



# *Capitalism in sustainability transitions research: time for a critical turn?*

Article

Published Version

Creative Commons: Attribution 4.0 (CC-BY)

Open Access

Feola, G. (2020) Capitalism in sustainability transitions research: time for a critical turn? *Environmental Innovation and Societal Transitions*, 35. pp. 241-250. ISSN 2210-4224 doi: <https://doi.org/10.1016/j.eist.2019.02.005> Available at <http://centaur.reading.ac.uk/83962/>

It is advisable to refer to the publisher's version if you intend to cite from the work. See [Guidance on citing](#).

To link to this article DOI: <http://dx.doi.org/10.1016/j.eist.2019.02.005>

Publisher: Elsevier

All outputs in CentAUR are protected by Intellectual Property Rights law, including copyright law. Copyright and IPR is retained by the creators or other copyright holders. Terms and conditions for use of this material are defined in the [End User Agreement](#).

[www.reading.ac.uk/centaur](http://www.reading.ac.uk/centaur)

## **CentAUR**

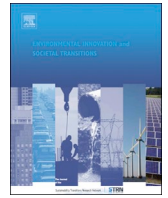
Central Archive at the University of Reading

Reading's research outputs online



Contents lists available at ScienceDirect

# Environmental Innovation and Societal Transitions

journal homepage: [www.elsevier.com/locate/eist](http://www.elsevier.com/locate/eist)

Original Research Paper

## Capitalism in sustainability transitions research: Time for a critical turn?

Giuseppe Feola<sup>a,b,\*</sup><sup>a</sup> Utrecht University, Copernicus Institute of Sustainable Development, the Netherlands<sup>b</sup> University of Reading, Department of Geography and Environmental Science, United Kingdom

### ARTICLE INFO

#### Keywords:

Sustainability transitions  
Capitalism  
Sustainability transitions in the Global South  
Forward-looking sustainability transition research

### ABSTRACT

Sustainability transition research (STR) has failed to engage in any significant analyses or critiques of capitalism. This article argues that capitalism is not a ‘landscape’ factor, but rather permeates the workings of socio-technical systems in ways that must be recognised both for elaborating rigorous accounts of transition trajectories and for enhancing the capacity of STR to support future societal sustainability transitions. This argument is developed specifically in relation to the three challenges of STR: the analysis of the actual sustainability of sustainability transitions, the application of transition theory to cases in the Global South, and the move towards a forward-looking STR. The article identifies three main implications of this argument with respect to interdisciplinarity, the validity of current theoretical frameworks, and the practice of STR. Ultimately, the article invites STR scholars to be more openly reflexive not only about possible theoretical biases, but also regarding their own roles in society.

### 1. Introduction

Sustainability transition research (STR) ‘asks “big picture” questions’ (STRN, 2017, p. 6) on issues surrounding ‘radical and non-linear societal change’ (Hölscher et al., 2018, p. 1). Surprisingly, however, this field has failed to engage with any significant analyses or critiques of capitalism, the dominant organising system of economic, social and natural life in modern societies. Discussions of capitalism are largely absent in STR; for example, the term appeared only once in the entire programme of the 2018 International Sustainability Transition conference, and its use was equally rare in two notable reviews of the field (Loorbach et al., 2017; Markard et al., 2012). A search of the same keyword in the 342 articles published in this journal since 2011 generated merely 33 results.<sup>1</sup> Similarly, the recently updated Sustainability Transitions Research Network (STRN, 2017) research agenda mentions the term ‘capitalism’ only in the following two instances:

Transitions research is therefore complementary to long-standing sustainability debates at the ‘macro’-level (e.g., changing the nature of capitalism or nature-society interactions) and the ‘micro’-level (e.g., changing individual choices, attitudes and motivations) (p. 5).

\* Correspondence to: Utrecht University, Copernicus Institute of Sustainable Development, Princetonlaan 8, 3584, CB, Utrecht, the Netherlands.  
E-mail address: [g.feola@uu.nl](mailto:g.feola@uu.nl).

<sup>1</sup> Search conducted on 12 October 2018. STR scholars, of course, have published in a wide range of journals which have traditionally included *Energy Research and Social Science*, *Research Policy*, and *Technological Forecasting and Social Change*, but also, though less commonly, *Environmental Politics* and *New Political Economy*. This search is presented here as an illustrative example of a trend that is also confirmed by the STRN Research Agenda.

<https://doi.org/10.1016/j.eist.2019.02.005>

Received 30 July 2018; Received in revised form 21 February 2019; Accepted 22 February 2019

Available online 28 February 2019

2210-4224/ © 2019 The Author. Published by Elsevier B.V. This is an open access article under the CC BY license (<http://creativecommons.org/licenses/by/4.0/>).

...drawing on comparative political economy frameworks (such as varieties of capitalism) to explain the large variation of transition pathways and dynamics across countries (STRN, 2017, p. 16).

As a scientific field with roots in innovation, science and technology studies, and evolutionary economics, STR has essentially taken capitalism for granted. In carving out its space at the ‘meso-level’, STR has generally viewed capitalism at the landscape level in the much used multi-level perspective (MLP) framework (Geels, 2002). This strategy might help to distinguish STR from other approaches to studying societal transitions and transformations (Feola, 2015). Indeed, STR has achieved great depth of understanding of transitions from this perspective, thus complementing the understandings generated by other approaches to studying non-linear societal change (e.g., Fischer-Kowalski and Rotmans, 2009; Hölscher et al., 2018).

However, I contend that STR omits capitalism at its own peril. Capitalism is more than an additional ‘landscape’ factor, and its core elements are not neutral givens, but rather defining elements of *capitalist* socio-technical systems (Kostakis et al., 2016; Wilhite, 2016). Capitalism permeates the workings and logics of socio-technical systems in ways that are critical both in the elaboration of rigorous accounts of transition trajectories and for the capacity of STR to support future societal sustainability transitions. To take capitalism as an implicit given in STR implies the impossibility of a serious analytical examination of its economic, political, social and cultural conditions and dynamics, its diversity, its influence on sustainability transitions in different contexts, and the possibility that sustainability transitions might involve potentially fundamental changes in the capitalist system. Blindness to capitalism also risks a return to an idealised image of the capitalist economy, which will constrain, rather than support STR.

Why should STR scholars turn their attention to capitalism? Why now? In this article, I argue that as STR emerges as a mature, recognised, and respected research field and community, a consideration of capitalism is particularly relevant to address three critical research challenges (Loorbach et al., 2017; STRN, 2017; Wieczorek, 2018). First, the debate on capitalism, particularly the relationship between economic growth and sustainability, cannot be ignored in any serious evaluation of the *sustainability* of sustainability transitions. Second, an explicit consideration of capitalism is essential for applying sustainability transition theories and frameworks to cases in the Global South, where many of transition frameworks’ implicit theoretical assumptions do not hold, and where anti- or non-capitalist logics have informed critiques of ‘Western’ sustainability transitions and related frameworks of progress and development. Third, as STR moves toward an increasingly forward-looking agenda, questioning the supposed inevitability of capitalism is fundamental to envisioning and exploring a broader and more diverse range of possible transition pathways.

