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## Future directions for early career researchers in planetary health equity

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### ABSTRACT

Achieving social and health equity on a healthy planet requires attending to the structural drivers of intersecting crises of global environmental change, social inequities, and health inequities. A diverse group of early career researchers have formed a new network aligned in advancing work that promotes planetary health equity. This Perspective articulates proposed future research directions emerging from shared understandings of intersecting governance and policy challenges, including sections on transdisciplinary and co-productive knowledge paradigms; political economy and governance; policy integration; and opportunities to advance planetary health equity. We present this agenda with reference to a range of substantive environmental- and health-related domains, including food systems governance, trade policy, energy policy, urban planning, and education. As early career researchers in the emerging field of planetary health equity, these future directions for research are intended to offer novel avenues towards the goals of social and health equity in a stable Earth system.

### 1. Introduction

The effects of accelerating global environmental change and increasing social and economic inequity pose a fundamental challenge

to human wellbeing in a sustainable Earth system (IPCC et al., 2023; Romanello et al., 2023). Achieving social and health equity on a healthy planet – referred to as planetary health equity (PHE) (Friel et al., 2022) – requires attending to the structural drivers of intersecting crises and how

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marginalised populations disproportionately experience the adverse effects of current systems on human health and the environment (Friel, 2019). PHE, as an objective, can therefore be seen as an outcome of systemic processes that encompass cross-cutting governance and policymaking activities within environmental, social, and health domains.

These systemic challenges, and potential pathways forward to address them, were explored in a two-week program that brought together a diverse group of 19 early career researchers through structured workshops and masterclasses aimed at mobilising the budding field of PHE. This *Future Leaders Program* of the Planetary Health Equity Hothouse, convened in September 2023 by ARC Laureate Fellow Professor Sharon Friel, forged a network of researchers from varying geographic, disciplinary, and lived experience backgrounds, aligned in advancing work that promotes PHE. Building on collective learnings and discussions during workshops, each author drafted a brief outline of core issues and necessary research directions, grounded in their disciplinary and substantive areas of expertise. These were grouped into overarching themes and refined to identify important areas for future research in a range of fields to advance PHE, from the perspective of this diverse group. This Perspective therefore interrogates PHE through various disciplinary and topical lenses to demonstrate the diverse research and practice opportunities that we envision. In the sub-sections below, we discuss these in terms of transdisciplinary methodological approaches drawing from diverse knowledges, political economy and governance, cross-sectoral policy integration, and windows of opportunity for solutions-based approaches to PHE.

## 2. Purposeful research across disciplines and knowledges

One of the first elements of directions for future research is setting out the *how* – articulating research paradigm(s) commensurate with the scale and complexity of the challenges at hand, and with the evolution of scholarly work on complex global problems (Darian-Smith and McCarty, 2016). In the context of intersecting crises, it is crucial to transcend conventional disciplinary and sector-based silos to develop interdisciplinary and transdisciplinary approaches that examine our complex realities and how to leverage change. Knowledge co-production and transdisciplinary approaches highlight the need for inclusively integrating diverse knowledge systems, including Western scientific paradigms, Indigenous Knowledges, and insights based on lived experience, among others (Bandola-Gill et al., 2023). By incorporating and valuing these perspectives, transdisciplinary work can achieve a richer and more nuanced understanding of the interconnectedness between human health, the ecosystems that underpin our wellbeing, and the complex political, economic, social, cultural, technological, and environmental relationships that determine PHE.

### 2.1. Indigenous Knowledges from the Torres Strait Islands

Indigenous Knowledges and lived experiences of First Nations Peoples have historically been marginalised and excluded from climate change discussions (Jones et al., 2022; Lansbury et al., 2022a; Matthews et al., 2021; Ratima et al., 2019) and other environmental and health governance spaces. Only as of 2022 was climate data from First Nations Peoples' Knowledges included in the *Sixth Intergovernmental Panel on Climate Change Assessment Report* (IPCC AR6) at the global level, and in the *State of the Environment* report in Australia (Lansbury et al., 2022a). In Australia, as elsewhere, it is essential to ensure that the resilience and knowledges of Torres Strait Islander and Aboriginal peoples are recognised, and that their voices are heard within the broader conversation of PHE. The peoples of the Torres Strait Islands, as other Indigenous peoples in Australia and globally (Matthews et al., 2021; Sahu et al., 2022), face inequitable direct and indirect impacts from climate change, shaped by the structural drivers of planetary health inequity. With current climate impacts causing irreversible damage to the people, region, culture, and health of the Torres Strait, it is vital that the decision-makers

and influencers of structural drivers working from afar (who are creating damage they cannot see) are called to action to work directly with Torres Strait Islanders to address these problems more effectively. It is important to bring an Indigenist and decolonising approach to exploring and advocating for self-determination of the Torres Strait Islanders and other First Nations peoples in navigating the complexities of climate change and impacts on health (Lansbury et al., 2022b; Redvers et al., 2022). Indigenous researchers' ancestral connection to Country provides crucial knowledge, which can be mobilised into wider research and policy conversations to empower them and their people (Lansbury et al., 2022a), as well as benefit wider planetary health (Redvers et al., 2022). Planetary health research must centre existing decolonising work and the diversity of Indigenous knowledges and stewardship (Hoogveen et al., 2023), as well as values and worldviews (Jones, 2019; Jones et al., 2020; Jones et al., 2022; Ratima et al., 2019; Redvers et al., 2022; Tu'itahi et al., 2021). This 'epistemological pluralism' is necessary to include multiple valuable ways of knowing, and an 'Earth-centred worldview', into research, policy, and law (Redvers et al., 2022). In particular, a strengths-based, community-focused lens is necessary to foreground Indigenous Peoples' existing leadership, and how this can be empowered and included through models such as co-design in policymaking processes. Grounded in the work of Indigenous leaders and scholars, this requires collective advocacy for policy change; addressing existing power asymmetries in policy and law; and co-governance of land, sea, and water for health and wellbeing benefits (Matthews et al., 2021).

### 2.2. Transcending natural and social scientific research divides

Another element in bringing together knowledges for PHE involves consideration of scientific and technological dimensions as inseparable from the social. This inseparability is increasingly recognised, as exemplified by the decision to add justice and equity to the Planetary Boundaries Framework (Gupta et al., 2024; Rockström et al., 2023). Science and technology play a critical role in supporting transformative shifts towards more sustainable systems and ways of being. However, the application of science and technology for systemic transformation is contingent on the context in which these innovations are developed. Innovations designed using purely biophysical or techno-economic criteria risk failure if they do not sufficiently engage with the complex, multifaceted social factors that influence successful adoption and translation, such as culture, policy, and political-economic structures (Geels and Schot, 2007). Developing innovations solely through a technocratic lens can limit the uptake of models promising paradigm shifts, such as the bioeconomy, circular economy, other types of "green" economies, or de-growth (MacArthur, 2013; Muscat et al., 2021; Wohlfahrt et al., 2019). These models and the innovations arising from them have been criticised as providing incremental shifts that perpetuate the current system, rather than disruptive solutions (Vogelpohl and Töller, 2021; Hermann et al., 2022). PHE provides a socio-technical lens to help identify transition pathways to reorient and align existing and emerging innovations towards transformational outcomes (Friel et al., 2022).

### 2.3. Solution-oriented knowledge production

Transdisciplinarity extends beyond institutionalised research spaces to foster the co-production of solutions that build on diverse knowledges, skills, and value positions. The Earth4All initiative provides an example of evolution from the 1972 interdisciplinary report *The Limits to Growth* (Meadows et al., 1972), to a cross-sectoral research and policy initiative fifty years later arguing for economic transformation to achieve wellbeing for all people within planetary boundaries (Dixson-Declève et al., 2022). Solution-oriented evidence can be generated and mobilised through cross-sectoral collaboration between policymakers, civil society, journalists and communication experts, and

business actors who seek to authentically institutionalise sustainable and socially just business practices. Embracing collaborative strategies is pivotal for generating culturally relevant solutions that recognise how context (i.e. time, space, culture) influences health, equity, and environmental outcomes. However, doing so requires critically navigating the power dynamics and potential conflicts of interest inherent to cross-sectoral collaboration, including with hybrid actors such as academic institutions and philanthropies (Littoz-Monnet and Osorio Garate, 2023). Moreover, to fully benefit from the strategic and substantive expertise of practitioners and advocates in diverse policy domains, governance mechanisms must redress power imbalances, including through First Nations-developed protocols and Indigenous Data Sovereignty (Lansbury et al., 2022b; Kukutai, 2023), and also through governance to avoid ‘corporate capture’ of these spaces (Gilmore et al., 2023).

Breaking disciplinary and sectoral silos is pivotal for tackling complex issues such as climate change and health inequities. While knowledge co-production paradigms like transdisciplinarity can provide an overarching orientation across the wide-ranging research topics described in this Perspective, within this ethos we recognise and celebrate the diversity of approaches that we adopt from our respective scholarly, professional, and experiential perspectives.

### 3. Political economy and global governance lenses for planetary health equity

While domestic institutional design, interests, and norms play a key role in conditioning PHE outcomes, so too do international governance arrangements. A PHE framework aligns with the evolving international relations scholarship, shifting from the study of individual institutions and their dyadic interactions to that of interplay among autonomous but interrelated institutions in overarching systems of global governance (Frank et al., 2024; Biermann and Kim, 2020; Gómez-Mera, 2020). This structural turn, developed in the study of international regime complexity and Earth systems governance, emphasises how institutions interact with one another and their environment to constitute a complex system with properties such as self-organisation, emergence, and adaptation (Alter and Meunier, 2009; Orsini et al., 2020; Raustiala and Victor, 2004).

In the absence of a central global authority to address systemic inequities, global governance looks beyond state-centric instruments, emphasising instead the constitution of power, knowledge, and norms for global governance through multi-level and multi-sectoral actors and institutions (Biermann and Pattberg, 2012; Zürn, 2012). It highlights the contributions of public and private agents at subnational, national, regional, and international levels, the collective actions of which constitute governance (The Commission on Global Governance, 1995). Understanding these interactions and operations of complex systems is critical to enabling policy actors to effect interventions that support the achievement of PHE objectives.

At a domestic level, lowering emissions and restructuring economies to promote PHE will require an expanded and novel role for the state in shaping the economy. The feasibility of interventions on the required scale, as well as their distributional impacts, will be influenced by domestic values and norms, state capacity and institutions, and economic interests (Lamb and Minx, 2020; Lewis et al., 2019; Meckling and Nahm, 2021). In turn, these factors are shaped by national growth models and their associated macroeconomic architectures (Baccaro and Pontusson, 2022; Hopkin and Voss, 2021). Variation across growth models – whether they are export-oriented, consumption-driven, or balanced – generates divergent politics of climate change and PHE (Frank et al., 2023; Nahm, 2021). Deepening our understanding of the interaction between growth models and domestic and international politics will help to identify the actors, strategies, and processes that will shape the success or failure of a transition to an economic system that protects the planet and people.

In this light, urgently needed improvements in PHE are only possible with a shift from the currently dominant political-economic paradigm where economic growth is seen as an end in itself to an approach that puts societal wellbeing and planetary health at the centre (Trebeck and Williams, 2019). While this would entail greater state intervention, governments must nevertheless be careful when regulating their domestic political economy to maintain economic competitiveness in the current era of hyperglobalisation (Rodrik, 2011). The *varieties of capitalism* literature shows that the liberal and financialised capitalism that is prevalent in the Anglosphere is not the only way to ensure economic growth in a globalised world (Hall and Soskice, 2001; Amable, 2003). Other advanced economies like Germany and Sweden have been able to generate economic growth without relying on market liberalisation and financialisation, while still intervening in the economy for the wellbeing of workers and the planet (Baccaro and Pontusson, 2016). Whether the Anglosphere can follow similar institutional paths towards greater PHE is a research question that needs immediate attention.

#### 3.1. Example: the political economy of food systems under a planetary health equity lens

Exploring the shift from growth-oriented political-economic paradigms to those prioritising PHE is relevant in the context of food systems. Food systems serve as a nexus where health, the natural environment, and the wellbeing of humans and non-human animals converge, intersecting with culture, identity, and as an important source of everyday enjoyment. While ensuring secure and accessible food for some, global industrial systems – primarily controlled by a small number of industrial agribusinesses – pose challenges for PHE (Clapp, 2021). The dominance of multinational corporations in food production perpetuates resource-intensive and environmentally and socially harmful practices, contributing to ecological degradation, diet-related illnesses, and unjust conditions for workers and animals (Fuchs et al., 2009; Hendrickson et al., 2020). Highly profitable foods such as ultra-processed foods and intensively produced meat and dairy share analogous corporate and financial operational structures (Baker et al., 2020; Sievert et al., 2022), emphasising the need to confront and reshape corporate control and institutional arrangements beyond the food system itself (Sievert et al., 2021). Achieving PHE in food systems requires challenging ingrained cultural, commercial, and political norms that tend to deprioritise planetary health equity (Friel, 2023a). Recognising the potential of social movements and the intrinsic regulatory capacity of nature itself may comprise part of this agenda (Parker and Johnson, 2019). In Mexico, community-led initiatives have shaped local policies to shift priorities from corporate-controlled industrial agriculture to agroecological practices that support small-scale farmers (Toledo and Barrera-Bassols, 2017). These policies have reduced dependence on resource-intensive monocultures, which are typically dominated by large agribusinesses (Altieri and Toledo, 2011). This shift has redirected focus toward, *inter alia*, enhancing biodiversity, supporting local food systems, and ensuring food security at the community level, integrating planetary health equity outcomes in food systems.

### 4. Policy integration for planetary health equity

To enhance justice for health equity at a planetary level, public policymaking must move beyond siloed thinking and meaningfully embed PHE as a cross-cutting objective across policy areas. Doing so, however, is a political process that requires navigating the various power dynamics that determine policy design (Tosun and Lang, 2017; Cejudo and Trein, 2023). In the following sub-sections, we provide snapshots of three policy areas that could better integrate PHE: international trade, energy, and urban planning. While these examples were chosen to provide concrete illustrations based on the expertise of the authors, the relevance of policy integration, by definition, extends beyond (transcends, even) those policy areas.

#### 4.1. Trade policy

International trade defines consumption and production patterns and has powerful impacts on PHE. Although trade holds potential to increase global wellbeing, the current global trade system is characterised by growing distances between production and consumption, which is not only unsustainable, but also inequitable (Sharmina et al., 2021; Wiedmann and Lenzen, 2018). Unfair international trade agreements have undermined local capacity to design policies for sustainable development, especially in low- and middle-income countries (Ruse-Khan, 2009). For example, scholars have underscored the impacts of trade regulation in areas directly linked to public health, such as access to medicines (Sell, 2007) and sustainable food production (Friel et al., 2020). There are, however, possibilities to embed social and environmental justice principles in the global trade regime. Research has shown how Geographic Indication<sup>3</sup> regulation has the potential to preserve traditional agricultural knowledge and protect biodiversity and agroecological farming practices (San Martin Portes et al., 2021). Geographic Indication is one regulatory mechanism that can positively contribute to socio-environmental sustainability – even though this is not its primary objective. As such, it is an interesting avenue for PHE integration in trade policy.

#### 4.2. Energy policy

As governments and communities around the world transition their energy systems away from fossil fuel energy sources, it is critical to place PHE and the values it embodies – including social and environmental justice, equity, and sustainability – at the core of a just energy transition (Rockström et al., 2023). Social impacts of the energy transition, including health outcomes beyond occupational health and safety obligations, are an essential consideration to avoid entrenching or exacerbating negative externalities, co-harms, and trade-offs that have prevailed under fossil fuel energy systems (Sovacool et al., 2019a, 2021). Negative externalities associated with renewable energy technologies have been identified by communities (von Möllendorff and Welsch, 2017). Some externalities, such as localised environmental degradation, excessive water consumption, and the use of child labour for critical mineral extraction, embody planetary health inequity, by harming the health of at-risk populations least able to protect themselves (Sovacool et al., 2019b). Effective climate change mitigation interventions should proactively seek to reduce, not exacerbate, existing inequities (Cissé et al., 2022). In the literature to date, there appears to be limited consideration of health outcomes across the life cycle of renewable energy systems (Tham et al., 2020). Such a blind spot points to the need for a transdisciplinary and holistic understanding of the energy system (Friel, 2023b). Further, the goals of the transition should themselves include delivering energy systems that meet the needs of populations to address underlying inequities driven by past and current systems. Applying a PHE lens to the development of renewable energy policies, programs, and interventions can reveal and help counter the perpetuation of ‘green extractivism’ (Bruna, 2022) as we decarbonise our energy systems.

#### 4.3. Urban planning

Urbanisation trends present sustainability solutions and challenges, which impact the availability of basic services, housing, education, health, land tenure, jobs, and safety (United Nations, 2017, 2022). Growing urban populations globally can facilitate access to goods,

<sup>3</sup> Geographical indications are place names used to identify the origin and quality, reputation or other characteristics of products. Examples of geographical indications include ‘Champagne’, ‘Tequila’, and ‘Roquefort’. (bib\_world\_trade\_organization\_2024World Trade Organization, 2024).

services, and opportunities to deliver improved wellbeing, encompassing education, employment, healthcare, a healthy built environment, and food security. Effective urban public policies, therefore, can shape urbanisation dynamics with the potential to improve PHE outcomes through public investment in infrastructure and services (Turok and Parnell, 2009; Kinyanjui, 2020). Regulatory measures such as land value capture, zoning, and taxation must aim to deliver equitable distribution of these investments and ensure that industries are taxed for negative externalities, generating revenues for equitable distribution of climate and health interventions (Samantela and Maquiling, 2024). These instruments are important to harness the potential of cities as key players in climate change mitigation, adaptation, and social inequity reduction. However, weak and/or fragmented institutions, lack of political capacity, differentiated self-interests coupled with political conflicts, and the influence of powerful landowners and corporations hinder the achievement of those outcomes. This results in the inequitable distribution of both public goods and environmental hazards, entrenching health disparities (Farazmand et al., 2022; Jacobs, 2011; Samantela and Maquiling, 2024; Turok, 2014).

#### 4.4. Moving forward: understanding policy change and continuity

Each of the policy areas explored above has the potential to contribute to PHE. As demonstrated in the case of trade policy, there are regulatory avenues for integrating PHE goals. However, generating systemic change faces challenges that are institutional and political in nature. This suggests that providing evidence of policy impacts is necessary but not sufficient to achieve change (Boswell and Smith, 2017). There is a perennial mismatch between research evidence highlighting the structural, political-economic root causes of the planetary health crisis, and policies framing the solutions around individual responsibility (Carey et al., 2017; Sell and Williams, 2020). Individualising poor health outcomes obscures negative externalities and perpetuates (health) inequities, as shown in the energy policy case. Furthermore, policymaking occurs in a multilevel governance context characterised by increasingly blurred boundaries between the governing and the governed (Hooghe and Marks, 2002). As highlighted in the urban policy example, this has resulted in institutionalising the most powerful corporate interests as influential norm-setters and indispensable governing partners, which undermines PHE integration.

To understand how (flawed) modes of governance become seen as natural and self-evident, PHE research on policy integration needs to engage with critical theories of power and public policy (Mykhalovskiy et al., 2019; Smith, 2013). Studying institutional change and continuity can offer valuable ‘mid-level’ insights in policymaking and governance dynamics, moving beyond the structure-agency impasse that either overestimates strategic agency of individual actors or falls victim to overly deterministic accounts of macrostructural power (Ralston et al., 2023). Such transdisciplinarity could foster new theoretical perspectives on policy integration and policy recommendations for effective PHE policy design.

### 5. Windows of opportunity for solutions-based approaches to planetary health equity

There are multitudes of opportunities to work toward PHE. Select avenues are highlighted in this section. Growing concern about climate change provides momentum to address social and health inequities, and provides increasing opportunities for early career researchers to engage in research addressing these issues as we realise the urgency with which we must uncover and implement solutions to these complex and interconnected challenges.

#### 5.1. Seizing win-win opportunities

Governments at all levels, facing a need to secure ‘green legitimacy’

(Eckersley, 2021), are investing in structures and policies that facilitate lower carbon ways of moving around, eating, and powering homes (see, for example, Kuss and Nicholas, 2022). Depending on how transitions occur, there is potential for these structural shifts to improve health and decrease energy, transport, and food poverty (Martiskainen et al., 2021; Riley et al., 2023). Windows of political will provide opportunities to implement transformative solutions as they arise, ensuring that they enhance state capacity to respond to diverse interests in building systems for the future (Eckersley, 2021). Political will can be leveraged for changes that demonstrate co-benefits, such as concurrently reducing pollution, supporting economic development, and improving health, as these are more likely to be supported than changes that address climate change alone (Bain et al., 2016). Instances of poor design, such as some low carbon zones or solar subsidies, have entrenched inequity (Dwarkaning, 2023; Player et al., 2023; Tidemann et al., 2019). Attention and priority must be given to ensure that climate policy outcomes include reduced, rather than increased (or unchanged), health and social inequity. Early career researchers can contribute to maximising windows of political will by engaging in political consultation processes such as giving feedback on draft policies or submitting relevant evidence from their research to parliamentary inquiries, emphasising co-benefits in doing so.

### 5.2. Recognising privilege

Positioning social and health equity as a focal point in policymaking is not a new idea. In 2008, the World Health Organization's Commission on the Social Determinants of Health identified that to improve health equity, urgent action must be taken regarding the unjust distribution of resources, money, and power (Commission on Social Determinants of Health, 2008). Over a decade since then, research and policy approaches continue to predominantly focus on marginalised or 'vulnerable' population groups, using downstream responses to address health and social problems once they have already manifested, instead of making structural changes (Baum and Fisher, 2014). Subsequently, we are yet to see a significant improvement in relative wellbeing and the gap in health outcomes between the most and least advantaged continues to increase (Flavel et al., 2022). Reorienting public and planetary health to foreground critical consideration of how public policies contribute to the distribution of power, privilege, and socioeconomic advantage—and how this distribution in turn influences the creation of public policy—is integral to ensuring that all people, within and across countries, experience PHE. This reorientation must involve, in part, those who are currently in positions of power and privilege, most notably high-emitting economies and wealthy elites. This cohort must confront the reality of their high-impact consumptive behaviours, which perpetuate states of insecurity, detachment, and apathy that only fuel further consumption and accumulation (Freudenberg, 2021; Oxfam International, 2023; Friel, 2023a). In the context of accelerated concentration of extreme advantage and privilege among fewer people, early career researchers can shift the problem narrative from one of disadvantage to one of advantage through research that highlights the nature of privilege; how public policy creates, maintains, or dismantles privilege; and feasible solutions to the undoing of privilege.

### 5.3. Cultivating compassion

While concurrent threats of climate change, biodiversity loss, and rising inequity understandably elicit apprehension and insecurity, and often result in cognitive dissonance (Haltinner et al., 2022; Australian Psychological Society, 2023), paralysis or avoidance of these uncomfortable realities are not viable options given the scale of challenges facing humanity. One way to navigate such challenges and further PHE in a constructive and resilient manner is to leverage affective states alongside cultivating greater social and emotional literacy (Brosch, 2021). Social and emotional literacy fosters self-awareness,

self-management, social awareness, relationship skills, and responsible decision-making (Durlak et al., 2011). These vital human competencies offer a potent antidote to competition, exploitation, and degradation. As a new generation of researchers, recognising the need to divert from status quo perspectives, furthering our understanding of the association between social and emotional literacy and PHE through research may facilitate the development of strategies that aid in fostering a social and economic framework characterised by compassion and empathy, which are pivotal in building a more equitable and sustainable system (Trebeck, 2023).

### 5.4. Transforming education

Social and emotional literacy are qualities that can be cultivated through education, and it is important to re-focus curricula towards a praxis that combines compassion, knowledge, and reflection (Redvers et al., 2023). The multifaceted crises we face require multidisciplinary learning approaches to further understanding of planetary health, either as an independent field of study or through its integration across all disciplines (Faerron Guzman et al., 2021). Prior studies have identified universities as potentially ideal settings for raising awareness about planetary health among students of health professions given the training they receive in advocacy and managing complex situations (Walpole et al., 2019). Short courses by academic institutions and independent education centres can provide another avenue (Asaduzzaman et al., 2022). Research can support these developments by providing an evidence base for their effectiveness. However, one limitation of current education efforts is that most universities are focused on including planetary health education primarily in medical and nursing curricula, while its inclusion is needed in all disciplines (Faerron Guzman et al., 2021). As recognition of planetary health and its fundamentally transdisciplinary nature increases, early career researchers who also engage in teaching activities (e.g., lecturing, tutoring) can integrate planetary health-related content into their teaching. An important consideration regarding planetary health education is that this tertiary-level education is mostly offered in high-income countries, leaving out low- and middle-income countries, and primary and secondary education. Research is needed to build contextualised knowledge for the development and design of these educational interventions.

Exploring these windows of opportunity through research, including re-evaluating power dynamics, embracing social and emotional literacy, and restructuring education, can ensure a holistic approach that drives transformative policies to foster a more equitable and sustainable future for all.

## 6. Conclusion

A PHE approach cultivates critical perspectives across sectors, disciplines, and theoretical viewpoints. Through a PHE framework, critical approaches are essential for understanding how marginalised communities are made increasingly vulnerable to the compounding effects of climate change, rising inequity, and human morbidities.

This piece offers a variety of perspectives on future research needs, building on existing research to advance the goals of social and health equity on a healthy planet. This multiplicity of perspectives is intentional and reflects our commitment to epistemic inclusivity, which we see as a fundamental value and precondition for PHE. Future directions proposed include greater attention to knowledge co-production and transdisciplinarity, political economy and governance considerations, policy integration, and multiple windows of opportunity through which to mobilise political action, challenge power dynamics, build social and emotional literacy, and educate future generations. In light of the ongoing marginality of structural and systemic analyses, and of attention to the social and environmental determinants of health and health equity, we aim to elevate these perspectives in a wide range of substantive environmental- and health-related domains.

## CRedit authorship contribution statement

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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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## Data availability

No data was used for the research described in the article.

## References

- Alter, K.J., Meunier, S., 2009. The politics of international regime complexity. *Perspect. Politics*. 7 (1), 13–24. <https://doi.org/10.1017/S1537592709090033>.
- Altieri, M.A., Toledo, V.M., 2011. The agroecological revolution in Latin America: rescuing nature, ensuring food sovereignty and empowering peasants. *J. Peasant Stud.* 38 (3), 587–612. <https://doi.org/10.1080/03066150.2011.582947>.
- Amable, B., 2003. *The Diversity of Modern Capitalism*. Oxford University Press, New York, USA.
- Asaduzzaman, M., Ara, R., Afrin, S., Meiring, J., Saif-Ur-Rahman, K., 2022. Planetary health education and capacity building for healthcare professionals in a global context: current opportunities, gaps and future directions. *Int. J. Environ. Res. Public Health*. 19, 11786. <https://doi.org/10.3390/ijerph191811786>.
- Australian Psychological Society, 2023. Public understandings of climate change. Australian Psychological Society. <https://psychology.org.au/community/advocacy-social-issues/environment-climate-change-psychology/t-resources-for-psychologists-and-others-advocating/public-understanding-of-climate-change#:~:text=People%20often%20experience%20cognitive%20dissonance,driving%2C%20flying%2C%20etc.> (Accessed 6 December 2023).
- Baccaro, L., Pontusson, J., 2016. Rethinking comparative political economy: the growth model perspective. *Politics Soc* 44 (2), 175–207. <https://doi.org/10.1177/00323292166380>.

- Baccaro, L., Pontusson, J., 2022. The politics of Growth models. *Rev. Keynes. Econ.* 10 (2), 204–221. <https://doi.org/10.4337/roke.2022.02.04>.
- Baker, P., Machado, P., Santos, T., Sievert, K., Backholer, K., Hadjikakou, M., Russell, C., Huse, O., Bell, C., Scrinis, G., Worsley, A., Friel, S., Lawrence, M., 2020. Ultra-processed foods and the nutrition transition: global, regional and national trends, food systems transformations and political economy drivers. *Obes. Rev.* 21 (12), e13126. <https://doi.org/10.1111/obr.13126>.
- Bain, P., Milfont, T., Kashima, Y., Bilewicz, M., Doron, G., Garðarsdóttir, R., Gouveia, V., Guan, Y., Johansson, L.-O., Pasquali, C., Corral-Verdugo, V., Aragones, J.I., Utsugi, A., Demarque, C., Otto, S., Park, J., Soland, M., Steg, L., González, R., Lebedeva, N., Madsen, O., Wagner, C., Akotia, C., Kurz, T., Saiz, J., Schultz, P.W., Einarsdóttir, G., Saviolidis, N., 2016. Co-benefits of addressing climate change can motivate action around the world. *Nat. Clim. Change* 6, 154–157. <https://doi.org/10.1038/nclimate2814>.
- Bandola-Gill, J., Arthur, M., Leng, R.I., 2023. What is co-production? Conceptualising and understanding co-production of knowledge and policy across different theoretical perspectives. *Evid. Policy* 19, 275–298. <https://doi.org/10.1332/174426421X16420955772641>.
- Baum, F., Fisher, M., 2014. Why behavioural health promotion endures despite its failure to reduce health inequities. *Sociol. Health Illn.* 36 (2), 213–225. <https://doi.org/10.1111/1467-9566.12112>.
- Biermann, F., Kim, R.E., 2020. Architectures of Earth system governance: setting the stage. In: Biermann, F., Kim, R.E. (Eds.), *Architectures of Earth System Governance: Institutional Complexity and Structural Transformation*. Cambridge University Press, Cambridge, UK, pp. 1–34.
- Biermann, F., Pattberg, P., 2012. Global environmental governance revisited. In: Biermann, F., Pattberg, P. (Eds.), *Global Environmental Governance Reconsidered*. The MIT Press, Cambridge, Massachusetts, USA, pp. 1–24.
- Boswell, C., Smith, K., 2017. Rethinking policy ‘impact’: four models of research-policy relations. *Palgrave Commu* 3 (44). <https://doi.org/10.1057/s41599-017-0042-z>.
- Brosch, T., 2021. Affect and emotions as drivers of climate change perception and action: a review. *Curr. Opin. Behav. Sci.* 42, 15–21. <https://doi.org/10.1016/j.cobeha.2021.02.001>.
- Bruna, N., 2022. A climate-smart world and the rise of Green Extractivism. *J. Peasant Stud.* 49 (4), 839–864. <https://doi.org/10.1080/03066150.2022.2070482>.
- Carey, G., Malbon, E., Crammond, B., Pescud, M., Baker, P., 2017. Can the sociology of social problems help us to understand and manage ‘lifestyle drift’? *Health Promot. Int.* 32 (4), 755–761. <https://doi.org/10.1093/heapro/dav116>.
- Cejudo, G.M., Trein, P., 2023. Policy integration as a political process. *Policy Sci.* 56, 3–8. <https://doi.org/10.1007/s11077-023-09494-6>.
- Cissé, G., McLeman, R., Adams, H., Aldunce, P., Bowen, K., Campbell-Lendrum, D., Clayton, S., Ebi, K.L., Hess, J., Huang, C., Liu, Q., McGregor, G., Semenza, J., Tirado, M.C., 2022. Health, wellbeing, and the changing structure of communities. In: Pörtner, H.-O., Roberts, D.C., Tignor, M., Poloczanska, E.S., Mintenbeck, K., Alegria, A., Craig, M., Langsdorf, S., Löschke, S., Möller, V., Okem, A., Rama, B. (Eds.), *Climate Change 2022: Impacts, Adaptation and Vulnerability*. Contribution of Working Group II to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change. Cambridge University Press, Cambridge, UK and New York, NY, USA, pp. 1041–1170. <https://doi.org/10.1017/9781009325844.009>. (Accessed 4 November 2022).
- Clapp, J., 2021. The problem with growing corporate concentration and power in the global food system. *Nat. Food*. 2 (6), 404–408. <https://doi.org/10.1038/s43016-021-00297-7>.
- Commission on Social Determinants of Health, 2008. *Closing the Gap in a Generation: Health Equity through Action on the Social Determinants of Health*. World Health Organization, Geneva. <https://apps.who.int/iris/bitstream/handle/10665/43943/97892sequence=1>. (Accessed 7 November 2023).
- Darian-Smith, E., McCarty, P., 2016. *Beyond Interdisciplinarity: Developing a global transdisciplinary framework*. *Transcience: A Journal of Global Studies*. 7, 1–26.
- Dixon-Decleve, S., Gaffney, O., Ghosh, J., Randers, J., Rockstrom, J., Stoknes, P.E., 2022. *Earth for All: a Survival Guide for Humanity*. New Society Publishers, Gabriola Island, BC, Canada.
- Durlak, J., Weissberg, R., Dymnicki, A., Taylor, R., Schellinger, K., 2011. The impact of enhancing students’ social and emotional learning: a meta-analysis of school-based universal interventions. *Child Dev.* 82 (1), 405–432. <https://doi.org/10.1111/j.1467-8624.2010.01564.x>.
- Dwarkasing, C., 2023. Inequality determined social outcomes of low-carbon transition policies: a conceptual meta-review of justice impacts. *Energy Res. Soc. Sci.* 97, 102974. <https://doi.org/10.1016/j.erss.2023.102974>.
- Eckersley, R., 2021. Greening states and societies: from transitions to great transformations. *Environ. Politics*. 30 (1–2), 245–265. <https://doi.org/10.1080/09644016.2020.1810890>.
- Faerron Guzman, C.A., Aguirre, A., Astle, B., Barros, E., Bayles, B., Chimbari, M., El-Abadi, N., Evert, J., Hackett, F., Howard, C., Jennings, J., Krzyzek, A., LeClair, J., Maric, F., Martin, O., Osano, O., Patz, J., Potter, T., Redvers, N., Trienekens, N., Walpole, S., Wilson, L., Xu, C., Zylstra, M., 2021. A framework to guide planetary health education. *Lancet Planet. Health* 5 (5), e253–e255. [https://doi.org/10.1016/S2542-5196\(21\)00110-8](https://doi.org/10.1016/S2542-5196(21)00110-8).
- Farazmand, A., De Simone, E., Gaeta, G.L., et al., 2022. Corruption, lack of Transparency and the Misuse of public Funds in times of crisis: an introduction. *Public Organiz Rev* 22, 497–503. <https://doi.org/10.1007/s11115-022-00651-8>.
- Flavel, J., McKee, M., Tesfeay, F., Musolino, C., Freeman, T., van Eyk, H., Baum, F., 2022. Explaining health inequalities in Australia: the contribution of income, wealth and employment. *Aust. J. Prim. Health* 28 (6), 474–481. <https://doi.org/10.1017/PY21285>.



- Frank, N., Arthur, M., Friel, S., 2024. Exploring the planetary health equity governance supercluster complex. *Earth System Governance* 20, 100207. <https://doi.org/10.1016/j.esg.2024.100207>.
- Frank, N., Arthur, M., Friel, S., 2023. Shaping planetary health inequities: the political economy of the Australian growth model. *New Political Econ* 1–15. <https://doi.org/10.1080/13563467.2023.2242796>.
- Freudenberg, N., 2021. *At what Cost: Modern Capitalism and the Future of Health*. Oxford Academic, New York. <https://doi.org/10.1093/oso/9780190078621.001.0001>.
- Friel, S., Schram, A., Townsend, B., 2020. The nexus between international trade, food systems, malnutrition and climate change. *Nat. Food* 1, 51–58. <https://doi.org/10.1038/s43016-019-0014-0>.
- Friel, S., Arthur, M., Frank, N., 2022. Power and the planetary health equity crisis. *Lancet* 400 (10358), 1085–1087. [https://doi.org/10.1016/S0140-6736\(22\)01544-6](https://doi.org/10.1016/S0140-6736(22)01544-6).
- Friel, S., 2019. *Climate Change and the People's Health*. Oxford University Press, New York, USA.
- Friel, S., 2023a. The planetary health equity hothouse: a research agenda for positive change. *J. Clim. Change Health* 10, 100195. <https://doi.org/10.1016/j.joclim.2022.100195>.
- Friel, S., 2023b. Climate change mitigation: tackling the commercial determinants of planetary health inequity. *Lancet* 402 (10419), 16–22. [https://doi.org/10.1016/S0140-6736\(23\)02512-6](https://doi.org/10.1016/S0140-6736(23)02512-6).
- Fuchs, D., Kalfagianni, A., Arentsen, M., 2009. Retail power, private standards, and sustainability in the global food system. In: Clapp, J., Fuchs, D. (Eds.), *Corporate Power in Global Agrifood Governance*. The MIT Press, Cambridge, Massachusetts, USA, pp. 29–59. <https://doi.org/10.7551/mitpress/9780262012751.003.0002>.
- Geels, F.W., Schot, J., 2007. Typology of sociotechnical transition pathways. *Res. Policy* 36 (3), 399–417. <https://doi.org/10.1016/j.respol.2007.01.003>.
- Gilmore, A.B., Fabbri, A., Baum, F., Bertscher, A., Bondy, K., Chang, H.J., Demaio, S., Erzse, A., Freudenberg, N., Friel, S., Hofman, K.J., 2023. Defining and conceptualising the commercial determinants of health. *Lancet* 401 (10383), 1194–1213. [https://doi.org/10.1016/s0140-6736\(23\)00013-2](https://doi.org/10.1016/s0140-6736(23)00013-2).
- Gómez-Mera, L., 2020. International regime complexity. SSRN: <https://doi.org/10.2139/ssrn.3749385>.
- Gupta, J., Bai, X., Liverman, D.M., Rockström, J., Qin, D., Stewart-Koster, B., Rocha, J.C., Jacobson, L., Abrams, J.F., Andersen, L.S., McKay, D.I.A., 2024. A just world on a safe planet: a Lancet Planetary Health–Earth Commission report on Earth-system boundaries, translations, and transformations. *Lancet Planet. Health* 8 (10), e813–e873.
- Hall, P.A., Soskice, D., 2001. *Varieties of Capitalism: the Institutional Foundations of Comparative Advantage*. Oxford University Press, New York, USA.
- Haltinner, K., Sarathchandra, D., Ziegler, A., Stuart, R., 2022. “It wasn’t like a big light bulb moment”: factors that contribute to changing minds on climate change. *Rural Sociol* 87 (4), 1370–1400. <https://doi.org/10.1111/ruso.12460>.
- Hendrickson, M.K., Howard, P.H., Miller, E.M., Constance, D.H., 2020. The food system: concentration and its impacts. A Special Report to the Family Farm Action Alliance. <https://farmaction.us/concentrationreport/>. (Accessed 9 November 2023).
- Hermann, R.R., Pansera, M., Nogueira, L.A., Monteiro, M., 2022. Socio-technical imaginaries of a circular economy in governmental discourse and among science, technology, and innovation actors: a Norwegian case study. *Technol. Forecast. Soc. Change* 183, 121903. <https://doi.org/10.1016/j.techfore.2022.121903>.
- Hoogeveen, D., Atleo, C., Patrick, L., Kennedy, A., Leduc, M., Parkes, M., Takaro, T., Gislason, M., 2023. On the possibility of decolonising planetary health: exploring new geographies for collaboration. *Lancet Planet. Health* 7, e179–e183. [https://doi.org/10.1016/S2542-5196\(22\)00334-5](https://doi.org/10.1016/S2542-5196(22)00334-5).
- Hooghe, L., Marks, G., 2002. Types of Multi-level governance. *Eur. Integ. online Pap.* 5 (11). <https://doi.org/10.2139/ssrn.302786>.
- Hopkin, J., Voss, D., 2021. Political Parties and growth models. In: Baccaro, L., Blyth, M., Pontusson, J. (Eds.), *Diminishing Returns: The New Politics of Growth and Stagnation*. Oxford University Press, New York, USA, pp. 375–400.
- IPCC, 2023. Summary for policymakers. In: *Climate Change 2023: Synthesis Report. Contribution of Working Groups I, II and III to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change* [Core Writing Team, Lee, H., Romero, J. (eds.)]. IPCC, Geneva, Switzerland, pp. 1–34. <https://doi.org/10.59327/IPCC/AR6-9789291691647.001>. (Accessed 22 November 2023).
- Jacobs, D.E., 2011. Environmental health disparities in housing. *Am. J. Public Health* 101, S115–S122. <https://doi.org/10.2105/AJPH.2010.300058>.
- Jones, R., 2019. Climate change and Indigenous health promotion. *Glob Health Promot* 26, 73–81. <https://doi.org/10.1177/1757975919829713>.
- Jones, R., Macmillan, A., Reid, P., 2020. Climate change mitigation policies and Co-impacts on Indigenous health: a Scoping review. *Int J Environ Res Public Health* 17, 9063. <https://doi.org/10.3390/ijerph17239063>.
- Jones, R., Reid, P., Macmillan, A., 2022. Navigating fundamental tensions towards a decolonial relational vision of planetary health. *Lancet Planet. Health* 6, e834–e841. [https://doi.org/10.1016/S2542-5196\(22\)00197-8](https://doi.org/10.1016/S2542-5196(22)00197-8).
- Kinyanjui, M., 2020. National urban policy: Tool for development. In: Kundu, D., Sietchiping, R., Kinyanjui, M. (Eds.), *Developing National Urban Policies*. Springer, Singapore. [https://doi.org/10.1007/978-981-15-3738-7\\_3](https://doi.org/10.1007/978-981-15-3738-7_3).
- Kukutai, T., 2023. Indigenous data sovereignty – a new take on an old theme. *Science* 382 (6674), ead14664. <https://doi.org/10.1126/science.ad14664>.
- Kuss, P., