth.

SDG trade-offs during industrialization

To highlight functional SDG trade-offs coinciding with economic growth during industrialization processes, we use empirical evidence on long-term changes in economic development and resource use (100–170 years). We aim at illustrating that the shift from “organic” to “mineral” economies (Wrigley 1990) in the course of industrialization contributed positively to some, but negatively to other indicators. We focus on specific indicators in SDG’s 2 Zero Hunger, 7 Affordable and Clean Energy, 8 Decent Work and Economic Growth, 9 Industry, Innovation and Infrastructure, and 15 Life on Land.

Industrialization enabled long-term increases in income. For example, the average annual growth rate in per-capita GDP was 1.6%/year across the period 1830–2000 in Austria and 2.4%/year across 1750–2000 in the United Kingdom (Krausmann et al. 2008). Industrialization also brought about major improvements in food security by significantly increasing both land and labor productivity in agriculture (Gingrich et al. 2018). At the national level, per-capita food production in Austria increased by a factor 45 between 1830 and 2000 (Krausmann et al. 2008). At the same time as agricultural productivity went up, forest recovery was enabled in most industrialized countries (Meyfroidt and Lambin 2011; Gingrich et al. 2019). Translated into SDG contexts, industrialization thus positively affected indicators in SDGs 8 Decent Work and Economic Growth (8.1.1 “Annual growth rate of real GDP per capita”), 2 Zero Hunger (2.3.1 “Volume of production per labour unit [...]”) and SDG 15 Life on Land (15.1.1. “Forest area as proportion of total land area”).

However, these achievements came at ecological costs. The continuous economic growth during industrialization was based on increasing fossil energy input and resulted in a steep decline of the renewable energy fraction in societal energy use (Gales et al. 2007) and rapidly increasing fossil-fuel-related CO₂ emissions (Raupach et al. 2007, Le Quéré et al. 2013). For example, 17.5% of energy

consumption in the EU comes from renewable sources (Eurostat 2019). While this fraction has increased in recent decades, the long-term perspective reveals that industrialization has resulted in a strong net increase in non-renewable energy use. CO₂ emissions per unit of GDP on the other hand multiplied in the long run (e.g., factors 26–34 in Austria and Czechia; Gingrich et al. 2011). Industrialization also coincided with strong increases in material consumption (Krausmann et al. 2009). These shifts in energy and resource use associated to industrialization and sustained economic growth thus resulted in trajectories opposing those of specific SDG targets, pertaining to SDGs 7 Affordable and Clean Energy (7.2.1. “Renewable energy share in the total final energy consumption”), 8 Decent Work and Economic Growth (8.4.2. “Domestic Material Consumption”) and 9 Industry, Innovation and Infrastructure (9.4.1. “CO₂ emission per unit of value added”).

These examples add to the critique that functional trade-offs exist among particular SDG targets (some of them even within the same SDG) in the context of long-term economic growth accompanying shifts from organic resource use to early stages of industrialization. While of course, ongoing industrialization processes are different from those of the past e.g., regarding the speed and the types of technologies adopted, the general pattern of industrialization has continued to remain surprisingly similar (Eisenmenger et al. 2007; Schandl et al. 2009). Largely organic modes of production are still prevalent in many parts of the world, in particular in rural areas of the Global South (Schaffartzik et al. 2014). With their strong focus on economic growth, the SDGs direct industrializing countries towards known trajectories of development (Moore 2015). This may alleviate some social and economic, while aggravating other, mostly ecological sustainability challenges, similar to those created by historical industrialization processes in the Global North.

The limited potentials for decoupling resource use from economic growth

Industrialized countries display a distinct level of resource use at high economic performance, and are responsible for much of the global cumulative resource extraction (Mayer et al. 2017; Schandl et al. 2018) and resulting environmental impact observed today (Raupach et al. 2007). Therefore, industrialized countries face the challenge of reducing their environmental impact while maintaining high levels of well-being (Steinberger et al. 2012). At the same time, industrialized countries are considered to be in a position of high economic and social well-being that opens room for the reduction of the environmental pressure (Dasgupta et al. 2002; Dinda 2004). Resource use in industrialized countries has stabilized since the 1970s (Wiedenhofer et al. 2013; Schaffartzik et al. 2014). But only few countries

managed to go further and actually decrease resource use in absolute terms (measured in domestic material use, DMC; Krausmann et al. 2017), that is, Germany, Greece, Italy, Japan, the Netherlands, Portugal, UK and the USA in the decades between 1992 and 2017 (own calculation based on UN IRP 2019b). These countries serve as best practice examples in many national environmental policies and fuel optimism towards reconciling economic and environmental goals (Ekins et al. 2016; Schandl et al. 2016). Two general, sometimes concurring processes have been identified in the literature that explain cases of absolute decoupling of economic growth and resource use in industrialized countries. First, observed reductions of resource use often coincide with modest economic growth (levels below a factor of 2 in 20 years; see Fig. 1a) or even economic decline (e.g., in the context of the 2008 economic crisis). The most pronounced case of economic decline resulting in an absolute reduction of environmental impacts was the collapse of the Soviet Union (West et al. 2014). However, the levels reached after the collapse were still high and above those of least developed or developing countries and then rapidly grew back to levels before the crisis (Schaffartzik et al. 2014; West et al. 2014).