This article is structured as follows. After providing a minimal definition of capitalism, I identify past engagements of STR, highlighting the few instances in which capitalism has made it into theories and models of sustainability transitions and reviewing many more in which it has not. I then develop my main argument—that the study of sustainability transitions cannot be wholly prescinded from the rigorous analysis and critiques of capitalism—specifically in relation to the three challenges of STR, namely the analysis of the actual sustainability of sustainability transitions, the application of transition theory to the Global South, and the move towards forward-looking STR. I conclude by identifying further implications of this argument for STR with respect to practice and the validity of current theoretical frameworks. Ultimately, this paper invites STR scholars to be more openly reflexive not only about possible theoretical and analytical biases, but also in considering their roles in a world in which sustainability and other transformations are urged, envisioned, contested, and resisted by a very large and diverse number of actors and coalitions.

## 2. Capitalism: a minimal definition

It is beyond the scope of this article to provide an extensive review of definitions and critiques of capitalism (for notable analyses and critiques see references in this section). Rather, my aim here is to provide a minimal definition of the concept and highlight some theoretical debates that are particularly relevant for the study of sustainability transitions.

Capitalism is defined in this paper as an historically specific form of social and economic organisation, which is characterised economically by the private property of the means of production, the freedom to pursue economic gains through production and the market, the transformation of labour power into a commodity, the owners’ control of the means of production and the destination of value generated through production, and the generalisation of production and exchange of commodities (Gallino, 1993).

The most fundamental dynamics of capitalism relate to the imperative of capital accumulation (Harvey, 2006). Strategies for capital accumulation include the externalization of costs, the lowering of labour costs, and the search for surplus value through the penetration of capitalist relations (commodification) in biophysical and human bodily and emotional life spheres (Harvey, 2006). Privatization and commodification are often accompanied by the enclosure of biophysical and other resources in processes of accumulation by dispossession, which may entail economic and extra-economic means, including violence (Glassman, 2006). The process of accumulation is characterized by the concentration of capital and by exclusionary social relations and rising levels of inequality (Harvey, 2006; Picketty, 2013). Other strategies for capital accumulation are the geographical expansion of the market economy and the displacement of capital over space and time (Harvey, 2006). Capitalism is ‘constituted’ by space-time arrangements in which ‘time and space work together in ways particular to the capitalist mode of producing, distributing, selling, consuming and disposing of commodities’ (Castree, 2009, p.26).

Capitalism also entails a ‘more comprehensive cultural, social and political architecture’ (Gregory, 2000, p. 57; Sheppard, 2015). In other words, accumulation depends not only on economic structures and strategies, but on extra-economic ones (Jessop, 2007). Culturally, capitalism permeates and shapes individual and collective identities and relations beyond the economic sphere, and includes the principles of competition, individualisation, rationalisation, commodification of human and non-human beings, and the imaginary of progress based on endless accumulation (e.g., Gregory, 2000; Parr, 2017; Urry, 2010; Wilhite, 2016). Politically, capitalism rests on state structures that participate in its reproduction both in periods of stability and crisis. The state in a capitalist

system is a ‘strategic field’ (Poulantzas, 2002, cited in Brand, 2016:11); it reflects and mediates capitalist power relations through regulation, discourses, and material resources; it often undertakes unprofitable activities that capital does not undertake, and it obtains revenues from taxation thus ultimately depending on continuous economic growth for its stability (Jessop, 2007).

Thus, capitalism is referred to here as a social construction that emerged and became established under historical conditions (Polanyi, 1944; Meiksins Wood, 2002), but is also diverse and mutates over space and time as it co-exists with non-capitalist forms of being and doing. With reference to the latter point, two elements particularly need to be emphasised for the purposes of this paper. First, although I use the term ‘capitalism’ in its singular form for the sake of brevity, this system is not homogeneously present in space, nor does it exist in any ‘pure’ form. In fact, some scholars have argued that what most Western countries have experienced thus far is a form of semi-capitalism (e.g., van den Bergh, 2017). More importantly, it has been amply and convincingly demonstrated that capitalism operates in a range of varieties that retain core elements even as they differ in other respects (e.g., Hall and Soskice, 2001).

Second, capitalism is often depicted as a dominant, and all-encompassing system in which the principles of individualisation, competition, productivism and market mechanisms extend from the economic realm to society at large (i.e., a market society) (Parr, 2017; Polanyi, 1944; Sandel, 2012). In fact, while hegemonic, capitalism co-exists with non-capitalist logics, institutions, and practices (see Thornton et al., 2012). Logics that are alien from capitalistic norms of individualism, competition, the belief in endless economic growth, and accumulation, among others, exist ‘here and now’ in the interstices of modern capitalist societies. They materialise in alternative experiments and trajectories, and in common forms of economic and social organisation such as co-operatives, alternative finance- and local exchange networks, and everyday family practices (Chang, 2011; Gibson-Graham, 2006a; Princen, 2006; Raworth, 2017; Sheppard, 2015; Thornton et al., 2012; Wright, 2010). Indeed, scholars have demonstrated that capitalism rests on ‘hidden’ (unvalued in economic terms) social reproduction in the household, non-market exchanges, and non-utilitarian rationality as expressed in social solidarity networks and related manifestations (Gibson-Graham, 2006a).

### 3. Capitalism in sustainability transitions research

It is important to specify the terms of the dis-engagement of STR with capitalism and its critiques before discussing the implications of such dis-engagement for STR (Section 4).

As suggested by the small number of references to capitalism in the STR literature (Section 1), a large proportion of this field has failed to engage with any specific analysis or critiques of capitalist conditions and dynamics as they relate to sustainability transitions, e.g., in the energy-, transport-, or agri-food sectors (see Loorbach et al., 2017 and STRN, 2017 for recent reviews of this research field).

Other studies have considered capitalism more explicitly; however, these have generally considered the phenomenon merely as a landscape factor in the background of a more focussed analysis of regime dynamics. Studies of the impact of the 2008 financial crisis on sustainability transitions illustrate this approach (Geels, 2013; Loorbach et al., 2016), as do analyses of the destabilisation of socio-technical regimes, which potentially might address the subversion of capitalism, but rather have focussed on destabilization of regimes *within* the system (e.g., Turnheim and Geels, 2012, 2013). Such studies approach capitalism solely as an external factor, and more remains to be done to improve the understanding of interconnections between economic structures and power relations at the regime level, which determines the winners and losers in a transition (e.g., Newell and Mulvaney, 2013; Smith and Stirling, 2010). Capital and capital flows, which are key elements of such winning and losing, are rarely examined in STR (Bruyninckx, 2018).

However, three minoritarian branches of STR have engaged with capitalism more intensively. First, various studies of sustainability transitions have shown that distinct varieties of capitalism influence transition pathways in diverse ways (see, for instance, Četković and Buzogány, 2016). Coenen et al. (2012), among others, recognised the importance of this research avenue and urged a more substantial engagement of STR with the varieties of capitalism literature (also see STRN, 2017).

Second, studies of grassroots innovation movements have demonstrated the significance of an explicit consideration of capitalism in helping to understand grassroots-led transitions, which is particularly important in the clarification of the strategic positioning of grassroots innovations. These are usually driven by the production of social (rather than economic) value, and characterized by horizontal (rhizomatic) rather than vertical (scaling-up) processes, which contrasts with the logics of dominant actors (competitiveness, efficiency) and the existing institutional arrangements (Smith et al., 2016). In fact, grassroots innovations often struggle for empowerment and the democratization of sustainability transition, thus enabling the contestations of those arrangements and the dominance of economic over social and political logics (Smith and Ely, 2015).

