



Democratising sustainability transformations: Assessing the transformative potential of democratic practices in environmental governance

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ABSTRACT

Many democracies find it difficult to act swiftly on problems such as climate change and biodiversity loss. This is reflected in long-standing debates in research and policy about whether democratic practices are capable of fostering timely, large-scale transformations towards sustainability. Drawing on an integrative review of scholarly literature from 2011 to early 2021 on sustainability transformations and the democracy-environment nexus, this article synthesises existing research on prospects and pitfalls for democratising sustainability transformations. We advance a new typology for understanding various combinations of democratic/authoritarian practices and of transformations towards/away from sustainability. We then explore the role of democratic practices in accelerating or obstructing five key dimensions of sustainability transformations: institutional, social, economic, technological, and epistemic. Across all dimensions we find substantial evidence that democratic practices can foster transformations towards sustainability, and we conclude by outlining a set of associated policy recommendations.

1. Introduction

The urgency of addressing global environmental problems such as climate change and biodiversity loss has fuelled calls for transformative change towards more sustainable societies (UN, 2015). Visions of large-scale societal transformation raise challenging questions for governance: Are democratic practices up to the task of promoting sustainability transformations and sustaining a liveable planet? If so, how should those practices be established or reworked? What hopes are there for the future of democracy if it fails to deliver sustainability?

Confidence in the ability of existing democracies to foster sustainability has been undermined by collective failures to address transboundary environmental problems (Drahoš, 2021). Nevertheless, many scholars argue that democratic processes and institutions at multiple scales remain essential for securing environmental protection (e.g.

Fiorino, 2018). At the same time, we witness new citizen mobilisations in support of transformative environmental action, evident in the Fridays for Future/School Strikes for Climate demonstrations across the world or political reform proposals based on a “Green New Deal” (Klein, 2020). These initiatives, in line with a long tradition of grassroots environmental movements and civil society organisations in the Global South and Global North, call for greater public participation in decision-making.

The emergence of the COVID-19 pandemic adds further complexity to this picture, while underscoring the timeliness of assessing the role of democracy in societal transformations. Many countries rolled back or suspended democratic safeguards in an effort to control the pandemic (Afsahi et al., 2020; Howarth et al., 2020). Nevertheless, other democratic possibilities have opened up during this period, as exemplified by worldwide protests against racism. Moreover, the European Green Deal

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and US President Biden's climate plan suggest that large democracies may yet prove capable of prioritising decarbonisation together with pandemic recovery and other societal goals.

The aim of this article is to synthesise existing scholarly knowledge on sustainability transformations and democratic governance to understand the prospects and challenges for democratising sustainability transformations. The overarching question addressed in this article is: *what does experience of democratic practices show about their potential to foster or obstruct transformations towards sustainability?*

In this study we develop a social science perspective on the political dynamics surrounding the democratic governance of sustainability transformations. While ideas of transformative change and governance have become widespread in the recent literature, and the political dimensions of sustainability transformations are likewise receiving increasing attention, the specific role of democratic practices in this context remains poorly understood (Patterson et al., 2017; Linnér and Wibeck, 2019; Goetz et al., 2020). Equally, despite a substantial body of research on whether existing democratic practices are conducive to environmental protection, it is necessary to assess whether findings from this research remain viable in contexts where unprecedented societal change is required. Building upon the framework on democracy and power set out in the Earth System Governance Project's Science and Implementation Plan (Burch et al., 2019), we conduct an integrative literature review of two main bodies of literature: *sustainability transformations* and the *democracy-environment nexus*.

This article proceeds as follows. After a brief overview of our methodology for reviewing the existing literature, we develop a conceptual framework for understanding the relationship between sustainability transformations and democratic governance. Next, we explore five key dimensions of sustainability transformation – *institutional, social, economic, epistemic* and *technological* transformations – and assess whether and to what extent democratic practices are capable of fostering transformations towards sustainability across each of these dimensions. The discussion and conclusion sections synthesise the foregoing findings, offer policy recommendations and identify avenues for further research.

2. Methods

The bodies of scholarship on sustainability transformations and the democracy-environment nexus are extensive, spanning several decades of research. Yet, scholars have only recently begun to bring these research streams together to investigate their interconnections (Pickering et al., 2020). A recent special issue editorial (Goetz et al., 2020) discusses theoretical conceptual debates at the intersection of these literatures, but (in contrast to our review) does not aim to synthesise empirical evidence on the causal relationship between democratic practices and sustainability transformations.

Our review of these two research fields draws primarily on scholarship published roughly in the past decade (from 2011 until May 2021), while also taking key earlier works into account. The disciplinary scope of our study ranges from political science (political theory, international relations and public policy) to disciplines such as sociology, human geography and environmental social sciences more generally. As the authors of the present study have a similarly diverse range of expertise, we have adopted a methodological approach that can be described as an *integrative literature review* (Snyder, 2019). The evaluation of the literature dealing with prospects for democratisation in each dimension of sustainability transformations is guided by a conceptual framework that is advanced in the following section.

For the purposes of this article, we define democracy as a form of political system (or polity), institution or practice where people collectively govern themselves, either through direct participation or (typically elected) representation in decision-making (Keane, 2009; Brown et al., 2018). The term 'democracy' can be used either to describe an existing state of affairs or an ideal. When we refer to 'existing

democracies' or 'democratic status' we mean political systems that exhibit some democratic characteristics (e.g. free and fair elections) even if they fall short of a full realisation of democratic ideals (e.g. visions of ecological or environmental democracy). Hence, as in Fig. 1 below, existing polities can be placed on a spectrum in between the ideal of democracy and its opposite, authoritarianism. The reason for extending our analysis to democratic *practices* – as opposed to just democratic systems or polities at large – is that it allows us to disaggregate the transformative potential of particular elements of democratic systems (e.g. representation of women in decision-making), while also encompassing cross-country evidence on democratic polities at large (these polities can be understood as clusters of democratic practices). A crucial advantage of focusing on the transformative capacity of *existing* democratic practices (rather than on as-yet untested reform proposals) is that it helps to bolster debates about transformation with evidence of what works and what does not. At the same time, we note that our approach cannot directly test the viability of unprecedented democratic practices that may ultimately prove necessary for thoroughgoing transformations towards sustainability.

While there is ample historical evidence of transformations from authoritarian to democratic societies – as illustrated in literature on democratisation and democratic consolidation (Keane, 2009; Haerpfer et al., 2019) – evidence of comparable societal transformations towards sustainability is harder to identify, but nonetheless crucial to investigate (for a partial exception, see Fahrmeir, 2020). Accordingly, some examples reviewed in this article include democratic practices to foster sustainability that fall short of societal transformation but which nevertheless enable us to draw inferences about prospects for democratising large-scale sustainability transformations.

In circumstances where resources are limited and the need for transformative action is urgent, efforts to advance sustainability and democracy simultaneously may give rise to trade-offs. In addition, the causal relationship between democracy and environmental protection is contingent on empirical evidence that remains contested. Causation could also work in the other direction, i.e. sustainability transformations could enhance or inhibit democratisation, but we leave it to future studies to explore this aspect of the relationship.