Second, structural change within national economies may be an important contributor to increased resource efficiency and shifting economic activity away from resource-intensive industries towards services. However, decomposition analyses (Dietzenbacher and Los 1998; Hoekstra and van den Bergh 2002) revealed that efficiency gains were often overcompensated by growing population, but more importantly by growing economies (Schandl et al. 2018; UN IRP 2019a). In addition, the shift in OECD countries towards

service economies has come at increasing imports of manufactured goods from foreign countries. Recent investigations of upstream resource requirements associated with traded goods allowed for a more nuanced discussion of this success story. The consumption-based indicator material footprint (Wiedmann et al. 2015) or other footprint indicators (Hertwich and Peters 2009; Hoekstra and Mekonnen 2012; Steen-Olsen et al. 2012; Galli et al. 2013) comprise resource use along the total supply chain induced by domestic final demand which is the total resource use necessary to produce the traded good. When changing from DMC to the material footprint (MF), decoupling patterns in OECD countries are alleviated and resource use again is on growing terms (see Fig. 1b).

Based on this empirical evidence, we do not consider resource efficiency increase alone to be a viable strategy for achieving sustainable resource use in industrialized countries. The focus of the SDGs on relative, rather than absolute, indicators obscures this problem and thus enables the persistence of ecologically unsustainable industrialized consumption patterns.

The limited transformative potential of the SDGs

Above we focused on the conflicts between economic growth and ecological integrity. We argued that economic growth dominates the SDG discourse, resulting in trade-offs that will further aggravate environmental problems rather than solving them. In this section, we investigate the self-proclaimed transformative potential of the SDGs and inquire

Fig. 1 Changes and trends in GDP and material use for the period 1992–2017 (**a**) and 1970–2017 (**b**). Red line in graph (**a**) indicates no change in DMC between 1992 and 2017 (i.e., $DMC_{2017}/DMC_{1992}=1$). Dots to the right in relation to the red line indicate an

increase of DMC, dots to the left indicate an absolute reduction of DMC. Sources: own calculations based on data from the UN global material flows database (UN Environment International Resource Panel 2019)

whether the actors and institutions responsible for implementing them are suitable to mitigate these contradictions. The literature has ascribed limits as well as potentials to the non-binding character of the SDGs, described as “governance through goals” approach (Biermann et al. 2017). The lengthy and transparent negotiation process, including civil society, has been critically reflected and held responsible for some of the contradictions between goals, targets and indicators (Stevens and Kanie 2016; Gratzner and Winiwarter 2018). At the same time, “corporate capture” (Martens 2017) has been discussed as a major problem for the transformative potential of the SDGs. Below, we reflect on SDG 17 (partnership for the goals) as the goal that explicitly targets the implementation of the SDGs to investigate the transformative potential of the SDGs.

SDG 17 calls on nation states, international governance structures, and private businesses to bring about transformative change, that is, on established institutions (Stevens and Kanie 2016, p. 395). This, per se, is a limitation to the SDGs’ transformative potential. The very political and economic institutions that have been responsible for the “governance of unsustainability” (Blühdorn 2013) in the past which have allowed for excessive resource use, emissions, and inequalities (Pichler et al. 2017) and are unlikely to bring about transformative change although they will of course play a role in a realistic transformation scenario. As researchers have shown in recent years, current institutions (also in their most favorable manifestation, e.g., the welfare state or representative democracy) are intrinsically linked to the abundant provision of fossil energy and other natural resources (Mitchell 2011; Deriu 2012; Koch 2013).

The targets of SDG 17 address the spheres finance (targets 17.1–17.5), technology (17.6–17.8), capacity-building (17.9), trade (17.10–17.12), and systemic issues (policy and institutional coherence, 17.13–17.19). SDG 17.1 targets domestic resource mobilization (mainly through taxes) and SDG 17.2 reminds developed countries of their official development assistance (ODA) commitments of 0.7% of GDP. These are important ascertainments but empirically “the combination of neoliberal ideology, corporate lobbying, business-friendly fiscal policies, tax avoidance and tax evasion [in recent years] has led to the massive weakening of the public sector” (Martens 2017, p. 13) and indeed points in the opposite direction. Hence, societies have to “reclaim the public (policy) space” (Martens 2017) and challenge privatization policies that have transformed institutions in the Global North and Global South alike.

Some of the targets pertaining to finance and trade are particularly critical, as they not only fail to enhance transformative change, but even strengthen current trajectories towards social and ecological unsustainability: SDG 17.3 calls for the mobilization of “additional financial resources for developing countries from multiple sources”. The

indicators narrow these “multiple sources” down to the increase in foreign direct investments (FDI) and remittances in relation to GDP. SDG targets 17.10 and 17.11 aim at an even more important role of free trade agreements under WTO rules and increasing exports by developing countries. In particular, FDIs as an indicator for progress are highly problematic as they reproduce the prioritization of private profit over social well-being in investment decisions (Martens 2017). Recent research shows, for example, the correlation of FDI and land grabbing, especially in the Global South (Zoomers 2010). FDIs in food production usually favor large-scale and export-oriented agriculture that increases national economic growth but makes local communities vulnerable to the loss of land and external price shocks with more destructive effects on livelihoods than small-scale improvements in access to land and water for the local farming communities (De Schutter 2011). In addition to threatening local livelihoods, increasing international trade has been shown to contribute to increasing global resource use (Plank et al. 2018).

