



Downscaling doughnut economics for sustainability governance

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The concept of ‘doughnut economics’ is attracting growing attention from policy-makers and has the potential to unify stakeholders around a holistic vision of sustainable development. The ‘safe and just’ space within the doughnut is framed at a global scale, based on human needs that represent a foundation for social wellbeing, and planetary boundaries reflecting biophysical limits. However, the geographical division of political power between and within nations means that its ability to stimulate change will depend upon its application at national and subnational scales. This paper examines the challenges facing local institutions in downscaling doughnut economics for planning, decision-making and leadership; draws on wider literature from previous efforts to localise sustainability governance to help illuminate these challenges; and outlines a future research agenda to support local governance for a safe and just space.

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Introduction

Doughnut economics [1] is one of the latest manifestations of long-standing efforts to shift socioecological systems towards sustainable outcomes. The doughnut framework (hereafter ‘the doughnut’) visually represents the need for an environmentally safe and socially just space for humanity — meeting people’s needs without disrupting biophysical processes. With its origins in the work of Kate Raworth at the pro-development NGO, Oxfam, doughnut economics is something of a hybrid, building on the imperative to recognise planetary

boundaries that, if crossed, could destabilise earth system processes [2,3] as well as priorities for human needs negotiated via political processes attached to the UN. As such, doughnut economics has the potential to widen the appeal and purchase of planning, decision-making and leadership for sustainable development. In doing so, it may offer the possibility for new approaches because of its integration of social and environmental domains that promotes a holistic rather than siloed approach; incorporation of the ecological imperative of staying within planetary boundaries and social imperative of meeting human needs; and underpinning vision that challenges the dominant paradigm of economic growth.

While the doughnut was developed as a global model, its ability to realise change will depend upon effective governance to support its application at a range of spatial jurisdictions. The geographical division of political power means that such action is likely to be taken at national and subnational scales [4,5]. The framework has captured the imagination of policy-makers, NGOs and citizens at a range of scales [6], aligning with a renewed focus on multilevel governance for sustainable development [7,8]. Local governance institutions have long been recognised as key to enacting change for sustainable development because of their proximity to communities and ability to respond to context-specific issues [9]. However, while planetary boundaries and the safe and just space encapsulated by the doughnut have received considerable attention among researchers, there has been comparatively little attention to the governance challenges of their application in local contexts.

In contrast, the wider literature on governance for sustainable development has paid considerably more attention to questions of local governance. In particular, Local Agenda 21 (LA21), emerging from the Rio Earth Summit in 1992, focused on the role of subnational action in achieving global goals, advocating that local authorities promote participatory, community based and inclusive initiatives [10]. Debate about ‘localising’ sustainable development was further advanced during the implementation of the Millennium Development Goals during the late twentieth century and continues through efforts to ‘mainstream’ the Sustainable Development Goals (SDGs) into local government practice [11]. To date, this literature has highlighted a number of challenges that arise from localisation and, given the appeal

and take up of the doughnut at local level, there is now a pressing need to consider how adopting this framework potentially overcomes some of the challenges encountered in local governance for sustainable development, and the extent to which it may present novel challenges. In comparison to previous approaches such as LA21 and the transition movement [12], however, advocates for the doughnut approach provide comparatively little guidance on the types of governance arrangements best suited to realise their vision.

This paper seeks to integrate currently disconnected areas of the literature to help realise the potential impact of the doughnut. Our review is not intended to be exhaustive, but focuses on bringing together recent literature on downscaling planetary boundaries and doughnut economics, published in the last five years, with more established debates on local governance for sustainable development. First, we summarise these bodies of literature to outline important gaps in existing research. Second, we identify three significant governance challenges related to downscaling the doughnut, examining issues highlighted by existing literature, as well as distinctive challenges related to downscaling global frameworks like the doughnut. This work is motivated by our experience of working with a local authority in Cornwall, UK, as they grappled with using the doughnut to inform decision-making and activity, and we use this case study to illustrate the challenges identified. Finally, we reflect on these challenges and wider governance literature to identify areas for future development of research and practice in downscaling the doughnut.