3. Conceptualising the nexus between sustainability transformations and democracy

3.1. Sustainability transformations: complex, multi-dimensional and politically contested

There is ample evidence that humans exert huge impacts not only on individual ecosystems but on the entire earth system (Steffen et al., 2018). Many scholars argue that far-reaching transformations towards environmental sustainability are required to avoid irreversible damage to the earth's life-support systems (e.g. Rockström et al., 2009). Research on sustainability transformations is typically concerned with purposive, human-induced processes of transformation (Chaffin et al., 2016). While no consensus definition exists, *transformation* or *transformative change* can be understood as "a fundamental, system-wide reorganization across technological, economic and social factors, including paradigms, goals and values" (IPBES, 2019: 14; see also Linnér and Wibeck, 2019: 4). We can distinguish between analytical studies of sustainability transformations and normative or critical studies *for* sustainability transformations (Linnér and Wibeck, 2019: 8–9). Our article seeks to synthesise findings from both literature streams to strengthen the empirical evidence on the prospects of democratising sustainability transformations.

Recognising that different understandings of the concept of sustainability and sustainable development exist, this article does not advance or rely on a single interpretation of either term. Instead, we underscore the plurality of the concept, which could be compatible with a range of understandings of human relationships with the planet, while

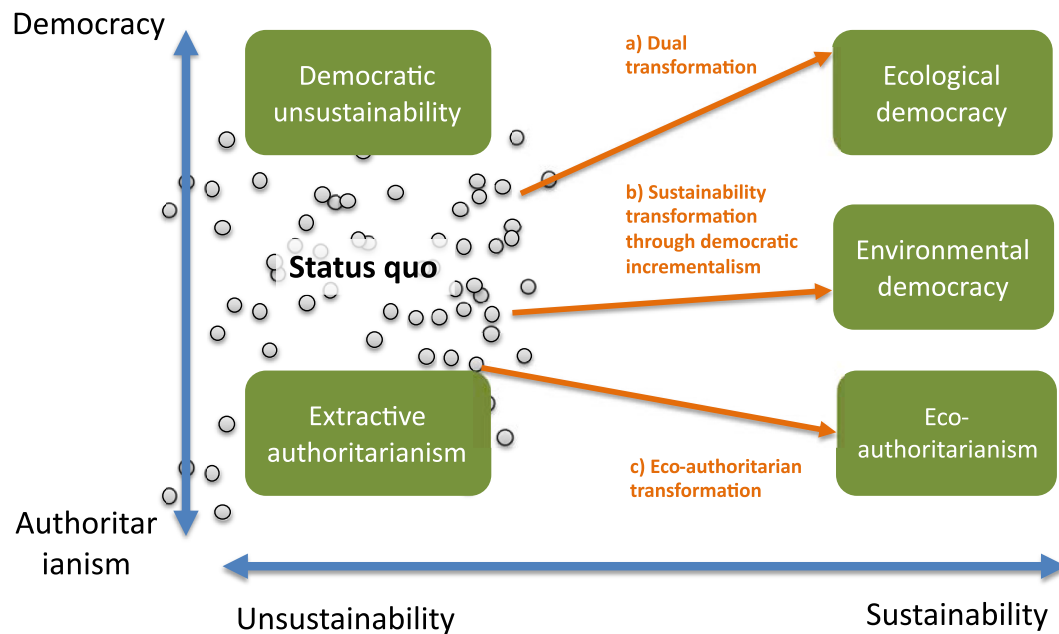


Fig. 1. Democratic and sustainability transformations: mapping the pathways.

Source: Authors' own compilation. *Environmental democracy* involves achieving sustainability through reform of existing liberal democratic institutions, while *ecological democracy* seeks to do so through a radical departure from existing democratic institutions (e.g. towards far more decentralised or participatory models). The placement of these two models aims to underscore that the latter involves a greater departure from the status quo, rather than that one model is superior to the other.

noting common themes across different definitions, including the maintenance of favourable conditions for human and non-human flourishing across generations (see generally WCED, 1987; Griggs et al., 2013). While the notion of sustainable development is framed through three interlinked dimensions of environmental, economic, and social sustainability and the 2030 Agenda and its 17 Sustainable Development Goals (SDGs), we focus on the *environmental* dimension of sustainability and its interconnectedness with democracy.

A wide variety of perspectives have emerged on sustainability transformations, including transformative governance (Chaffin et al., 2016), green transformations (Scoones et al., 2015), transformations towards sustainability (Scoones et al., 2020) and socio-ecological transformations (Blühdorn, 2020). A related literature addresses socio-technical transitions (Geels, 2004), sustainability transitions and transition management (Avelino et al., 2016; Loorbach et al., 2017).¹ Drawing on elements of all these research streams, we perceive transformation as a process which is (i) complex, (ii) multi-dimensional and (iii) politically contested.

First, transformations occur in complex systems and involve “profound and enduring non-linear systematic changes” (Linnér and Wibeck, 2019: 4). External shocks often cause rapid change, but it remains controversial whether large-scale transformations are feasible outside times of crisis or emergency. Even if the idea of purposive transformations might suggest a degree of coordination and governability, transformative change in social-ecological systems is inextricably linked with the myriad interactions among actors, institutions and the material world (Stirling, 2015). This gives rise to questions about the extent to which transformative change can be and should be controlled or centralised (Linnér and Wibeck, 2019). Moreover, the history of transformations from autocracy to democracy demonstrates that transformative change may be incomplete, uneven and subject to setbacks and reversals (Keane, 2009).

¹ It is common to distinguish between more wide-ranging, multi-dimensional transformations and more controlled processes of transition (Linnér and Wibeck 2019: 5–6; Eckersley, 2020b).

Second, transformations towards sustainability are multi-dimensional and cross-sectoral. As reflected in the definition of transformation outlined above, ensuring sustainability requires not only technological innovation, but also economic restructuring and shifts in social norms, relationships and behaviour (Hargreaves and Middlemiss, 2020; Goetz et al., 2020). The degree of transformation needed varies across dimensions and sectors (e.g. transport, production/consumption, energy, industry and land use), as does the range of options for and barriers to transformation. Sustainability transformations need to occur at scales ranging from households and communities to states and regional and global governance institutions (Linnér and Wibeck, 2019). Concurrent changes across these sectors, dimensions and scales may produce conflicting or mutually supportive interactions (Nilsson et al., 2016).

Finally, societal transformations are politically contested, not least because different stakeholders may disagree over both the ends that transformation should achieve and the means of achieving those ends, and also because transformations may involve or require disrupting existing configurations of power and resources (Patterson et al., 2017; Scoones et al., 2015).

3.2. The role of democracy in sustainability transformations

3.2.1. Theorising the democracy-environment nexus

Despite growing academic and policy interest in the politics of sustainability transformations, questions of democracy and democratic legitimacy have received insufficient attention in these debates (Patterson et al., 2017; Goetz et al., 2020). For example, a recent review of transformative environmental governance mentions public participation but makes no reference to democracy (Chaffin et al., 2016), while a recently published agenda for research on sustainability transitions research acknowledges the relevance of democratic theory and practice but devotes very little attention to this issue apart from flagging it as one of several ‘avenues for further research’ (Köhler et al., 2019:16).

Just as with ideas of transformation and sustainability, democracy is widely understood as being multi-dimensional, involving not only minimal characteristics such as free and fair elections, but also a range of

further procedural qualities and values, such as civil liberties, public participation in decision-making, accountability of decision-makers to citizens, and the quality of public deliberation (Lindberg et al., 2014). Accordingly, democratisation may involve not just exiting from authoritarian rule but also a deepening or enhancement of democracy along some or all of the dimensions outlined above.

To better understand the role of democracy in sustainability transformations we can turn to the literature on environmental politics, which contains a longstanding debate on whether democracy is compatible with environmental sustainability (for recent reviews of the literature, see Eckersley, 2020a; Pickering et al., 2020). Many scholars argue that democratic governance can be reconciled with environmental values (see e.g. Dryzek, 2013; Eckersley, 2004; Pickering et al., 2020). Common arguments in support of this claim include that: democratic accountability mechanisms and the free flow of information enable citizens to hold governments accountable for their environmental performance; and an active and diverse civil society can effectively promote stronger environmental commitments (Fiorino, 2018). However, environmental political theorists hold divergent views on whether reform of liberal democratic institutions is sufficient or whether a comprehensive replacement of existing institutions is necessary – typically in the direction of more decentralised and participatory models. The former view is often termed ‘environmental democracy’, and the latter ‘ecological democracy’ (Eckersley, 2020a; Pickering et al., 2020; see also Fig. 1 above). Moreover, just as there is great variation in conceptions and practices of democracy across the world (Keane, 2009), ideas comparable to ecological democracy – including *buen vivir* in Latin America and ecological *swaraj* in India (Kothari et al., 2014) – vary considerably across cultures.

Sceptics of the environmental benefits of democracy argue that global sustainability cannot be achieved through democratic means. Eco-authoritarians argue that more centralised and technocratic means are needed to transform the planet toward sustainability (see Humphrey, 2007; Shearman and Smith, 2007). Common arguments in favour of this view are that contemporary environmental challenges are too complex for ordinary citizens to understand, and election cycles incentivise democratic governments to focus on short-term priorities (Fiorino, 2018). Further critiques are outlined in section 4 below.

3.2.2. A conceptual framework for assessing the democratisation of sustainability transformations

Building on the research we have reviewed so far we can now develop an integrated framework for examining different configurations of democratisation and sustainability transformations and their associated prospects and pitfalls. A range of possibilities for combining trajectories of democratisation and sustainability transformations is illustrated in Fig. 1 above. The boxes in each corner and the right-hand edge depict ideal types combining a high/low level of democracy with a high/low level of sustainability. Most contemporary societies fall somewhere in between these ideal types, typically towards the lower-to-middle left-hand of the space, as depicted by the circle marked ‘status quo’. Transformations towards sustainability involve a large shift from the status quo towards the right-hand side of the space. States with both strong environmental performance and high-quality democratic practices will be situated in the top right-hand quadrant.

The arrows in orange show different possible trajectories for sustainability transformations from the status quo, ranging from:

- a) **Dual transformation:** achieving sustainability transformation through a parallel transformation toward democratic practices (democratisation or deepening of existing democratic practices);
- b) **Sustainability transformation through democratic incrementalism:** achieving sustainability through existing democratic institutions and decision-making processes; and
- c) **Eco-authoritarian transformation:** achieving sustainability transformation through a shift to or persistence of authoritarian rule.

Trajectories (a) and (b) reflect different accounts of sustainability transformations through democratic practices.

4. Democratising multiple dimensions of sustainability transformations

As outlined in the previous section, sustainability transformations involve wide-ranging changes across many sectors and levels of society. We now unpack the democratisation of sustainability transformations by focusing on five crucial societal drivers of sustainability transformations derived from the literature (compare for example the definition of transformations set out in IPBES, 2019, cited in section 3.2 above): *institutional, social, economic, epistemic and technological* transformations.² To this end, the literature review in each section is guided by the following sub-questions:

1. *Theoretical expectations:* are democratic practices expected to help or hinder sustainability transformations in each dimension, and why?
2. *Empirical evidence:* what examples of democratic practices have emerged in each dimension, and what evidence is there to show whether they can accelerate or obstruct transformations towards sustainability?

While empirical evidence is the ultimate arbiter of whether theoretical expectations are supported or not, it remains valuable to review theoretical expectations (including those that have not yet been subjected to extensive empirical testing), as this can help to identify which are the most promising and thereby inform future theoretical and empirical research. Given that it is not possible to present an exhaustive account of literature associated with each dimension within space constraints, the review in each subsection focuses on two key areas of practice associated with each dimension. Findings are numbered and then tabulated in Table 1.

4.1. Institutional transformations

Institutions – understood in a broad sense as sets of principles, norms, rules and decision-making procedures – are crucial for resolving collective action problems and offering durable frameworks to safeguard societal values such as environmental protection (e.g. Young et al., 2008). Yet, paradoxically, the very durability of institutions may present an obstacle for transformation because of the strong path dependency in societies’ existing dominant institutions, including states and markets that systematically disregard their environmental impacts (Dryzek and Pickering, 2019; Patterson, 2020). Likewise, prevailing institutions perpetuate inequalities of gender, race and socioeconomic status that are reflected in disparities in access to benefits from social-ecological systems and in exposure to environmental harms (Pellow, 2017).

Institutional change could take place through many forms of governance, ranging from technocratic or authoritarian rule to democratic, decentralised or citizen-led transformation. States and intergovernmental institutions have long been regarded as the most significant institutions for coping with transboundary environmental problems, and states have traditionally been regarded as the primary locus for democracy. In the past three decades, non-state actors – including city networks, civil society and business – have taken on an increasing array of roles at all levels of environmental governance while also serving (to varying degrees) as drivers of democratic innovation in national and

² Since these dimensions are all societal drivers of sustainability transformations, we do not include a separate ecological/environmental dimension in our analysis. Rapid environmental change (e.g. disasters or ecosystem collapse) could be a catalyst for sustainability transformations, but it is less clear how this change itself could be democratised.

Table 1

The role of democratic practices in accelerating or hindering sustainability transformations: summary of findings.