Among the targets addressing actual institutional change, several focus on economic indicators (e.g., the target on capacity building is measured by the indicator 17.9.1. “Dollar value of financial and technical assistance ... committed to developing countries”). Others remain very vague (e.g., 17.14.1 “Number of countries with mechanisms in place to enhance policy coherence of sustainable development”).

We argue that transformative change requires an explicit challenge of current growth trajectories and existing institutions in particular in industrialized countries (Kothari et al. 2014; Stevens and Kanie 2016; Pichler et al. 2018; Hickel and Kallis 2019). While we acknowledge the fact that a specific SDG is devoted to the actors of change, we contend that the targets and indicators are insufficient for bringing about transformative change, while some of the targets and indicators even perpetuate non-sustainable trajectories of economic growth and increasing resource use. The only target that cautiously points towards alternative visions and measurements is target 17.19 that aims to “build on existing initiatives to develop measurements of progress on sustainable development that complement gross domestic product”. Unfortunately, however, there is no indicator that corresponds to this target, meaning that the vague target cannot be monitored.

Transformative visions of development have to merge prosperity for all with ecological integrity, without solely depending on growth-oriented measurements of progress (Fioramonti et al. 2019); the latter being most questionable for industrialized countries. Kothari et al. (2014) mention, for example, the Latin American vision of Buen Vivir, the European Degrowth project, and the Indian principle of Ecological Swaraj as more decentral and regionally rooted alternatives to sustainable development. Other movements

include remunicipalization efforts (Kishimoto et al. 2015), solidarity economy (Lang and Mokrani 2013), or commons (Bollier and Helfrich 2014). While we do not claim these visions as ready-made alternatives towards social–ecological transformations, a transformative agenda has to acknowledge the contradictions of current institutions and explicitly focus on experiments, institutional innovation and a broad range of stakeholders to challenge the power of incumbent structures and institutions (Stirling 2015; Schot and Steinmueller 2018).

Conclusion and outlook

In this contribution, we investigated the SDGs' effectiveness from a perspective of social ecology, which puts a strong focus on the links between societal transformation and biophysical interactions of society with the natural environment and their iterative co-evolution. Thus, a sustainability transformation of our societies has to acknowledge planetary boundaries and at the same time has to consider the mutual dependence between socio-economic activities and their biophysical grounds. Based on an analysis of targets and indicators, we identify a prioritization of economic growth over ecological integrity and a focus on efficiency improvements rather than absolute reductions in resource use. Due to their high and unsustainable levels of resource use, this lack of absolute reduction targets is especially problematic for industrialized countries in the Global North that are addressed by UN development goals for the first time. An integration of indicators on absolute physical scale of society–nature interaction addressing the planetary boundaries could tackle this deficiency of the SDGs. By building on empirical evidence, we highlight the contradictions of economic growth and sustainable resource use for industrialization processes, which developing countries are currently undergoing. We investigate the potential of decoupling economic growth from resource use, and ascertain that a focus on resource efficiency alone will not be enough for bringing resource use down to sustainable levels in industrialized countries. Acknowledging these contradictions, we reflect on the transformative potential of the SDGs. We find that the SDGs mainly rely on those institutions currently responsible for unsustainable resource use and propose measures that in part counteract the possibility of transformative change. Overall, we conclude that reaching all SDG targets by 2030 will not suffice for achieving a reduction of resource use to levels below planetary boundaries and a sustainability transformation of societal structures enabling this.

Despite our critical assessment of the SDGs from an analytical point of view, we argue that strategic potentials of the SDGs prevail which can be used to support a social–ecological transformation. The SDGs are thus in our view

“necessary but insufficient to lead humanity towards long-term sustainable development” (IIASA 2018). We acknowledge the fact that the SDGs have brought the challenge of sustainable development back on the agenda of international policy. By their very existence, the SDGs have ignited many processes in civil society (e.g., SDG watch Europe, see <https://www.sdgwatcheurope.org/>), science (e.g., The World in 2050 <https://www.iiasa.ac.at/web/home/research/twi/TWI2050.html>, Sachs et al. 2019) and beyond that may be viewed as potential starting grounds for transformation.

However, a transformation towards sustainability has to go beyond proposals set with the SDGs; development has to merge an equal distribution of prosperity for all with ecological integrity, without depending predominantly on growth-oriented measurements of progress (Fioramonti et al. 2019). New ways of decentral and regionally rooted alternatives to sustainable development have to be strengthened. The SDGs can serve as arguments supporting such initiatives and movements, and thus contribute more to transformative change towards sustainability than the achievement of targets and goals.

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