Downscaling the doughnut and governing for sustainable futures

Downscaling global frameworks

Research related to downscaling the doughnut has primarily focused on interpreting and measuring key parameters across scales. This work began with a focus on planetary boundaries that are reflected in the ‘environmental ceiling’ of the doughnut. Though planetary boundaries were not designed to be downscaled [13], translating their meaning to subglobal scales is important to align with decision-making processes [14]. It also requires grappling with the challenges of data availability and identifying appropriate methodologies to downscale boundaries, some of which are inherently global, while others have identifiable national limits or local thresholds [15–18]. Critically, establishing subglobal limits also raises normative questions about tolerance to risk in approaching biophysical thresholds, which may vary across contexts, as well as historical justice issues relating to inequities in past resource use [19,20].

Raworth’s innovation has been to incorporate social domains that reflect human development needs and form

the basis of the doughnut’s ‘social foundation’ alongside the more established focus on biophysical planetary boundaries [1]. Between the ecological ceiling and social foundation lies the safe and just space where both biophysical systems and human well-being can be maintained. While the social foundation is based on human needs, understanding the context-specific nature of how these are understood and met according to different cultural expectations is a challenge for translating the model across spatial scales [21]. Furthermore, social domains are multidimensional and may be open to competing interpretations or numerous potential indicators for monitoring progress [18]. There are also obvious challenges in the spatial delimitation of social problems which necessarily stretch across socio-political boundaries [22].

Research on downscaling has taken various approaches. Burden-sharing approaches that seek to allocate responsibility equitably have identified geographical differences in the extent to which countries meet social thresholds within planetary boundaries [23], mapped national trajectories over time [24], and illustrated the urban contribution to global trends [25]. Other approaches have developed a ‘barometer’ or ‘portrait’ to identify priority areas for action [18], or examined place-based dynamics at regional scales [26]. Many of these studies are expert-led, data-driven and highly technical, yet despite this, practitioner-led approaches have also been experimenting with the doughnut. The framework is being taken up at a diversity of spatial jurisdictions including nations, cities and regions (e.g. see doughnuteconomics.org/tools-and-stories) [27–32]. These examples illustrate the strength of the doughnut in providing a powerful visual framework to stimulate public engagement, debate and policy innovation. To date, however, the governance challenges of such local scale applications have received limited attention in academic debate.

Governance for a safe and just space

Academic debates about governance relating to planetary boundaries and the safe and just space of the doughnut have been closely associated with literature on earth system governance (ESG) which integrates the idea of planetary-scale social–ecological systems with theories of governance [33]. Though ESG has been applied to multiple scales [34], there has been a strong focus on global governance arrangements. ESG scholars highlight key challenges including a need to understand the interplay between earth system processes and global policies, querying the roles and capacities of global institutions to respond to the planetary boundaries and interactions between them [35,36]. While the role of bottom-up processes is acknowledged, for example through the potential to provide a ‘mobilising narrative’ to drive higher level change [36], the role of local institutions has received comparatively less attention. This is important given that the doughnut has particular

resonance at the local scale, reflecting concern for human needs [14]. The practical implications for existing local institutions and their role in shaping a safe and just space thus need further consideration.

Recent refinement of planetary boundaries concepts incorporates aspects of doughnut economics thinking to include the idea of a 'safe and just corridor' that aims to consider complex interactions among biophysical and social processes to identify pathways in which safe and just overlap. This analysis is intended to inform an international scientific assessment and the development of associated goals for downscaling, to be determined by the Earth Commission with the ambition of mobilising other actors [37]. This aligns with new forms of 'goal-setting' governance, whereby non-binding international goals steer change through networks, allowing for adaptation to national and local circumstances [38]. However, the suggestion is that goals will be set for cities and corporations, neglecting other jurisdictions. Furthermore, which actors will be mobilised, how, and for what, remain important questions around the operationalisation of these ideas. Drawing insights from the wider literature on localising governance for sustainable development can inform these debates by developing an understanding of the governance approaches that might effectively support downscaling the doughnut.