Dimension of transformation	Evidence for how democratic practices can accelerate or hinder sustainability transformations
<i>Institutional</i>	<ol style="list-style-type: none"> 1. (a) Democracies have stronger environmental performance than autocracies (+) but (b) this correlation is weaker for some environmental problems requiring far-reaching change or where corruption is high (~). 2. Political rights, procedural environmental rights, gender equality in political representation, proportional electoral representation, corporatist models of interest group representation and a longer history of democracy are correlated with stronger environmental policies and/or performance (+) 3. Participatory environmental governance initiatives have a positive effect on environmental outputs (+) 4. Civil society participation in environmental treaty negotiations is correlated with stronger treaty commitments (+) but increasing participation may fail to yield transformative effects if actors are co-opted or existing inequalities of power are replicated (~/-)
<i>Social</i>	<ol style="list-style-type: none"> 5. (a) Deliberative citizens' forums can articulate and strengthen citizens' pro-environmental values (+) but (b) some forms of participatory governance may reflect status quo ambivalence about environmental values (-/~) 6. Social media can facilitate mobilisation of environmental social movements (+) but can create 'echo chambers' that exacerbate political polarisation on environmental issues (-) 7. Functioning democratic institutions can help build the trust necessary to initiate major environmental reforms (+) 8. Presence of environmental NGOs is positively correlated with environmental policy reforms and outcomes (+) but this relationship may depend on civil liberties, democratic status and vulnerability to international pressure (~)
<i>Economic</i>	<ol style="list-style-type: none"> 9. Membership of agricultural cooperatives can enhance farm sustainability (+) 10. Greater involvement of business in multistakeholder and private sustainability initiatives can increase buy-in (+) but can water down commitments (-)
<i>Epistemic</i>	<ol style="list-style-type: none"> 11. Civil society involvement in private sustainability initiatives can improve their environmental performance (+) 12. Inclusive science-policy processes (a) can enhance environmental problem-solving (+) but (b) are liable to co-option by powerful actors who may seek to obstruct transformation (-) 13. Citizen science can provide early warning of and localised evidence on environmental risks (+) 14. Increased public knowledge about climate change is correlated with greater climate change concern in most countries (+) 15. Epistemic pluralism and Indigenous, feminist and critical perspectives can highlight and help overcome racial, gender, species and other biases and exclusionary practices in knowledge production (+)
<i>Technological</i>	<ol style="list-style-type: none"> 16. Democratic status is correlated with the uptake of policies for decentralised renewable energy technologies and green patents (+) 17. Public participation and trust in institutions can enhance the social acceptability of new technologies (+) but can also obstruct their local deployment (-) 18. Grassroots social movements can foster the innovation of new technologies for sustainability (+)

Note on symbols: positive (+), negative (-) or neutral (~) effect. These symbols are only intended to provide a rough guide as to the direction of evidence and cannot reflect all nuances in the findings reviewed in this article. All effects are understood to be average rather than ubiquitous effects.

global institutions (Bäckstrand et al., 2017; Hale, 2016). Nevertheless, the state has returned to the forefront of scholarship on sustainability transformations (e.g. Bäckstrand and Kronsell, 2015; Duit et al., 2016; Hausknot and Hammond, 2020). Accordingly, we focus first on the state before turning to global institutions and the role of non-state actors therein. Space precludes a detailed discussion of radically decentralised models of ecological democracy here but this is an important area where further scrutiny of evidence from existing practice is warranted.

4.1.1. The role of the state in democratising sustainability transformations

The state is frequently conceived of as the most powerful authority for coordinating collective action on environmental issues due to its capacity to allocate and distribute resources, regulate production and consumption, manage free-rider problems associated with common resources, and enforce legal frameworks (e.g. Johnstone and Newell, 2018). Meadowcroft (2008), Eckersley (2004, 2020b), and Duit (2016) have highlighted the significant role of the "environmental" or "green" state or "eco-state" in driving environmental protection. But can democratising the state help to accelerate sustainability transformations?

Proponents of environmental democracy envisage democratic states as best suited to governing sustainability transformations. However, far-reaching sustainability transformation may conflict with the inherent incrementalism of decision-making and reform in democratic states. Accordingly, some scholars argue that even reformist states will eventually hit the 'glass ceiling' of socio-ecological transformation rather than challenging the traditional sources of their legitimacy (e.g. ongoing pursuit of economic growth) (Hausknot and Hammond, 2020; Blüh-dorn, 2020). Proponents of ecological democracy claim that a radical reconfiguration of the state and/or a shift away from the state towards decentralised, citizen-centred governance is needed (Schlosberg et al., 2019), while advocates of eco-authoritarianism argue that only centrally controlled states are capable of implementing the wide-ranging reforms necessary for transformation (e.g. Gilley, 2012).

An important source of evidence for the potential of democratic states to foster sustainability transformations can be found in cross-

national studies. These studies generally point to a positive correlation between democratic status and pro-environmental policies or outcomes (e.g. Dasgupta and De Cian, 2018; Fiorino, 2018; see also Glass and Newig, 2019; finding 1a). However, the extent to which the positive correlation between democratic status and environmental performance holds across different domains of environmental policy remains contested (Bättig and Bernauer, 2009; Dasgupta and De Cian, 2018; Clulow, 2019). For example, the value of democracy for environmental performance may be limited in the case of environmental problems that require far-reaching behavioural and economic change (Wurster, 2013) or in the presence of factors such as corruption (Povitkina, 2018; finding 1b).

One reason cited for the mixed evidence of a positive correlation between democratic status and environmental performance is that empirical studies often work with narrow definitions of democratic status centred on the presence or absence of elections, without adequately accounting for the quality of democratic institutions (Böhmelt et al., 2016; Hanusch, 2018). Some studies address this deficiency by testing the influence of individual components of democratic quality on environmental policy or performance, pointing to positive effects from: political rights, including freedom of expression (Escher and Walter-Rogg, 2018); procedural environmental rights, i.e. rights to public participation, access to information and justice in environmental decision-making (Gellers and Jeffords 2018); and gender equity in political representation (Erga and York, 2012; Atchison and Down, 2019; finding 2).

Other studies compare the performance of different types of democratic systems. Some types – e.g. those based on proportional representation and corporatist modes of interest group representation – tend to perform better on environmental policy than other types, e.g. majoritarian systems with pluralist modes of interest group representation (Lijphart, 2012; Dasgupta and De Cian, 2018). Fredriksson and Neumayer (2013) show that the length of a country's history of democracy is more important than its current democracy level in determining the robustness of its climate policies (finding 2). This suggests

that rapid democratisation may not necessarily result in a similarly rapid transformation towards sustainability. Beyond such cross-national studies, a recent meta-analysis of over 300 participatory environmental governance initiatives showed that on average they have a positive effect on environmental outputs (Jager et al., 2020; finding 3).

While some of these findings highlight possibilities for democratic states to foster sustainability transformations, they do not encompass the full range of democratic practices that could enhance the state's ability to foster sustainability transformations. Deliberative citizens' forums or 'mini-publics' (such as citizens' assemblies or citizens' juries) may catalyse broader institutional change, as illustrated by the legislative reforms enacted pursuant to citizens' assemblies on climate change in Ireland and France (Torney, 2021), although the transformative potential of these forums may be constrained by the mandates they are given and the willingness of decision-makers to accept their findings (Hammond, 2020; findings 3, 5).

Other relevant practices that warrant further scrutiny but which are not addressed here further due to limited evidence of the environmental impacts of existing practice include: lowering the voting age (although evidence on correlations between youth and pro-environmental attitudes remains mixed: see e.g. Lewis et al., 2019); campaign finance reform to reduce undue influence of business interests opposed to sustainability transformations (Ard et al., 2017); and representation of future generations and non-humans in decision-making (Linehan and Lawrence, 2021). Moreover, the globalized nature of contemporary production and consumption systems means that only limited progress can be made within the confines of the sovereign state. Deep transformations hence require the involvement of globally operating institutions.

4.1.2. Democratising global institutions

Global institutions face a severe legitimacy crisis because of their shortcomings in dealing with environmental devastation (e.g. Bäckstrand et al., 2010; Tallberg et al., 2018). While the threat of stratospheric ozone depletion was reduced through multilateral treaty-making, wicked problems like climate change and biodiversity loss remain unresolved. Calls for multilateral institutions to catalyse transformative shifts towards biodiversity conservation and decarbonization have been coupled with calls to democratise institutions for global governance (Stevenson and Dryzek, 2014; Dryzek et al., 2019).