Third, studies of long-term transitions have devoted more focus on elements of capitalism and their change over time. Examples include the historical analysis proposed by Newell (2015) on the politics of green transformations. Along similar lines, Swilling (2013) highlighted the key role of capitalism’s orientation to financial capital (rather than productive capital) in hindering sustainability transitions in Africa through such constraints as determining carbon lock-ins. Sustainability transitions in Africa have also been studied by other scholars who have explored the role of capitalist structures especially in energy transitions (Baker et al., 2014; Newell and Phillips, 2016; Power et al., 2016).

In addition, Kranger and Schot (2018) (also see Schot, 2016; Schot and Kranger, 2018): introduced the ‘deep transition’ framework, which applies a long-wave and multi-regime perspective to explain the ‘emergence, acceleration, stabilization and directionality of Deep Transitions’, i.e., series ‘of connected and sustained fundamental transformations of a wide range of socio-technical systems in a similar direction’ (Schot and Kanger, 2018, p.1045). Although this framework focusses on the proxies of industrialisation and modernisation rather than capitalism, it helps to clarify the conceptualisation of a socio-technical landscape of industrial modernity along with the selection environment, an influence on interactions among niches, and the product of ‘surges’ from the regime. Thus, among other elements, the framework provides more room to consider the longer-term social impacts of transitions on

capitalism (Schot, 2016). However, as acknowledged by its proponents, the deep transition framework is still in an early phase of development and will need further work to fully elucidate the ‘landscape’ and multi-level interactions (Schot and Kanger (2018)).

Kemp et al. (2018) proposed another long-wave approach with the socio-economic transformation perspective, albeit admittedly with a predominant focus on Western countries. The socio-economic perspective examines sustainability transitions in the framework of longer-term and broader transformations. This conceptual approach

addresses the economy in its different forms (profit-based, benefit-based and hybrid forms) and variants (varieties of capitalism and sectoral differences). [...] The focus is on the link between the economy and society, with a special focus on the role of capitalism, the money economy and markets in shaping consumers, consumption decisions, work activities and government policies. [...] It is concerned with market institutions that shape and frame markets and with the political economy of the growth paradigm and its globalisation. Attention is given to the ‘cultures’ that institutionalise and drive individuals, organisations and societies to high levels of material consumption, as well as to cultural change and the motivations and practices of counter-movements (Kemp et al., 2018, p. 70).

The socio-economic perspective is particularly relevant to the current discussion because it represents an attempt to envision and explain sustainability transitions in a manner that does not take capitalism for granted, but rather considers the phenomenon explicitly and is equipped with an interdisciplinary, diverse and heterodox intellectual ‘toolbox’ that includes, among fields, political economy, historical sociology, political philosophy, human geography, ecological and institutional economics. Thus, socio-economic transition research

‘brings out the complexities of environmental management in a capitalistic society, but also shows entrance points for action. Above all, the literature shows the need for systemic change, not only in socio-technical systems, but also in the system of capitalism and the process of marketization [...] together with emancipation and democratisation’ (Kemp et al., 2018, p. 71).

These three branches—sustainability transitions and varieties of capitalism, grassroots innovations movements, and long-wave transition studies—constitute a relative minority of STR; however, they illustrate some core elements of a fruitful and insightful engagement of the discipline with capitalism and its critiques: the conceptualisation of capitalism as a social construction (the outcome of social processes), that changes over (long) time; the recognition of the diversity of capitalism and of its coexistence with alternative logics in various interstitial or non-market institutions, practices, and spaces; and more broadly, an interdisciplinary historical and socio-economic perspective as an alternative to socio-technical approaches toward conceptualising societal change. I revisit these issues in the discussion (Section 5).

#### 4. Capitalism and three challenges in sustainability transitions research

The lack of explicit and theory-informed considerations of capitalism and its critiques is a constraint for STR’s efforts to address three crucial research challenges: analysing the sustainability of sustainability transitions; applying transition theories to the Global South; and promoting a more forward-looking research approach (Loorbach et al., 2017; STRN, 2017; Wieczorek, 2018).

##### 4.1. The sustainability of sustainability transitions

STR has significantly advanced our understanding of transitions; however, it has not applied the same scrutiny to the *sustainability* of sustainability transitions, thus leaving unanswered the question of what transitions are actually sustainable. For example, it is often assumed that a more energy efficient technology is ‘more sustainable’ than its conventional alternative; however, a greater understanding of capitalist logic would reveal that in capitalist systems, as with others geared toward endless accumulation of capital and economic growth, gains in efficiency are likely to be accompanied by rebound effects (e.g., Antal and van den Bergh, 2014; Gillingham et al., 2016; Sorrell, 2007), and therefore ultimately result in ‘less sustainable’ outcomes, as any efficiency gains are spent by consumers in further consumption and used by companies to invest in further production capacity<sup>2</sup>. As discussed by Jackson (2016), efficiency in capitalist economic systems drives the continuous cycle of economic growth that is necessary for the system to avoid economic collapse. The data elucidated by Jackson (2016) demonstrate that such growth offsets any efficiency gains, and furthermore, any decoupling of environmental impact from economic growth will not occur at the pace and magnitude needed to counter the trends of most sustainability challenges, including climate change (see also Antal and van den Bergh, 2016). Steinberger and Roberts (2010) found that decoupling is hindered not by technical elements, but rather by economic, political, and cultural factors, specifically the imperatives of competitiveness and economic growth. Decoupling would be technically feasible to meet the needs of a growing population if the economic, political, and cultural pressure for economic growth did not counterbalance the efficiency gains. It is beyond the scope of this article to enter into the debate on growth, degrowth and a-growth (see, for example, D’Alisa et al., 2014; Kallis, 2011; van den Bergh, 2011, 2017). However, it is important to stress that the dynamics of capitalist economies, particularly the evidence of rebound effects, at the very least call for caution in attributing the label ‘sustainability’ to transitions.

A second reason for caution and another blind spot of STR with respect to capitalism concerns the appropriation of nature and labour through global value chains and across telecoupled systems (Liu et al., 2013; Moore, 2018). Supposedly more sustainable

<sup>2</sup> For a more radical critique of efficiency, see Shove (2018).

technologies (e.g., biofuels or hybrid transport) rely on such value chains, which often extend spatially to the Global South and temporally to the colonial and post-colonial history of social and ecological exploitation (Moore, 2017, 2018). These issues are hardly considered in STR despite an increasing interest in the geography of sustainability transitions (for an exception, see Baptista, 2018). The spatio-temporal reorganisation of capital and the patterns and scales of economic and social activity that also occurs through such chains in sustainability transitions are of crucial importance (Bridge et al., 2013), as their analysis helps determine whether environmental problems are only being ‘fixed’ temporarily by re-articulating their spatio-temporal dimension (Castree, 2009; Bryant et al., 2015), shifted rather than solved (van den Bergh et al., 2015; Yang et al., 2012), or even compounded, such as through the creation of new vulnerabilities and opportunities for further exploitation (Böhm et al., 2012).

If STR is to take sustainability seriously, this discipline cannot afford to ignore the dynamics through which sustainability transition and capitalism might or might not become a contradiction in terms (Newell and Paterson, 2010).