Challenges for local governance

Our review of the literature and reflection on our experience of applying this approach to local governance in Cornwall, UK, has highlighted three major challenges involved in downscaling the doughnut to subnational scales. Each of these incorporates problems that are found in evaluations of other efforts to localise governance for sustainable development, as well as those distinct to downscaling global models. In this section, we outline each of these challenges and illustrate their application in relation to the case of Cornwall, where the local authority has been experimenting with the doughnut framework since 2019 (see [Box 1](#)).

Representing, understanding and responding to complex systems

Downscaling the doughnut may require more attention to connectivity across scales than has been demanded by past approaches to local governance for sustainable development. The task of downscaling global models intensifies established challenges around goal setting, indicator selection, data availability and ongoing monitoring [18,22,23,26,39] because it requires goal setting to be informed by an understanding of context-specific social and ecological trends and how they interact to influence both local and planetary outcomes. There are particular complications in incorporating a burden-sharing approach that explores the extent to which local activity contributes to global trends and problems. In

practice, this may not be viable due to data paucity, scientific uncertainty, weak institutional legitimacy, and the need to consider place-sensitive problems and solutions [40]. However, the doughnut highlights the importance of considering absolute rather than relative performance in relation to social and ecological goals [24], demanding a holistic approach that reflects and responds to the ways in which places are implicated in sustainability challenges.

Understanding complex inter-relationships within and between environmental and social domains remains a challenge for pursuing a safe and just space [21,41]. While research has sought to address this, for example, by modelling social and biophysical processes together [42], downscaling poses the additional complexity of understanding place-based dynamic systems to identify pathways that are safe and just over time [26,37]. In comparison to national processes, where issues are addressed by separate government departments and siloed policy agendas [22], local institutions may be better able to generate integrative place-based policy and action [43,44]. However, institutional capacity and integration mechanisms may be needed to support these kinds of policies [45]. Applications of the doughnut present further challenges in this regard because of a need to integrate and respond to changing scientific knowledge regarding non-linear change, tipping points, interactions and feedbacks [35], for which it may be difficult to identify the implications for local contexts.

Localising global models poses the challenge of reconciling global goals with the inherently contested and contextual nature of sustainable development [46]. Literature on localising the SDGs highlights the risk that global goals may not reflect the interests and concerns of local communities [47,48]. In downscaling the doughnut, this challenge may be exacerbated by the strong focus of the environmental ceiling on scientifically determined limits, raising the question of whether downscaling should be a technocratic exercise (e.g. consulting experts to inform decisions on what should be measured [18]) or whether it needs to be supported by societal debate about the ambitions of governance. Both avenues present capacity challenges for local institutions, either to keep up with the complex and rapidly evolving systems science underpinning the environmental ceiling, or to engage in deliberative processes to establish locally relevant and acceptable goals. Research on local governance for sustainable development already identifies limited technical capacity, human resources and specific expertise as major challenges [9,10,38].

While discussion of planetary boundaries has to date been dominated by scientists, limiting policy-makers to the task of staying within expert-defined limits [14], there is an argument that the identification of social and

Box 1 Experimenting with doughnut economics and local governance in Cornwall, UK.

Cornwall Council covers a rural county in southwest England, with a dispersed population of just over half a million residents concentrated around small towns. The Council declared a climate and ecological emergency in 2019 and has since developed ambitious plans to achieve carbon neutrality and boost nature recovery. As part of this work, Council officers began to experiment with the doughnut to take a holistic view when considering major decisions. The Council created a 'decision-making wheel' that incorporated a traffic light system to register the potential impact of change on 21 social and ecological domains, which broadly mirrored those used by other versions of the doughnut. Subsequent research by the authors in partnership with the Council developed a portrait of the 'Cornish doughnut', identifying existing data that could be used to assess the current situation. In combination with a public consultation launched by the Council to ask people about 'the Cornwall we want', this work contributed to a new strategic plan, *The Cornwall Plan 2020–50* with the goal of achieving greater social and ecological sustainability. The plan was published in early 2021 with endorsement from the Cornwall and Isles of Scilly Leadership Board, a multistakeholder forum that includes public, private and voluntary sector partners. Since initial publication, the Leadership Board has undertaken an Annual Review that evaluated progress against the doughnut as well as including independent research to assess the strength of collaborative partnership working [74]. The need for deeper community engagement in securing the delivery of the plan has been identified as a pressing issue for action in future. Our involvement in this process of applying the doughnut framework in Cornwall has illuminated the challenges identified in the literature reviewed in this paper.

Representing, understanding and responding to complex systems: identifying goals and monitoring progress is hampered by a lack of suitable data, targets and indicators at a county scale, as well as conflicting views among Leadership Board partners around which indicators are most appropriate. Many national datasets are unavailable locally, and for some domains, no appropriate available indicators could be identified. Available indicators predominantly assess relative progress rather than change in relation to goals or limits, for which locally appropriate values are difficult to determine. Moreover, indicators are likely to be monitored discretely with no established mechanism to consider interactions among and between social and environmental domains either within the locality or across scales. While the doughnut is useful to visualise the potential impacts of decisions, integrating complex dynamics and interactions further requires developing the means to take stock of all decision-making in order to identify the aggregated and cumulative impact across Cornwall and to then alter course if required. However, decision-making within the council is necessarily siloed between departments, and there are only weak mechanisms to develop an aggregated view.

Goal coherence across scales: Community activists promoted the use of the doughnut in advance of the upsurge in environmental activism that prompted many governments to declare a climate and ecological emergency in late 2019. This double-movement encouraged council officers and elected councillors to start experimenting with the doughnut, but subsequent elections and the pressures of the COVID-19 pandemic changed the political context again, highlighting a vulnerability to political change in the absence of a higher level steer towards this approach. Since the election of new political leadership in Cornwall in 2021, previous priorities will inevitably change and may reconfigure policy ambitions. Furthermore, multiscale connections within and beyond the county present challenges. The unitary council covers the whole county and works with more than 200 town and parish councils at the very local scale. Ensuring that they have the authority and capacity to lead while also ensuring pan-county progress towards the goal of the plan is one challenge. In key areas such as planning, both town and parish councils and the County Council are also constrained by national-level policy.

Navigating power dynamics, inequalities and trade-offs: A county-wide portrait of the doughnut risks masking the wide divisions in wealth within Cornwall, while there is an absence of data at town and parish level that makes it difficult to identify and monitor particular areas of concern. To facilitate the dialogue needed to identify and debate potential trade-offs across sectors, there is a need to ensure shared ownership and coordinated leadership across the public, private and voluntary sector organisations involved in delivering on different goals in the *Cornwall Plan*. This requires fostering trust among partners; consideration of how the plan's objectives align with existing strategies, goals and modes of working; and building institutional memory. With the development of *The Cornwall Plan*, there is now also a need to boost effective stakeholder engagement, to communicate the vision of the plan in a way that engages a broad range of organisations, businesses, civil society groups and citizens who have an interest in its implementation, to ensure their voices are heard; build wider momentum and capacity for action; and enable space for deliberation over difficult decisions. This will present significant risks for politicians and elected officials in opening up their decisions to public debate, posing a danger of losing control of the plan as it has to reflect the wider range of voices and new ideas that are raised. However, recognising the potential to mobilise the capacity of civil society to achieve the goals of the plan, the Leadership Board have committed to wider engagement to support the identification of short-term priorities for shared action. As well as the challenge of ensuring broad representation in such processes, wider engagement will mean the need to engage with power dynamics and vested interests.

environmental goals can be more effective by engaging stakeholders in dialogue [19,49]. If the doughnut is to be a practical tool for governance it will need to involve new conversations incorporating political institutions, civil society organisations, and the wider public. The importance of collaboration, participation and deliberation is widely recognised in relation to governance for sustainable development [8,50,51]. A key strength of the doughnut framework may be its powerful visual image that can broaden its appeal beyond sustainability challenges that are often framed as being purely 'environmental' [34,45].

Goal coherence across scales

Coherence across global, regional and local agendas is important to galvanise actors and institutions [30].

Global institutions can help drive 'action coherence' across scales, encouraging stakeholders to subscribe to shared goals, set priorities, allocate resources, establish or modify institutions, and facilitate implementation [11,52]. Yet, with the concept of planetary boundaries prioritising scientific expertise and discussed primarily in academic debates [14], and the doughnut commonly appealing to policy-makers and practitioners at national or subnational scales, neither has the traction across spatial scales that has been achieved through the steer by the UN in the case of SDGs. The potential role of the Earth Commission to provide this necessary global steer has been questioned, in particular because of a lack of buy-in across the Global South [14]. Initiatives to downscale the doughnut may therefore be largely driven by local actors in practice, whether through civil society

initiatives or institutions such as local councils. This raises questions about the mechanisms to coordinate and monitor change across scales, as well as the challenge of maintaining coherence over time while wider priorities and goals may shift. Given this, and the plethora of local governance institutions and arrangements that exist, successfully deploying the doughnut will require renewed attention to coordination across multilevel governance regimes [5,53].

Without cross-scale coherence, local action can be frustrated by wider economic and political systems. Local authorities may have little control over important issues such as planning processes, even if political power has been devolved for other concerns [54]. Furthermore, institutions at the smallest scale, though well placed to respond to context-specific issues, typically have limited capacity, power or authority [55]. Thus, for downscaling to lead to effective action, it may require further decentralisation or devolution to enhance the powers of local institutions. This requires national government support for local autonomy and constitutional protection [9], which in the case of LA21 was often lacking [10,45], as well as accountability and coordination mechanisms across scales [22]. While particular institutional arrangements have been advocated to distribute authority and promote coordination, for example bridging institutions or polycentric arrangements [14], nation states may seek to protect their power in matters of global governance such as those pertaining to sustainable development [56].

Efforts to redistribute decision-making power must also consider differentiated enthusiasm and capacity for action at the local scale. Through LA21, the transition movement in Europe, the localisation of the SDGs and the associated New Urban Agenda, much of the practice has been developed at the urban scale [22,56–58]. This work has identified important challenges related to resources and capacity, political interests, and ability to deal with the complexity of change [56]. Yet, smaller settlements and those geographically distant from centres of power may have more limited capacity, be remote from sources of guidance, and less likely to adopt new initiatives [22,45]. There is a need to consider more rural locations, which often experience political marginalisation and socioeconomic deprivation [59] alongside a richness of environmental resources that are critical to securing ecological goals [60]. In considering multiscale ‘action coherence’, there is a need to consider the particular constellation of interests and capacity at each scale of social organisation, which adds further complexity to governing and galvanising around doughnut economics.

Navigating power dynamics, inequalities and trade-offs
Moving towards a safe and just space involves hard choices among and between social and environmental

objectives, meaning that local governance institutions will need to engage with difficult trade-offs. While the underpinning vision of sustainable development inherently implies potential trade-offs, policy-makers continue to struggle to avoid siloed decision-making and to systematically understand interactions between aspects of sustainable development such as those captured by the SDGs [61]. Though synergies and trade-offs are a common theme in sustainability literature, research often stops short at their systematic mapping or identification [62–64], without going further to identify the implications for local governance institutions and their capacity to manage conflict, navigate vested interests and address power imbalances.

Translating the ambition behind the doughnut to local action is inherently political given the demand for social and economic shifts that imply a significant redistribution of power and resources [23,65]. Critical social science research highlights the need for principles to underpin such decision-making processes, ensuring that governance for sustainable development is transparent, accountable, and responsive, particularly to those who are marginalised [49]. A rights-based approach has been advocated to secure the social foundation and achieve greater social equity [66], while others also point to the need to compensate or support those who ‘lose’ when trade-offs occur [51]. While global unevenness in how nations contribute to and are impacted by sustainability problems is well documented [23], even small jurisdictions display spatial and social inequality that can be masked by aggregate indicators [55]. Limited availability of disaggregated data and difficulties of engaging marginalised communities pose difficulties in addressing this heterogeneity [9]. Though the planetary boundaries and doughnut models offer powerful visual frameworks that illustrate an ambitious vision, neither easily lend themselves to an examination of social differences and inequalities [20,21].

While other approaches to sustainable development have been critiqued for insufficiently challenging the status quo [67,68], doughnut economics does question the dominant economic growth paradigm [1,14]. However, Brand et al. [49] see the absence of upper limits on the social foundation as a particular limitation of the doughnut, proposing that ‘societal boundaries’ are needed to address injustice and slow the metabolism of societies that overshoot ecological boundaries. In downscaling efforts, determining such societal boundaries would require powerful local leadership and intensive public engagement to foster their legitimacy while also helping to identify the social and cultural resources that can support collective self-restraint [49]. Such engagement may also help to counter the interests of powerful actors who oppose socioeconomic limits or benefit from greater inequality [69]. Other sustainability

initiatives such as LA21 and the transition movement demonstrate that who is involved and how they engage is critically important in shaping the outcomes of such deliberations [70].

While local governance institutions have an important role in supporting political debate about the standards and practices that are understood to be constitutive of a 'good life for all', their potential to achieve a radical shift in values may be limited by the growth imperative embedded in existing institutional practices and discourse [49] and the power held by elites who may be opposed to transformation [71]. Strengthening decentralised institutions can support societal deliberation [49], but actors outside existing political institutions are also critical in driving change [70]. Vested interests often lead to path dependency in institutions [8], restricting the ability to embrace the full implications of sustainable development agendas [72], and local authorities may be reluctant to relinquish control to other stakeholders [45,73]. In downscaling the doughnut, citizen-led social movements may therefore be important to drive societal debate towards self-limitation and embed values around social justice. Such movements offer potential for 'disruptive deliberation' that makes space for alternative discourse and action needed to address difficult decisions and trade-offs [71].

Future directions

Our review thus far has identified the ways in which downscaling the doughnut shares challenges common to other approaches to localise sustainable development but also presents distinct difficulties. The doughnut offers potential for local institutions to contribute to the deliberate steering towards sustainable development that is needed across all scales [38,75], with scope to reach people and places (and their institutions) in ways that other frameworks have not [14]. However, applying the doughnut in ways that are appropriate to local scales while also coalescing with action at higher scales is particularly challenging and demands much greater attention. It is therefore urgent that we attend to governance processes at local scales in this wider context, and in this final section, we reflect on these challenges and wider governance literature to identify avenues for future development and research in this field.

First, making the difficult decisions needed to achieve the safe and just vision of the doughnut requires flexibility and responsiveness via adaptive and reflexive governance that includes the capacity to redesign institutions and avoid institutional path dependency [46,76]. Ongoing debates about the nature of institutional arrangements for sustainable development include the extent to which institutions should be made more effective, reorganised or newly developed [14,34,46]. The redistribution of power and

authority in multilevel systems is proposed, including more coordinated global governance, new polycentric structures, or strengthened regional government, as well as recognition of the continued importance of the state [5,46,77,78]. While different institutional arrangements are likely to suit different contexts, there is a need for institutional analysis and experimentation to identify opportunities to encourage reflexivity around core ambitions and values at the local scale [8]. This is the scale where it will be easier to experiment and examine the relationships between governance interventions and outcomes on the ground [79]. It is also the scale at which it should be easier to build positive collaborative relationships between organisations to work together around overlapping place-based interests [43,44], foster goal-based governance [38,52] and identify ways to support coherence across scales [80].

Second, in the absence of a global or national steer towards the doughnut, local applications of the framework must consider how to generate momentum for this vision in a way that is non-partisan and robust in the face of political change; mobilises a wide range of actors; can be integrated or aligned with existing policies, plans and goals; and overcomes capacity challenges. In this regard, we can be positive about new forms of governance that enable rather than direct or provide, promoting multi-actor networks that can widen the reach of sustainable development initiatives. This involves using 'generative power' to supplement legal authority and financial resources, mobilising relationships in place to harness the latent capacity of the private sector, third sector, civil society and civic institutions [81–83]. This approach to governance is particularly appropriate in realising the power of the doughnut's vision which can be used to steer change. Using 'interpretive' [84] or 'framing' power [85] can help leaders to articulate problems in ways that generate solutions. It also provides a shared vision around which people and organisations can 'convene' despite their differences. However, research into these new forms of governance highlights the weakness of civic and democratic engagement [82]. Inclusive approaches can be challenged by their ad hoc nature, power imbalances and vested interests, with significant implications for legitimacy and longevity [8,86]. Further research is needed to examine how generative power can be used to engage people in the process of change, to enable democratic deliberation to manage conflicting values and views, and to orient these processes to include those without a voice alongside the powerful. Democracies require ongoing deliberation over policy and decision-making at a variety of scales to ensure credibility, legitimacy and popular authority. As yet, and despite recognition of the challenge [8,87,88], there is no blueprint for a democratic transition to sustainability.

Third, despite limited capacity to engage in cross-scale complex systems science, local institutions' application of

the doughnut can serve to mobilise engagement with the vision of the safe and just space, opening up debate about how to define the social foundation and environmental (and social) limits, while considering issues across scales. Recognition of the post-functionality of local political institutions highlights their potential to mobilise the doughnut approach. Governance structures reflect communities based on social identity and meaning as well as public service delivery, and the former can be mobilised to increase the momentum, impact and legitimacy of sustainable development initiatives. Postfunctionalism emphasises engaging people's feelings about their communities [5] and implies taking the political context very seriously [44,75]. Drawing on local identities can help to foster engagement, for example, around environmental citizenship, and strengthening people's connections to places that they value can enhance stewardship [89]. There is a need for research to consider how local institutions can explicitly engage people around their own goals and attachments to place, while simultaneously addressing global-scale change [56,70].

Finally, transdisciplinary action research approaches are well suited to pursuing these areas of enquiry and offer a means to redefine the relationship between scientists, decision-makers and citizens. Networks such as the Doughnut Economics Action Lab are emerging to help support fast policy transfer between groups, recognising the value of sharing ideas [90]. Cross-scale networks can link global and local knowledge to address challenges related to expertise, data, capacity and resources to downscale global models [36]. A number of research approaches, including action research, deliberative forums and participatory methods offer tools to increase inclusion and diversity of views [91–93], which can generate plural pathways for change [75]. Pereira et al. argue for a need to go beyond traditional forms of transdisciplinarity to create 'transformative spaces' that are oriented towards experimental action [91]. Such spaces offer a route to combine the pursuit of scientific accuracy and social legitimacy through reflexivity around values and assumptions [94], creating opportunities to integrate expert perspectives on planetary science with the deeply political debates that accompany downscaling efforts. These spaces of learning are generating innovative ideas rooted in the Global South as much as the North, reconfiguring geographical relations of power, which benefits the wider appeal of this work [14,91,95]. Such activity can also be important in underpinning the broad-based collaborative governance models outlined above, particularly if they are to prove able to reflect, adapt and revise their approach.

Conclusion

While the doughnut offers the promise of a new approach to reinvigorate sustainable development, questions about the potential for local governance institutions

to support this have been under-examined. Our review identifies three key challenges in downscaling the doughnut: representing, understanding and responding to complex systems; goal coherence across scales; and difficult decisions and trade-offs. Downscaling the doughnut intensifies these challenges, while at the same time reflecting well-established concerns in governance studies (such as those relating to capacity, public engagement and conflicting interests). These challenges are substantial, yet addressing them is essential to achieving progress towards sustainable development, and the doughnut may offer a powerful vision to motivate local action in this regard. Looking forward, contemporary governance literature highlights the potential to experiment locally by adopting modes of governance that encourage reflexivity and adaptation; attending to the ways in which generative power can be mobilised to support deliberation and steer towards a safe and just space; connecting the doughnut to the post-functionality of local political institutions, recognising the importance of place-based identity that can help mobilise people for change; and integrating the capacity to learn and grow through the application of this approach. These avenues for research and action offer scope to generate new insights and support for plural pathways to multi-scalar action for a safe and just future.

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