Scholars have identified various pathways toward democratising global institutions. Here we focus on one pathway: increasing civil society participation in environmental diplomacy.³ Over recent decades, the involvement of non-state actors in global environmental policy-making has steadily grown (e.g. Tallberg et al., 2013; Bäckstrand et al., 2017). Some authors underline the potential for non-governmental organisations (NGOs) to push for societal action and elicit greater transparency and accountability from states (Nasiritousi et al., 2016) and their ability to widen the range of perspectives voice in international negotiations (Nasiritousi et al., 2014). Böhmelt and Betzold (2013) find that governments tend to make stronger commitments under multilateral environmental treaties where more environmental NGOs have access to treaty negotiations (finding 4a). However, others caution that civil society actors can be co-opted by dominant institutions (Mert 2019), and that transparency and accountability initiatives frequently fail to translate into improved environmental outcomes (Gupta, 2010; Kramarz and Park, 2016; finding 4b).

The 2030 Agenda for Sustainable Development and the Paris Agreement, both adopted in 2015, feature deliberate efforts to enhance the legitimacy of multilateral environmental cooperation by involving non-state and sub-state actors (Chan et al., 2019). Regarding global

climate policy, scholars argue that the stronger role of non-state actors at international conferences has given a voice to underrepresented groups (Thew et al., 2021). International treaty secretariats such as the climate secretariat can broker transformative climate action and advance democratic values through efforts to orchestrate the contributions of non-state actors (Bäckstrand and Kuyper, 2017; Hickmann and Elsässer 2020; Saerbeck et al., 2020). However, the dominance of the global North and neoliberal discourses in international relations may be replicated to some extent in the representation of non-state actors (Gereke and Brühl, 2019; finding 4b). Despite efforts to include non-state actors, some civil society viewpoints – including on more radical forms of transformation such as lifestyle change – may remain marginalised (Nasiritousi et al., 2014). For global sustainability policy, Sénit (2019) shows that civil society participation in the negotiations leading to the SDGs only had a marginal influence on their content. Nevertheless, the inclusive process appears to have generated considerably more awareness and ownership of the SDGs than what occurred for their less ambitious (and less environmentally oriented) predecessor instrument, the Millennium Development Goals, which were designed through a far less participatory process (Chasek et al., 2016; Dryzek and Pickering, 2019).

4.2. Social transformations

Sustainability transformations will require behavioural changes in many areas ranging from energy and water use to transportation and food consumption (Fuchs, 2020). More controversial is whether a corresponding transformation towards pro-environmental individual values is required, or whether institutional, technological or economic transformations that change citizens' incentives (while not challenging their underlying values) are sufficient to produce collective behavioural change (Stirling, 2015; Scoones et al., 2020). In the present context we understand the social dimension of transformations as involving fundamental shifts in social behaviours, values and cultural practices, including through self-organised social change (e.g. social movements) or the catalytic role of established (e.g. state) institutions (Stuart et al., 2020).⁴ The first part of this subsection deals with the role of democratic practices in encouraging behavioural and value change, while the second part addresses the role of social movements in building momentum for transformations toward sustainability.

4.2.1. Democratising behavioural and value change

Democratic practices can play a key role in challenging prevailing values, assumptions and beliefs, which can spur transformation of value systems and individual behaviour (O'Brien 2012). These practices can be found both at a micro-level and in the macro-dynamics of democratic societies.

At a micro-level, participatory and deliberative practices such as citizens' juries (often known as 'mini-publics') can positively influence perceptions of and willingness to act on environmental issues by exchanging information and shaping preferences (Niemeyer, 2011; Rask et al., 2012; O'Brien et al., 2019). Deliberative forums, for example, can broaden the range of policy choices that people, including environmental sceptics, could accept (Dryzek and Lo, 2015; MacKenzie and Caluwearts, 2021; finding 5a). However, participatory stakeholder or resident meetings may privilege local and short-term interests (Few et al., 2007), while highly contested debates may undermine processes of trust building (Mah et al., 2021) and discourage some individuals from participating (Lo et al., 2020; finding 5b).

At a macro-level, democratic freedoms provide spaces for contestation over social attitudes and values and over different pathways

³ Space precludes a detailed discussion of other aspects of international institutions, including the democratisation of regional organisations such as the European Union (see Tobin, 2017; Avrami and Sprinz, 2019).

⁴ The behaviour of businesses and markets could also be seen as an aspect of social transformation, but to avoid duplication this aspect is dealt with in the section on economic transformations.

towards transformation. However, public spheres are often characterised by a high degree of polarisation over environmental issues. Social media, while potentially allowing for greater citizen autonomy in debates over social values, has often exacerbated ‘echo chambers’ where individuals only engage with like-minded people and their values are not subjected to challenge (Williams et al., 2015; finding 6). Populist governments – which frequently emerge amid declining public trust in political institutions – typically perform more poorly on environmental protection (Böhmelt, 2021). However, functioning democratic institutions can build mutual trust between citizens and decision-makers, which has been found to have a positive impact on intended environmental behaviour (Taniguchi and Marshall, 2018; finding 7).

4.2.2. Civil society mobilisation

Social movements are vital elements of a vibrant democracy and powerful bearers of new ideas. The environmental movement has seen significant success in raising environmental issues to the agendas of states and global forums, even if these successes have not always been matched by subsequent policy responses (Allen 2020; Eckersley, 2020a; Hadden and Bush 2021). Environmental social movements hold potential to drive future sustainability transformations in a number of ways, from raising public awareness of the need for transformation and prompting shifts in public attitudes to holding powerful actors to account and challenging existing power relations that resist transformation (see Burch et al., 2019; Scoones et al., 2020). Despite numerous successes, it remains contested whether contemporary civil society mobilisation on environmental issues can help to lay the groundwork for deep transformation (Schlosberg and Craven, 2019) or whether it only serves as a performative distraction from ongoing societal unsustainability (Blühdorn and Deflorian, 2019).

A recent cross-national study of 100 countries by Pacheco-Vega and Murdie (2021) finds that the presence of environmental NGOs is correlated with lower carbon dioxide emissions in countries that (a) protect civil liberties (which suggests that liberal democratic practices are important for NGO effectiveness) or (b) are vulnerable to international pressure (finding 8). Longhofer et al. (2016) find that the presence of domestic NGOs is correlated with environmental policy reform only in democratic countries, while the presence of international NGOs has a positive effect on reform in democratic and non-democratic countries alike (finding 8). While civil liberties could also foster anti-environmental social movements, the large-n evidence does not show that this effect outweighs the positive effects for environmental policy and outcomes.

Some environmental organisations have faced persistent criticism for seeming all too prepared to sacrifice democratic ideals at the altar of conservation and for democratic shortcomings within their own membership and operations (Almeida 2019). In contrast, some social movements – such as recent youth climate activism movements explicitly call for different ways of practising democracy, which may in turn yield benefits for sustainability transformations, although evidence of the impacts of these recent movements remains limited (Fisher and Nasrin 2020).