#### 4.2. Research on sustainability transitions in the Global South

It is problematic not to recognise capitalist logics as they apply to socio-technical systems; hidden assumptions and idealised models of the economy might result in analytically weaker accounts of transitions, thus hampering the validity of transition models and frameworks and the capacity of STR to contribute to future sustainability transitions. This risk is particularly evident in studies of transitions in the Global South, where it is often apparent that many such assumptions do not hold (Power et al., 2016; Hansen et al., 2018; Wieczorek, 2018). As noted by Hansen et al. (2018) and Wieczorek (2018), among others, regime instability and diversity is higher in the Global South than in Western countries, and informal institutions play a more important role than formal structures. Thus, some implicit assumptions regarding the existence of a common good, the dominance of market mechanisms, and particular governance arrangements are exposed as flawed (Kenis et al., 2016). I further suggest that informal institutions in the Global South are often informed by traditional principles and ontologies that are incompatible with capitalist institutions and logics (e.g., Feola, 2017; also see Böhm et al., 2015; Escobar, 2010). This point emphasises the importance of embedding critiques of capitalism’s homogeneity (Section 2) into critical examinations of regime models and conceptualisations in STR. Such critiques might further reveal a diversity of decision-making logics (e.g., social trust), value priorities, and power relations (e.g., ethnic group affiliations) that co-exist and at times contrast with logics of competitiveness, utilitarian rationality, and the prioritisation of economic benefit. Of course, such traditional informal institutions also exist in the North; however, they have been historically sidelined by capitalist economic and political structures and widespread cultural change through the modernisation and industrialisation of Western countries (Kanger and Schot, 2018).

Applications of STR to the Global South also reveal a second and more normative critical reason to consider capitalism and its critiques more explicitly in STR. Scholars in the South have strongly critiqued capitalist development models as sources of dependence and marginalisation, which has resulted in the emergence of alternative development frameworks such as dependency and structuralist theories, which have informed governmental attempts to implement development in their own terms (Amin, 2012; Kay, 2010). Similarly, if their social (power relations, knowledge, inequality) and environmental conditions and effects are not addressed (e.g., Broto et al., 2018; McDonald, 2012), then energy transitions in the Global South risk the reproduction of Western ideals of progress and modernity and might be perceived as a new form of colonisation (Nilsson, 2016). Such reactions to developmentalism in the Global South cannot be overlooked, as applications of STR in these contexts have been mostly associated with development interventions.

Furthermore, non-capitalist visions and practices of a flourishing society have emerged from the Global South to inform political contestations of otherwise unquestioned socio-technical transitions (Escobar, 2015) and capitalist society-nature relationships (Brand, 2016). Various civil society movements and governments have rejected the notion of ‘development’ altogether in favour of alternative visions of living-well (e.g., *buen vivir* and *sumak kawsay* in Latin America; Gudyas, 2011; also see Harcourt, 2014; Sachs, 2010); ‘some social movements suggest radical possibilities towards post-liberal, post-developmental, and post-capitalist social forms [...] At stake in many cultural-political mobilizations in Latin America [...] is the political activation of relational ontologies, such as those of indigenous peoples and Afro-descendants, which differ from the dualist ontologies of liberal modernity’ (Escobar, 2010, p.1).

Goals of transitions in the South differ from those in the North even when non-capitalist logics do not play a primary role. The notion of a ‘just transition’ that combines what Swilling, Musango and Wakeford (2016, p.657) described as ‘wellbeing (income, education and health) within a sustainable world (decarbonization, resource efficiency and ecosystem restoration)’ underscores varying political economic priorities other than sustainability and justice, which are rarely acknowledged in sustainability transition frameworks (also see Newell and Mulvaney, 2013). To address this neglect, Swilling et al. (2016) introduced the concept of the socio-political regime, which aims to facilitate a better understanding of the political dynamics of transitions in the developmental state.

However, as noted by Wieczorek (2018), STR most often assumes that—usually technical, rather than social—innovations originate in the North and are diffused in the South in different degrees and forms and with varying success. In other words, most STR related to the Global South has relied on convergence or catch-up theories. Consequently, as Swilling (2013) warned, ‘only certain futures are being imagined with [...] options largely ignored’ (p. 96). In contrast, considerations of capitalism in STR would expose the global economic interconnections, capital flows and telecoupling that in fact may imply the impossibility to study or promote sustainability transitions in the South that are not inherently linked to the North (and vice versa) as various studies of energy transitions and clean development suggest (e.g. Swilling, 2013; Bryant et al., 2015).

Therefore, to avoid merely being another form of disguised colonisation, STR needs to recognise its overlaps with capitalist development interventions and understand the extent and forms through which development is contested and resisted in favour of

variably radical and institutional attempts to envision and practice alternative notions of or alternatives to ‘development’.

#### 4.3. Forward-looking research on sustainability transitions

STR has largely developed by studying past and present transitions in the Global North (STRN, 2017), which inevitably has resulted in a ‘landscaping’ of capitalism in the multi-level perspective. As remarked by Swilling (2013, p.96), ‘to make sense of the global crisis and a possible transition, many re-interpret the past as a set of successive long-term development cycles that could repeat in future’. I maintain that this strategy is inadequate to envision and support societal transitions at the pace and magnitude needed to face the current ‘polycrisis of unsustainability’ (Böhm et al., 2015, p.6). To study potential future sustainability transitions inherently calls for engaging with the future and futuring techniques (Hajer and Versteeg, 2018; Vervoort and Gupta, 2018), and for examining the role of sociotechnical imaginaries and imagined capitalist futures in shaping current and possible future transition pathways (Beckert, 2016; Jasanoff and Kim, 2015). Thus, forward-looking STR is in need to broaden the spectrum of possible conceivable futures, which may be the key to making sense of future historical changes.

It has become increasingly evident that modern capitalist societies engage in destructive modes of interaction with the natural environment, which are not simply a remediable side effect but rather a characterising trait of these societies (Jackson, 2016; Urry, 2010; Wilhite, 2016). For this reason, a number of scholars and activists have argued that the possibility of pursuing transitions to meet global sustainability targets necessarily rests on challenging and reforming capitalist institutions and deeply held beliefs such as the ‘invisible hand’, or the necessity of endless economic growth (e.g., Anderson, 2018; Brand, 2016; Järvensivu et al., 2018; Koch, 2012; Newell, 2011; Storm, 2009; Wilhite, 2016). Furthermore, since the 2008 financial crisis, the debate on the conditions and potential of post-growth and post-capitalist economies has expanded beyond the circles of activists and critical theorists to reach a range of academic, mass media and institutional fora (Blauwhof, 2012; García-Olivares and Solé, 2015; Frase, 2016; The Guardian, 2018; Healy et al., 2018; Mason, 2016; Streek, 2014), including the European Union and the United Nations (Järvensivu et al., 2018).<sup>3</sup>

It is also important to acknowledge that the term ‘transition’, if not ‘transition theory’, is already being appropriated widely, as social movements in both the Global North and South use this label not only to question the sustainability of single technologies or socio-technical domains, but also to critique the entire modern capitalist project, and therefore advocate and prefigure post-capitalist transitions (Escobar, 2015; Feola and Jaworska, 2019; Harcourt, 2014).

Although the nature and outcomes of sustainability transitions are inherently emergent and unpredictable, to engage explicitly with capitalism and its critiques helps to conceptualise this system as a social construction that is diverse, co-exists with alternative logics (Section 3), and changes over time. Capitalism is constantly in flux and—at least latently—in a state of change, evolution or transformation. Not considering the question of capitalism, and assuming that this system will persist as it is, means to be doing the ideological work of making capitalism seem natural and bound to persist forever. In contrast, naming and imagining other (i.e., non-capitalist) futures is an essential step toward opening up the debate to a more diverse range of possible conceivable futures, including those that entail the change *of*, rather than merely *within* a capitalist system (Castree et al., 2010; Chatterton, 2016; Gibson-Graham, 2006b).

## 5. Implications for future sustainability transitions research

The above discussion represents an invitation to STR scholars to engage with and critique capitalism, which are present partly within (Section 3) and largely outside (Section 2) this scientific field. This has implications that extend beyond the three research challenges, for such an action questions the validity of current theoretical frameworks as well as STR practice.

As elucidated in Section 2, the STR approaches that have most explicitly engaged with capitalism and its critiques are those that ‘zoom out’ to take a long-wave temporal and spatial perspective to investigate transitions across different sectors and countries at different historical periods (Kemp et al., 2018; Schot and Kanger, 2018). Such ‘zooming out’ facilitates an historical perspective that exposes the dynamism of capitalism as the outcome of social processes rather than a given contextual factor. Furthermore, some of these approaches encompass and illustrate attempts to re-embed economy and technology within our conceptualisation of society and accordingly re-elaborate typologies and core concepts such as those of regime, landscape, and actors (e.g., Kemp et al., 2018, more so than Schot and Kanger, 2018).

However, one of the risks of such zooming out is restrictive conceptualisations of capitalism as a landscape factor. In fact, capitalism’s manifestations in the inner logics of socio-technical systems challenge the validity of current theoretical frameworks. For example, capitalism is reflected in market institutions, in consumerist cultures that institutionalise and drive individuals and organisations to high levels of material consumption (Kemp et al., 2018; Wilhite, 2016), as well as in the principles of competition and individualisation that permeate not only the economy, but also extend to other spheres of social life (Parr, 2017; Wilhite, 2016).

Therefore, an important research objective for future work in STR is how to renew the existing theoretical frameworks in a manner that includes considerations of capitalism and thus avoids the idealised economic models that result from overlooking critiques of this system (e.g., Chang, 2011; Gibson-Graham, 2006a; Raworth, 2017; Sandel, 2012). For example, Wieczorek (2018)

<sup>3</sup> The Post-Growth 2018 Conference was a multi-stakeholder gathering organised by ten members of the European Parliament representing five political groups. It was held at the International Trade Union House in Brussels, Belgium, on 18-19 September 2018 (<https://www.postgrowth2018.eu>).



maintained that ‘transferring the approaches to analyse other milieus requires care and reflexivity and raises new research questions for both contexts’, i.e., the South and the North (p. 213, emphasis added). Hansen et al. (2018) argued that STR scholars need to ‘generate greater awareness of how western-based perspectives influence the manner in which we study and understand how transitions toward sustainability unfold in developing countries’, and promoted the ‘need to engage in discussion at a more fundamental level about the basic ontological assumptions of the theoretical frameworks in the transitions literature with regard to application in a developing country context’ (Hansen et al., 2018, p.202). Swilling et al. (2016) introduced the concept of socio-political regimes to account for some of the issues discussed in this paper, and similarly, Kemp et al. (2018) suggested that capitalism ‘shapes the choices of national governments’ such that government ‘is best viewed as an institutional actor (or, even better, as an actor-based sub-system, i.e., a policy regime)’ (p. 92).

Admittedly, these approaches remain in the nascent stages of development. However, the contemplation of capitalism explicitly at the ‘meso’ level helps to explain the conditions for the reproduction of existing *capitalist* socio-technical regimes and the possibilities for, and barriers to their transition to sustainable configurations. Therefore, to further our thinking on the role of capitalism in sustainability transitions, and without ambition of exhaustion of a surely very rich area of enquiry, I suggest here three sets of research questions for future STR.

First, concerning the geography of sustainability transitions, it is important to explain how the capitalist tendency to geographical expansion, including the creation of global markets, capital flows and global interconnections, binds transition in one place (e.g. a city, a region) to those in other places. Similarly, with reference to the uneven geographical development of capitalism, when does the attempt of capital to spatio-temporally ‘fix’ environmental crises result in their displacement, rather than the mitigation or eradication of environmental impacts? How do local, regional and global flows of capital influence which innovation happens, where, and who pays for, and benefits from any associate displacement of environmental impact?

Second, questions can be asked concerning the role of political actors in sustainability transitions. If it is recognized that the state is a social relation to be understood as a reflection of capitalist power relations, which depends on the reproduction of capitalist accumulation, why does the state privilege particular strategies, alliances, forms of actions (e.g. market-based instruments) and discourses of transition (e.g., mild ecological modernization)? Similarly, it is important to ask whether rising levels of inequality in capitalism influence social cohesion and the ability of the less affluent to participate, and their willingness to lend political support for sustainability transitions that may be perceived as elitist projects. Can exploitative and exclusionary social relations be reconciled with the deliberative, often implicitly consensus-based models of sustainability transitions? On the other hand, the appreciation that capitalism co-exists with other social logics invites to ask whether and how the spaces of alterity within capitalism (e.g. autonomous spaces, or ‘commoning’ experiments) can inform and support which types of radical sustainability transitions.

Third, the contemplation of capitalism in STR can further the practice and increase the potential of STR as a forward-looking science. ‘Futuring’ and ‘visioning’ exercises are exposed as ‘enormously power-driven process[es]’ (Brand, 2016:16), in which the unequally distributed capacities to invest resources in scenario-building are likely to influence whose interest and visions of a desirable future are represented. Furthermore, a solid understanding of capitalist logics and dynamics in socio-technical regimes is essential to broaden the range of envisioned possible futures. In models of sustainability transitions, including those related to ambitious climate targets, it is important to ask which political and economic structures need to be modeled, and which model assumptions need to be exposed, challenged and reconsidered to explore radical trajectories of sustainability transitions? Why are visions of sustainability transition usually predicated to depend on increasing efficiency gains, rather than sufficiency (e.g., voluntary reduction and/or containment in material consumption), on market mechanisms rather than political action, and on dis-incentives for individual economic decision-makers (e.g., consumers, companies), rather than collective and civil decision-making processes? Which model assumptions rather reflect the modeler’s implicit idealized understanding of a capitalist economy (Section 2), than the reality of a dominant but not homogeneous nor all-encompassing, evolving and varied capitalist system?

Even a quick glance at the bibliography of this article emphasises the criticality of interdisciplinarity in moving STR forward towards an explicit engagement with analyses and critiques of capitalism. STR should join forces with other disciplines to broaden its understanding of the pathways toward radical non-linear societal changes beyond capitalism. Encouragingly, scholars from sociology, human geography and ecological economics have already engaged in STR to inform conceptualisations of capitalism and post-capitalism (Chatterton, 2016; Lawhon and Murphy, 2011; Shove, 2010; Vandeventer et al., 2019). These types of interdisciplinary conversations are very promising, but the STR community has made much less appreciable movement toward those communities and disciplines. In the past, STR has fruitfully integrated insights from political economy (e.g., Newell and Paterson, 2010; Swilling, 2013) and geography (e.g., Coenen et al., 2012; Truffer et al., 2015) and additional bridges remain to be built concerning the analysis and critique of capitalism in sustainability transitions. For example, as discussed above (Sections 4.1 and 4.2), environmental and ecological economics have much to offer in examining the actual sustainability of sustainability transitions, and development studies scholarship is essential for scholars involved in STR in the global south. Moreover, insights from the debate on positionality (e.g., Rose, 1997), as well as research on—and with—activists in human geography (e.g., Chatterton et al., 2010), and transdisciplinarity in sustainability science (e.g., Lang et al., 2012) could help negotiate the multiple roles possible for researchers in analysing sustainability transitions (Wittmayer and Schöpke, 2014).

It is necessary to recognise that STR scholars are not only researchers, but also change actors in society, regardless of whether the form of engagement with other societal actors is conventional or transdisciplinary. In an historical context in which sustainability transitions are inevitably never politically neutral, how should STR scholars position themselves with respect to contested capitalist ideals of progress and development, and to what extent should these be implied in their transition models? How does awareness of capitalism influence not only where, but also with whom and for what purposes STR scholars conduct research? Perhaps most importantly, what steps should be taken to ensure that future generations of STR scholars are literate in a range of relevant disciplines

and engage in more self-critical research approaches?

## 6. Conclusions

In this paper I have organised my reflections on STR and capitalism by focussing specifically on three research challenges that have been recently identified as critical for STR: the analysis of the sustainability of sustainability transitions; the application of transition theory to the Global South; and the move towards a more forward-looking STR. There is no presumption that these three challenges of STR exhaust the possible intersections of capitalism, sustainability transitions, and STR; in fact, future research might further explore these and other theoretical and methodological overlaps. However, the implications of my reflection extend beyond those three challenges to encompass STR theories and practice, and they essentially articulate and invite an engagement in a more reflexive and critical STR. I have not advocated that STR should take any pro- or anti-capitalist stance. Rather, I have proposed that STR should acknowledge evidence and experiences from other disciplines and equip itself with the analytical and intellectual tools to address the influence of capitalism on sustainability transitions, and vice versa. In doing so, STR needs to be more openly reflexive not only about possible theoretical biases, such as those that manifest themselves when transition frameworks are applied in non-Western contexts, but also with regard to its role in society within a world in which sustainability and other transformations are urged, envisioned, contested, and resisted by a very large and diverse range of actors and coalitions.

The study of sustainability transitions cannot be wholly prescinded from the rigorous analysis and critiques of capitalism. To take capitalism as an implicit given in STR precludes a serious analytical examination of its diversity, its economic, political, social and cultural conditions and dynamics, its influence on sustainability transitions in different contexts, and the possibility that sustainability transitions may involve a fundamental change of the capitalist system, rather than within it. Blindness to capitalism risks a return to an idealised image of the world economy that constrains, rather than supports the analysis of the sustainability of sustainability transitions, the application of STR to the Global South, and the move towards a forward-looking STR. Capitalism should be explicitly considered and critically questioned. This is not a normative endeavour; indeed, it represents the opposite of such, as it is rather the presumption of neutrality toward capitalism that reflects a normative and uncritical, if implicit, assumption of its uniformity, dominance, and future persistence.

## Acknowledgments

I give thanks to Marko Hekkert, Ellen Moors, Richard Lane and Koen Frenken for their constructive comments on an earlier version of this manuscript. I presented some ideas discussed in this paper in a research seminar at the Innovation Studies Group of the Copernicus Institute of Sustainable Development at Utrecht University, and received very useful feedback on that occasion. This research was partly financed by the Netherlands Organisation for Scientific Research (NWO) through the research project number 016.Vidi.185.073.

## References

- Amin, S., 2012. On deligitimising capitalism: the scourge of Africa and the south. *Afr. Dev.* XXXVII (4), 15–72.
- Anderson, K., 2018. Response to the IPCC 1.5°C Special Report. Last accessed 17/10/2018. Manchester Policy Blogs. <http://blog.policy.manchester.ac.uk/posts/2018/10/response-to-the-ipcc-1-5c-special-report/>.
- Antal, M., van den Bergh, J.C., 2014. Re-spending rebound: a macro-level assessment for OECD countries and emerging economies. *Energy Policy* 68, 585–590.
- Antal, M., van den Bergh, J.C., 2016. Green growth and climate change: conceptual and empirical considerations. *Clim. Policy* 16 (2), 165–177.
- Baker, L., Newell, P., Phillips, J., 2014. The political economy of energy transitions: the case of South Africa. *New Polit. Econ.* 19 (6), 791–818.
- Baptista, I., 2018. Space and energy transitions in sub-Saharan Africa: understated historical connections. *Energy Res. Soc. Sci.* 36, 30–35.
- Beckert, J., 2016. *Imagined Futures: Fictional Expectations and Capitalist Dynamics*. Harvard University Press.
- Blauwhof, F.B., 2012. Overcoming accumulation: Is a capitalist steady-state economy possible? *Ecol. Econ.* 84, 254–261.
- Böhm, S., Misoczky, M.C., Moog, S., 2012. Greening capitalism? A Marxist critique of carbon markets. *Organ. Stud.* 33 (11), 1617–1638.
- Böhm, S., Bharucha, Z.P., Pretty, J., 2015. ECOCULTURES. Towards sustainable ways of living. In: Böhm, S., Bharucha, Z.P., Pretty, J. (Eds.), *Ecocultures: Blueprints for Sustainable Communities*. Routledge, pp. 3–26.
- Brand, U., 2016. How to get out of the multiple crisis? Contours of a critical theory of social-ecological transformation. *Environ. Values* 25, 503–525.
- Bridge, G., Bouzarovski, S., Bradshaw, M., Eyre, N., 2013. Geographies of energy transition: space, place and the low-carbon economy. *Energy Policy* 53, 331–340.
- Broto, V.C., Baptista, I., Kirshner, J., Smith, S., Alves, S.N., 2018. Energy justice and sustainability transitions in Mozambique. *Appl. Energy* 228, 645–655.
- Bruyninx, H., 2018. International Sustainability Research Conference [key Note Presentation]. Manchester University, Manchester, United Kingdom, pp. 11–14 June.
- Bryant, G., Dabhi, S., Böhm, S., 2015. Fixing' the climate crisis: capital, states, and carbon offsetting in India. *Environ. Plan. A* 47 (10), 2047–2063.
- Castree, N., 2009. The spatio-temporality of capitalism. *Time Soc.* 18, 26–61.
- Castree, N., Chatterton, P.A., Heynen, N., Lerner, W., Wright, M.W. (Eds.), 2010. *The Point Is to Change It: Geographies of Hope and Survival in an Age of Crisis*. John Wiley & Sons.
- Četković, S., Buzogány, A., 2016. Varieties of capitalism and clean energy transitions in the European Union: when renewable energy hits different economic logic. *Clim. Policy* 16 (5), 642–657.
- Chang, H.-J., 2011. *23 Things They Don't Tell You About Capitalism*. Penguin Books, London.
- Chatterton, P., 2016. Building transitions to post-capitalist urban commons. *Trans. Inst. Br. Geogr.* 41, 403–415.
- Chatterton, P., Hodgkinson, S., Pickerill, J., 2010. Beyond scholar activism: making strategic interventions inside and outside the neoliberal university. *ACME: Int. J. Crit. Geogr.* 9 (2).
- Coenen, L., Benneworth, P., Truffer, B., 2012. Toward a spatial perspective on sustainability transitions. *Res. Policy* 41, 968–979.
- D'Alisa, G., Demaria, F., Kallis, G. (Eds.), 2014. *Degrowth: a Vocabulary for a New Era*. Routledge.
- Escobar, A., 2010. Latin America at a crossroad. *Cult. Stud.* 24, 1–65.
- Escobar, A., 2015. Degrowth, postdevelopment, and transitions: a preliminary conversation. *Sustain. Sci.* 10, 451–462.
- Feola, G., 2015. Societal transformation in response to global environmental change: a review of emerging concepts. *Ambio* 44 (5), 376–390.