4.3. Economic transformations

Rapid economic growth – particularly since the mid-twentieth century acceleration of industrialisation and globalisation – has lifted hundreds of millions of people worldwide out of poverty but has also yielded highly uneven benefits, failed to eliminate entrenched disadvantage in many parts of the world and placed extreme pressure on ecosystems (UNEP, 2017). Simultaneously, economic transformations have concentrated business power along global supply chains and increased business power in policy-making, resulting in power imbalances vis-à-vis governments and civil society (Dauvergne, 2018). Sustainability transformations will hence require equally profound changes to existing patterns of production and consumption (Fuchs, 2020). Not

only will economic transformations towards sustainability create winners and losers, but they will also need to take place in a context of pronounced asymmetries of power (Newell and Patterson, 2010). While the core democratic value of inclusion could empower marginalised groups to have a say in economic decision-making processes, these same processes could also enable powerful economic interests to advance their own goals.

4.3.1. Dilemmas of inclusion in economic transformations

Many perspectives converge on the idea that a wide range of economic actors needs to be included in debates about the direction of transformation, including workers and consumers (Stavis et al., 2018). Otherwise, there is a risk of backlash against radical policy shifts, as illustrated by protests against sustainability measures in France by the Yellow Vests movement and against fossil fuel subsidy reform in Ecuador (IISD, 2019). Hence, there is a growing recognition of the need for a ‘just transition’ towards more sustainable societies (Newell and Mulvaney, 2013; Stavis and Felli, 2015).

However, contention remains over how to structure inclusive decision-making processes. Stakeholder-based governance may achieve consensus on contested issues of transition but this may come at the price of the speed of transformation. The German Coal Commission, for example – which included representatives from governments, business, unions, and environmental organisations – reached agreement on the phase-out of coal mining and coal-fired plants in Germany, but the 2038 deadline for this goal has been criticised as being too late (Coggio and Gustafson, 2019).

Overall, inclusiveness features prominently in economic and business models that diverge from and sometimes challenge capitalist economic structures. Business models based on solidarity and sustainability ideals, such as agricultural cooperatives, tend to include direct participation of agricultural producers in decision-making processes, even though doubts remain as to the extent to which the poorest farmers when these cooperatives have a clear market orientation (Bijman and Wijers, 2019). A literature review by Candemir et al. (2021) finds that membership of agricultural cooperatives is associated with higher levels of environmental sustainability on farms (finding 9). Likewise, examples of participatory circular economy initiatives illustrate that addressing environmental issues in an inclusive manner can not only alleviate environmental pressures but also create new employment opportunities for marginalised groups (Schröder, 2020).

4.3.2. Strategies for democratising economic transformations

A major approach to democratising economic transformations toward sustainability has been the establishment of transparency and accountability mechanisms in corporate governance (e.g. Gupta, 2010; Kramarz and Park, 2016). Through both collaborative and confrontational interactions, civil society actors have sought to change business practices through a variety of mechanisms, including corporate reporting legislation, shareholder activism (Grewal et al., 2016), directly ‘shaming’ corporations (Bloomfield, 2014; Dauvergne, 2018), roundtables and multi-stakeholder initiatives (Kalfagianni and Pattberg, 2013; Schleifer and Sun, 2018), eco-labels and certifications (Auld, 2014; van der Ven, 2019), and other forms of private governance (Kalfagianni, 2014; Renckens, 2020). Yet, many business-led initiatives on transparency and accountability have had only marginal impacts on corporate sustainability (van der Ven et al., 2018). Indeed, policies aligned with self-regulation such as industry-wide codes of conduct often act as a strategy to defer more effective state-based regulation (finding 10). However, evidence from forestry, fair trade and organic agriculture governance demonstrates that continued pressure from activists and social movements can ratchet up such initiatives – increasing their democratic credentials and effectiveness simultaneously (Auld, 2020; Bloomfield, 2017; finding 11).

Ultimately, democratising economic transformations requires rethinking the broader role of the economy in the public sphere.

Currently, the role of the economy is inextricably linked to economic growth for its own sake rather than as a means to achieve sustainability and wellbeing (Kubiszewski et al., 2013). Some scholars, particularly from a degrowth perspective, urge societies to change dominant GDP-oriented ways of thinking towards more community- and ecologically-oriented ones (Asara et al., 2013). More inclusive democratic decision-making processes could help to engender a shift towards the equitable redistribution of the fruits of economic activity, rather than the pursuit of unending economic growth, as a key source of state legitimacy (Eckersley, 2020b).

4.4. Epistemic transformations

New forms of knowledge and thinking are essential for understanding and avoiding existing patterns of unsustainability. We understand epistemic transformations as fundamental shifts in ways of knowing, and practices of producing, disseminating and using knowledge on sustainability. We focus on two aspects of epistemic transformations. The first relates to *democratising processes* for producing new scientific knowledge and its interaction with policy-making, with an emphasis on broadening the range of actors involved in these processes. The second focuses on *democratising the kind of knowledge produced*, through fostering epistemic pluralism.

4.4.1. Democratising knowledge production through inclusive science-policy processes

Sophisticated scientific inquiry and inter-disciplinary collaboration are central to identifying the causes and dynamics of complex environmental problems as well as monitoring and predicting the effects of sustainability measures (Stock and Burton, 2011). This is particularly the case for understanding the operation of the global climate and the earth system as a whole (Biermann et al., 2010). However, scientific knowledge geared towards technological solutions to sustainability problems – and the ways in which this knowledge is produced – can be difficult to reconcile with practices of democratic participation, deliberation and policy-making (Hulme, 2014; Löwbrand et al., 2015). Conventional practices of science have been criticised not only for being elitist and lacking democratic legitimacy (Bäckstrand et al., 2010; Jasanoff, 2017) but also for giving rise to contemporary ecological crises (Latour, 2010; Jasanoff, 2011). Democratising knowledge production and use could alleviate some of these problems. Transforming the one-way information flow from science to society into a more iterative, dialogical relationship can result in more contextualized or context-sensitive knowledge production models, open to public inquiry and deliberation (Nowotny et al., 2001).

Citizens and stakeholders have a central role in producing knowledge for sustainability transitions and democratising these processes. Recent research on the epistemic benefits of democracy supports the idea that the ‘wisdom of the many’ can aid solutions to complex problems (Landemore, 2013; Stevenson, 2016). Greater societal involvement in scientific practice can accelerate sustainability transformations by generating knowledge that is more responsive to societal needs, gaining greater public acceptance and reducing disenfranchisement (Beck et al., 2014; Díaz-Reviriego et al., 2019; finding 12a). Furthermore, practices such as citizen science could provide early warnings of emergent environmental risks and support disaster risk management, for instance by forecasting and warning of hazards, generating shared understandings of risk, and reducing costs of adaptation for low- and middle-income countries (Berg and Lidskog, 2018; Hicks et al., 2019; finding 13).

However, greater public and stakeholder engagement in knowledge production can pose different kinds of risks. For example, powerful actors could co-opt stakeholders if inclusion processes are not carefully designed with democratic principles in mind (Bäckstrand et al., 2010; Mert, 2014). Furthermore, tensions can arise in knowledge co-production between the “critical/reflexive ambition” contained in the idea and its utilitarian deployment to secure societal acceptance for

pre-determined objectives (Löwbrand, 2011:225; finding 12b).