- Feola, G., 2017. Adaptive institutions? Peasant institutions and natural models facing climatic and economic changes in the Colombian Andes. *J. Rural Stud.* 49, 117–127.
- Feola, G., Jaworska, S., 2019. One transition, many transitions? A corpus-based study of societal sustainability transition discourses in four civil society's proposals (forthcoming). *Sustain. Sci.*
- Fischer-Kowalski, M., Rotmans, J., 2009. Conceptualizing, observing, and influencing social–Ecological transitions. *Ecol. Soc.* 14, 3.
- Frase, P., 2016. *Four Futures: Life After Capitalism*. Verso.
- Gallino, L., 1993. *Dizionario di Sociologia*. Torino: TEA.
- García-Olivares, A., Solé, J., 2015. End of growth and the structural instability of capitalism—from capitalism to a Symbiotic Economy. *Futures* 68, 31–43.
- Geels, F.W., 2002. Technological transitions as evolutionary reconfiguration processes: a multi-level perspective and a case-study. *Res. Policy* 31 (8/9), 1257–1274.
- Geels, F.W., 2013. The impact of the financial–economic crisis on sustainability transitions: financial investment, governance and public discourse. *Environ. Innov. Soc. Transit.* 6, 67–95.
- Gibson-Graham, J.K., 2006a. *The End of Capitalism (As We Knew It)*. University of Minnesota Press, Minneapolis, US.
- Gibson-Graham, J.K., 2006b. *A Post-capitalist Politics*. University of Minnesota Press, Minneapolis, US.
- Gillingham, K., Rapson, D., Wagner, G., 2016. The rebound effect and energy efficiency policy. *Rev. Environ. Econ. Policy* 10 (1), 68–88.
- Glassman, J., 2006. Primitive accumulation, accumulation by dispossession, accumulation by 'extra-economic' means. *Prog. Hum. Geogr.* 30 (5), 608–625.
- Gregory, D., 2000. Capitalism. In: Johnston, R.J., Gregory, D., Pratt, G., Watts, M. (Eds.), *The Dictionary of Human Geography*. Blackwell, Oxford, pp. 56–59.
- Gudynas, E., 2011. *Buen Vivir: today's tomorrow*. *Development* 54, 441–447.
- Hajer, M., Versteeg, W., 2018. Imagining the post-fossil city: why is it so difficult to think of new possible worlds? *Territ. Politics Gov.* 1–13.
- Hall, P.A., Soskice, D.W. (Eds.), 2001. *Varieties of Capitalism: The Institutional Foundations of Comparative Advantage*. Oxford University Press, Oxford.
- Hansen, U.E., Nygaard, I., Romijn, H., Wieczorek, A., Kamp, L.M., Klerkx, L., 2018. Sustainability transitions in developing countries: stocktaking, new contributions and a research agenda. *Environ. Sci. Policy* 84, 198–203.
- Harcourt, W., 2014. The future of capitalism: a consideration of alternatives. *Cambridge J. Econ.* 38, 1307–1328.
- Harvey, D., 2006. *The Limits to Capital (New and Fully Updated Edition)*. Verso, London and New York.
- Healy, S., McNeill, J., Cameron, J., Gibson, K., 2018. Pre-empting Apocalypse? Postcapitalism as an everyday politics. *AQ-Aust. Q.* 89 (2), 28.
- Hölscher, K., Wittmayer, J.M., Loorbach, D., 2018. Transition versus transformation: What's the difference? *Environ. Innov. Soc. Transit.* 27 (1), 1–3.
- Jackson, T., 2016. *Prosperity Without Growth: Foundations for the Economy of Tomorrow*. Routledge, London.
- Järvensivu, P., Toivanen, T., Vadén, T., Lähde, V., Majava, A., Eronen, J.T., 2018. *Governance of Economic Transition*. Global Sustainable Development Report 2019. Invited background document on economic transformation, to chapter: Transformation: The Economy.
- Janoff, S., Kim, S.H. (Eds.), 2015. *Dreamscapes of Modernity: Sociotechnical Imaginaries and the Fabrication of Power*. University of Chicago Press.
- Jessop, B., 2007. *State Power: A Strategic-Relational Approach*. Polity, Cambridge.
- Kallis, G., 2011. In defence of degrowth. *Ecol. Econ.* 70, 873–880.
- Kanger, L., Schot, J., 2018. Deep transitions: Theorizing the long-term patterns of socio-technical change. *Environ. Innov. Soc. Trans.*
- Kay, C., 2010. *Latin American Theories of Development and Underdevelopment*. Routledge, London.
- Kemp, R., Weaver, P.M., Strasser, T., Backhaus, J., Golland, A., 2018. Socio-economic transformations: insights for sustainability. EEA, *Perspectives on Transitions to Sustainability*. European Environment Agency Report No 25/2017, pp. 70–94.
- Kenis, A., Bono, F., Mathijs, E., 2016. Unravelling the (post-)political in transition management: interrogating pathways towards sustainable change. *J. Environ. Pol. Plann.* 18, 568–584.
- Koch, M., 2012. *Capitalism and Climate Change: Theoretical Discussion, Historical Development and Policy Responses*. Palgrave.
- Kostakis, V., Roos, A., Bauwens, M., 2016. Toward a political ecology of the digital economy: socio-environmental implications of two competing value models. *Environ. Innov. Soc. Transit.* 18, 82–100.
- Lang, D., Wiek, A., Bergmann, M., Stauffacher, M., Martens, P., Moll, P., Swilling, M., Thomas, C., 2012. Transdisciplinary research in sustainability science: practice, principles, and challenges. *Sustain. Sci.* 7, 25–43.
- Lawhon, M., Murphy, J.T., 2011. Socio-technical regimes and sustainability transitions: insights from political ecology. *Prog. Hum. Geogr.* 36, 354–378.
- Liu, J., Hull, V., Batistella, M., DeFries, R., Dietz, T., Fu, F., Hertel, T.W., Izaurralde, R.C., Lambin, E.F., Li, S., Martinelli, L.A., McConnell, W.J., Moran, E.F., Naylor, R., Ouyang, Z., Polenske, K.R., Reenberg, A., de Miranda Rocha, G., Simmons, C.S., Verburg, P.H., Vitousek, P.M., Zhang, F., Zhu, C., 2013. Framing sustainability in a telecoupled world. *Ecol. Soc.* 18.
- Loorbach, D., Avelino, F., Haxeltine, A., Wittmayer, J.M., O'Riordan, T., Weaver, P., Kemp, R., 2016. The economic crisis as a game changer? Exploring the role of social construction in sustainability transitions. *Ecol. Soc.* 21.
- Loorbach, D., Frantzeskaki, N., Avelino, F., 2017. Sustainability transitions research: transforming science and practice for societal change. *Annu. Rev. Environ. Resour.* 42.
- Markard, J., Raven, R., Truffer, B., 2012. Sustainability transitions: an emerging field of research and its prospects. *Res. Policy* 41, 955–967.
- Mason, P., 2016. *Postcapitalism: A Guide to Our Future*. Macmillan.
- McDonald, D.A., 2012. *Electric Capitalism: Recolonising Africa on the Power Grid*. Routledge.
- Meiksins Wood, Ellen, 2002. *The Origin of Capitalism: A Longer View*. Verso.
- Moore, J.W., 2017. The Capitalocene, Part I: on the nature and origins of our ecological crisis. *J. Peasant Stud.* 44, 594–630.
- Moore, J.W., 2018. The Capitalocene Part II: accumulation by appropriation and the centrality of unpaid work/energy. *J. Peasant Stud.* 45, 237–279.
- Newell, P., 2011. The elephant in the room: capitalism and global environmental change. *Glob. Environ. Change* 21 (1), 4–6.
- Newell, P., 2015. The politics of green transformation in capitalism. In: Scoones, I., Leach, M., Newell, P. (Eds.), *The Politics of Green Transformations*. Earthscan, Routledge, pp. 68–85.
- Newell, P., Mulvaney, D., 2013. The political economy of the 'just transition.' *Geogr. J.* 179, 132–140.
- Newell, P., Paterson, M., 2010. *Climate Capitalism: Global Warming and the Transformation of the Global Economy*. Cambridge University Press, Cambridge, UK.
- Newell, Phillips, P.J., 2016. Neoliberal energy transitions in the South: kenyan experiences. *Geoforum* 74, 39–48.
- Nilsson, D., 2016. The unseeing state: how ideals of modernity have undermined innovation in Africa's urban water systems. *NTM Zeitschrift für Geschichte der Wissenschaften, Technik und Medizin* 24 (4), 481–510.
- Parr, A., 2017. *Birth of a New Earth*. Columbia University Press, New York.
- Picketty, T., 2013. *Capital in the Twenty-First Century*. Harvard University Press.
- Polanyi, K., 1944. *The Great Transformation*. Rinehart, New York.
- Power, M., Newell, P., Baker, L., Bulkeley, H., Kirshner, J., Smith, A., 2016. The political economy of energy transitions in Mozambique and South Africa: the role of the Rising Powers. *Energy Res. Soc. Sci.* 17, 10–19.
- Princen, T., 2006. *The Logic of Sufficiency*. MIT Press.
- Raworth, K., 2017. *Donought Economics*. Cornerstone, Wisconsin, US.
- Rose, G., 1997. Situating knowledges: positionality, reflexivities and other tactics. *Prog. Hum. Geogr.* 21 (3), 305–320.
- Sachs, W. (Ed.), 2010. *The Development Dictionary: A Guide to Knowledge as Power*. Zed Books, London.
- Sandel, M.J., 2012. *What Money Can't Buy: The Moral Limits of Markets*. Penguin.
- Schot, J., 2016. Confronting the second deep transition through the historical imagination. *Technol. Culture* 57, 445–456.
- Schot, J., Kanger, L., 2018. Deep transitions: emergence, acceleration, stabilization and directionality. *Res. Policy* 47, 1045–1059.
- Sheppard, E., 2015. Thinking geographically: globalizing capitalism and beyond. *Ann. Assoc. Am. Geogr.* 105, 1113–1134.
- Shove, E., 2010. Social theory and climate change: questions often, sometimes and not yet asked. *Theory Cult. Soc.* 27, 277–288.
- Shove, E., 2018. What is wrong with energy efficiency? *Build. Res. Inf.* 46 (7), 779–789.

- Smith, A., Ely, A., 2015. Green transformations from below? The politics of grassroots innovation. In: Scoones, I., Leach, M., Newell, P. (Eds.), *The Politics of Green Transformations*. Earthscan – Routledge, pp. 68–85.
- Smith, A., Stirling, A., 2010. The politics of social-ecological resilience and sustainable sociotechnical transitions. *Ecol. Soc.* 15, 11.
- Smith, A., Fressoli, M., Abrol, D., Arond, L., Ely, A., 2016. *Grassroots Innovation Movements*. Routledge.
- Sorrell, S., 2007. The Rebound Effect: an Assessment of the Evidence for Economy-wide Energy Savings from Improved Energy Efficiency. UK Energy Research Centre.
- Steinberger, J.K., Roberts, J.T., 2010. From constraint to sufficiency: the decoupling of energy and carbon from human needs, 1975–2005. *Ecol. Econ.* 70, 425–433.
- Storm, S., 2009. Capitalism and climate change: can the invisible hand adjust the natural thermostat? *Dev. Change* 40, 1011–1038.
- Streek, W., 2014. How will Capitalism End? *New Left Rev.* 87, 35–64.
- Sustainability Transitions Research Network, 2017. *A Research Agenda for the Sustainability Transitions Research Network*. [online, viewed 21 June 2018. [https://transitionsnetwork.org/wp-content/uploads/2018/01/STRN\\_Research\\_Agenda\\_2017.pdf](https://transitionsnetwork.org/wp-content/uploads/2018/01/STRN_Research_Agenda_2017.pdf)].
- Swilling, M., 2013. Economic crisis, long waves and the sustainability transition: an African perspective. *Environ. Innov. Soc. Transit.* 6, 96–115.
- Swilling, M., Musango, J., Wakeford, J., 2016. Developmental states and sustainability transitions: prospects of a just transition in South Africa. *J. Environ. Policy Plan.* 18, 650–672.
- The Guardian, 2018. *The EU Needs a Stability and Wellbeing Pact, Not More Growth*. <https://www.theguardian.com/politics/2018/sep/16/the-eu-needs-a-stability-and-wellbeing-pact-not-more-growth>.
- Thornton, P.H., Ocasio, W., Lounsbury, M., 2012. *The Institutional Logics Perspective: A New Approach to Culture, Structure, and Process*. Oxford University Press.
- Truffer, B., Murphy, J.T., Raven, R., 2015. The geography of sustainability transitions: contours of an emerging theme. *Environ. Innov. Soc. Transit.* 17, 63–72.
- Turnheim, B., Geels, F.W., 2012. Regime destabilisation as the flipside of energy transitions: Lessons from the history of the British coal industry (1913–1997). *Energy Pol.* 50, 35–49.
- Turnheim, B., Geels, F.W., 2013. The destabilisation of existing regimes: Confronting a multi-dimensional framework with a case study of the British coal industry (1913–1967). *Res. Pol.* 42, 1749–1767.
- Urry, J., 2010. Consuming the planet to excess. *Theory Cult. Soc.* 27, 191–212.
- van den Bergh, J.C.J.M., 2011. Environment versus growth — a criticism of “degrowth” and a plea for “a-growth.” *Ecol. Econ.* 70, 881–890.
- van den Bergh, J., Folke, C., Polasky, S., Scheffer, M., Steffen, W., 2015. What if solar energy becomes really cheap? A thought experiment on environmental problem shifting. *Curr. Opin. Environ. Sustain.* 14, 170–179.
- Van den Bergh, J.C.J.M., 2017. *Green agrowth: removing the GDP-growth constraint to human progress*. In: Victor, P.A., Dolter, B. (Eds.), *Handbook on Growth and Sustainability*. Edward Elgar, pp. 181–210.
- Vandeventer, J.S., Cattaneo, C., Zografos, C., 2019. A degrowth transition: pathways for the degrowth niche to replace the capitalist-growth regime. *Ecol. Econ.* 156, 272–286.
- Vervoort, J., Gupta, A., 2018. Anticipating climate futures in a 1.5° C era: the link between foresight and governance. *Curr. Opin. Environ. Sustain.* 31, 104–111.
- Wieczorek, A.J., 2018. Sustainability transitions in developing countries: major insights and their implications for research and policy. *Environ. Sci. Policy* 84, 204–2016.
- Willhite, H., 2016. *The Political Economy of Low Carbon Transformation: Breaking the Habits of Capitalism*. Routledge, London.
- Wittmayer, J.M., Schöpke, N., 2014. Action, research and participation: roles of researchers in sustainability transitions. *Sustain. Sci.* 9 (4), 483–496.
- Wright, E.O., 2010. *Envisioning Real Utopias*. Verso, London and New York.
- Yang, Y., Bae, J., Kim, J., Suh, S., 2012. Replacing gasoline with corn ethanol results in significant environmental problem-shifting. *Environ. Sci. Technol.* 46 (7), 3671–3678.