Finally, there is the concern that citizens’ knowledge on environmental issues is filtered through ideological lenses. In the US, increased knowledge on the issue is associated with higher climate change concern among liberal voters, but with lower concern among conservative voters (Hamilton, 2011). However, a cross-national study of 36 countries did not find such strong ideological filtering elsewhere; outside the US, climate change concern is strongly correlated with education and a commitment to democratic principles (Lewis et al., 2019), suggesting both improved knowledge and stronger support for democratic values may help to accelerate sustainability transformations (finding 14).

4.4.2. Epistemic pluralism

The question discussed above regarding *who* is included in knowledge production is closely related to that of *what* kinds of knowledge are included, but the two questions remain distinct. Thus, different levels of inclusion remain compatible with different degrees of epistemic pluralism, which refers to an openness and invitation to different ways of knowing. Here, we discuss the role of two types of epistemologies in democratising sustainability transitions: Indigenous knowledge and critical theories.

First, there is increasing awareness within sustainability research and policy communities of the importance of including the knowledge of Indigenous peoples and local communities that have been excluded by existing structures of power and knowledge (Cornell et al., 2013). Indigenous cultures have long been viewed by sustainability science as a rich source of data (see Bohensky and Maru, 2011). Yet, beyond their instrumental or practical use, Indigenous knowledge systems can help overcome some of the blind spots of contemporary science and policy processes (Shiva, 2016; Yunkaporta, 2019). For example, Indigenous thinkers and scholars have suggested ways to sensitize contemporary scientific production to underlying racial, gender and other biases (TallBear, 2014; Muñoz 2015). The strict separation between the human and natural world in modern epistemes has often been criticised for justifying human domination of nature (Pedersen, 2011; Westerlaken, 2017). Many Indigenous worldviews do not countenance such a strict separation, thus offering possibilities to rethink humanity’s relationship with the non-human/more-than-human world (Ingold, 2011; finding 15).

Second, stronger inclusion of social sciences and humanities in the science-policy interface could aid sustainability transformations by highlighting the political, social and economic opportunities and constraints facing different policy options (Sörlin, 2013). While much social scientific research operates within a positivist framework shared to some extent by the natural sciences, other perspectives – e.g. critical theories (Escobar, 1999; Latour 2018) and feminist approaches (Haraway, 2013; Tsing, 2015) – can reveal the ontological and epistemological biases and limitations of current scientific practices (finding 15). Epistemic pluralism of this kind does not necessarily imply democratisation (e.g. if knowledge production remains within the hands of elites) but can help reinforce the normative case for more inclusive approaches outlined earlier. However, there remains the concern that some critical perspectives on science could be misused by actors such as climate denialists who seek to discredit scientific findings as politically motivated (Latour, 2010), or altogether irrelevant and relative for being socially constructed (Fischer, 2019; Stevenson, 2021).

4.5. Technological transformations

The phase-out of environmentally damaging technologies and the adoption of sustainable technologies are crucial for sustainability transformations (Clark et al., 2014). Some proponents of ecological modernisation posit that technological change can bring about sustainability without fundamentally challenging existing institutions or social values (Warner, 2010). However, a long history of scholarship has highlighted that Western technological systems co-evolved in a close

relationship with capitalism and the formation of the modern state (Jasanoff, 2010; Mitchell, 2011; Pichler et al., 2020). Given the proximity of technology to incumbent systems of power, efforts to replace old technologies in the name of sustainability will almost certainly encounter resistance from existing institutions and vested interests (Unruh, 2000). Critics of technology-driven transformations towards sustainability argue that technological systems are often embedded in practices that embody central control, hierarchy and patriarchy, and exclude local and lay knowledge and expertise (Jasanoff, 2004). Accordingly, many argue that the democratisation of technology is a necessary pathway to technological transformation (see e.g. Mitchell, 2011; Warner, 2010). While the overall relationship between democracy and technological innovation remains contested (Gao et al., 2017), Zecca and Nicolli (2021) find a positive correlation between democratic status and patenting of green technologies (finding 16; noting that patenting serves only as an imperfect proxy for environmental performance). In the remainder of this section we discuss democratic practices in governing emerging technologies and energy systems.

4.5.1. Democratic governance of emerging technologies

A common theme in public debates over the development and diffusion of new technologies for sustainability is the risks and trade-offs they may pose for other societal values. Controversial examples include agricultural biotechnology (e.g. genetic modification to produce pest- or drought-resistant crops) and new technologies to address climate change such as carbon capture and storage (CCS) and solar geoengineering (technologies to block or reflect incoming solar radiation).⁵ While weighing up the risks and benefits of new technologies is dependent on empirical knowledge and expert modelling, it also depends crucially on societal values and priorities. Accordingly, many argue that the appraisal of technological risks needs to be governed democratically through meaningful public input and deliberation (Jasanoff, 2011; Stirling, 2015). However, it remains debated as to whether increased public input is more likely to accelerate or slow technological transformations towards sustainability.

Public support for new technologies is likely to depend on a number of factors, including (i) the characteristics of the technology in question; (ii) characteristics of publics, including demographic, social and cultural factors; and (iii) the processes by which decisions about new technologies are reached (Boudet, 2019). Next we elaborate on the democratic implications of the second and third aspects.

There may be important demographic differences in risk perceptions across populations, with women and people of colour often attributing higher risks to new technologies than white men, while also being more concerned about risks such as climate change (Boudet, 2019). Similarly, risk perceptions may differ between publics in the global South and North, and between publics and experts. For example, Sugiyama et al. (2020) find that survey respondents in the South were more likely to support solar geoengineering than respondents in the North. Policy debates about geoengineering have so far been driven largely by actors in the North (Biermann and Möller, 2019). Further democratisation of debates about new technologies (e.g. to include marginalised social groups) may alter the trajectories of these debates, but the evidence is not consistent as to whether this will yield greater public support for potentially risky technologies.

The extent to which people can participate meaningfully in deliberation about the introduction of a new technology may have a significant effect on its likelihood of adoption (Boudet, 2019). People are more likely to accept a technological risk if they trust the institutions advocating for the technology's adoption (Greenberg, 2014; finding 17).

⁵ The role of other technologies (e.g. information, manufacturing or transport technologies) in accelerating or inhibiting sustainability transformations is a further major issue, but due to space constraints we do not address these in detail.

Accordingly, strengthening practices of public engagement and broader democratic institutions may help to build support for transformative technological change.

4.5.2. Energy democracy

A shift to less polluting, carbon-neutral societies will be impossible unless existing energy systems are transformed. Due to space constraints we focus here primarily on renewable technologies, while noting that ideas of democratisation could apply across the entire energy system (Burke and Stephens 2017), including the phase-out of fossil fuels. The challenge for a renewable energy transition is no longer so much a question of costs since renewable energy is now the cheapest source of new generation globally (IEA, 2021). Instead, many of the key challenges to the uptake of renewable technologies relate to institutional barriers, vested interests, political partisanship and societal acceptance, along with the need to minimise any adverse environmental and social consequences associated with particular technologies (Devine-Wright et al., 2017; Kramarz et al., 2021; Sovacool et al., 2019).

Contemporary energy systems are highly technocratic, managed by experts, who in many countries frame the challenge of energy change within the contours of competitive markets (Szulecki, 2018, p. 27). Accordingly, dominant framings of energy transformations or transitions continue to largely exclude the possibility of public involvement in how the sector may evolve (Jasanoff, 2018). In contrast, energy democracy is gaining increasing traction both as a body of literature and a social movement. While some accounts of energy democracy use the term to describe existing practices of decentralised energy production, others view it as a goal – whereby citizens are involved in the design and potentially the ownership of energy systems – towards which energy transformation should aspire (Szulecki, 2018, p. 23).

Democratising the energy sector could accelerate technological transformations towards sustainability in several ways. First, fair processes involving affected communities are critical for acceptance in the siting of renewable technology installations (Demske et al., 2015). Second, public ownership of renewable technologies, such as rooftop solar panels or energy cooperatives, may help to destabilise the power of vested interests in fossil fuel technologies while giving a broader group of citizens a direct stake in sustainable sources of energy (van der Schoor et al., 2017; Ramalho et al., 2018). For example, there is a positive relationship between the adoption of solar feed-in tariff (FIT) policies and the democratic status of countries (Bayer and Urpelainen, 2016; finding 16). Third, improved public accountability could help to constrain the power of incumbent interests and ensure that technological change is responsive to public preferences (Szulecki, 2018, p. 31). Finally, democratic practices could facilitate decentralised innovation and diffusion of sustainable technologies (van der Schoor et al., 2017; finding 18). While there does not seem to be a direct relationship between the democratic status of a country and the likelihood of a rapid transition, it does appear that public participation in aspects of the design, location, and ongoing use of that technology leads to more rapid uptake (Sovacool and Martiskainen, 2020; finding 17).

5. Discussion

5.1. Theoretical expectations: are democratic practices expected to help or hinder sustainability transformations?

Our review of the literature reveals a diverse array of expectations about the extent to which democratic practices in spheres of institutions, economy, society, technology and knowledge-production can foster large-scale transformations towards sustainability. While a few scholars argue that large-scale transformation to sustainability will require the rollback of democratic safeguards or the imposition of technocratic or authoritarian rule, a majority of researchers on the democracy-environment nexus argue that democratisation and sustainability transformation are mutually supportive.

A common expectation in literature on the five dimensions outlined above is that stronger citizen and stakeholder participation and more effective representation of their interests and values in decision-making can help to counterbalance the powerful forces that pose roadblocks to sustainability, including neoliberal and extractive states and unregulated markets. Yet, there remains some ambivalence about whether citizens' existing values are sufficiently aligned with goals of sustainability. Accordingly, while many accounts call for an opening up of technological and scientific practices, they still see an important role for expert knowledge in informing collective decision-making. This underscores the need for a differentiated approach to democratising each dimension of sustainability. Transformation along all dimensions will require action by states, sub- and supra-national institutions, citizens, experts, businesses, and civil society. However, the type of involvement required of each group varies according to the dimension in question. For example, iterative dialogue between citizens, experts and policy-makers is important particularly for the technological and epistemic dimensions, whereas ensuring space for citizen-led social movements and sustainability experiments remains crucial for social transformations.

Much of the literature expects that the state will continue to have a significant role in sustainability transformations. Therefore, deep democratisation of the state is an important pathway for the broader democratisation of sustainability transformations. At the same time, it is increasingly clear that democratising the state is insufficient, given that a shift towards more sustainable practices is required at all levels of governance. This underscores the need for a polycentric and transnational approach to both sustainability and democratic transformations, e.g. through encouraging the diffusion of local sustainability experiments, deepening civil society participation in international environmental negotiations and transnational governance or linking citizen deliberation at local scales to larger deliberative systems (Niemeyer, 2019).

5.2. Empirical evidence and policy implications: can democratic practices accelerate sustainability transformations?

The evidence presented in our review reinforces, nuances and extends existing findings about the complex relationship between democracy and sustainability transformations. While there is a significant body of empirical evidence indicating that democracies tend to perform better on environmental policy than autocracies, we have shown that this finding requires further investigation to better understand whether democratic practices are well equipped to accelerate large-scale transformations towards sustainability. Our review reveals that a focus on deepening the quality of democracy across all scales of governance is likely to foster sustainability transformations. The evidence is summarised in Table 1 above.

These findings yield several policy implications, including:

- a) deepening citizen participation and securing procedural environmental rights across all dimensions of transformation at all levels of governance (findings 1–5, 8–13, 17–18);
- b) strengthening arrangements to regulate undue influence by vested interests in the media, science-policy processes and environmental decision-making (findings 2, 4, 10, 12)
- c) enhancing gender equality and the representation of Indigenous peoples and marginalised groups in political institutions, science-policy processes and environmental decision-making (findings 2, 15);

- d) investing in public awareness and education to promote informed public debate on sustainability transformations (findings 6, 14); and
- e) building broader public trust in political institutions responsible for decision-making on sustainability transformations (findings 7, 17).

Given that the empirical evidence on links between democratic practices and environmental performance remains mixed and evolving, there will inevitably remain some uncertainty about whether the policy options outlined above will necessarily accelerate sustainability transformations. At the same time, it is important to emphasise that most if not all of these strategies are intrinsically valuable for other reasons (e.g. political equality) irrespective of their instrumental effects on sustainability (Hammond, 2020).

6. Conclusion

Democratic practices by cities, states, international and supranational organisations hold considerable potential for accelerating sustainability transformations across all of the five dimensions in our analysis. Potential downsides of democratisation can be found in each dimension, although the weight of evidence does not suggest that they outweigh the benefits. States and international institutions remain central to efforts towards enhancing democracy and achieving sustainability transformations. But it has become clearer than ever that effective sustainability transformations rely on concerted action by different societal actors, ranging from individuals, civil society groups and social movements, researchers and other experts, businesses, and sub-national public bodies. Democratic practices can help to foster productive interactions amongst these actors (Dryzek et al., 2019). At the same time, the evidence remains unclear as to whether democratic incrementalism embodied in existing practices will be sufficient to generate the sustainability transformation at a scale needed to avoid irreparable disruptions in socio-ecological relationships and systems. While it is beyond the scope of this paper to conclude whether it is preferable to strive for ecological or environmental democracy (see Pickering et al., 2020), it is nevertheless the case that many existing democracies have not fully embraced the range of democratic practices outlined in Table 1 above. This suggests that a dual transformation may be necessary; one that promotes sustainability while simultaneously deepening democracy.

Our review points to the need for further research in several areas. First, enhanced collaboration and dialogue are needed between researchers on democracy and scholars analysing the various dimensions of sustainability transformations. Second, there remains a need to go beyond analysis and diffusion of existing democratic practices to explore whether unprecedented modes of transformation may be needed to challenge the power of incumbent interests that undermine both democracy and sustainability and that simultaneously perpetuate inequalities of race, gender and other dimensions. Third, further work is needed to explore how democratic practices across different levels of governance – from local to global – could interact to accelerate transformations. Finally, social scientific research on democracy needs to be better integrated into interdisciplinary and transdisciplinary collaboration on sustainability (Overland and Sovacool, 2020), including inter-governmental assessments.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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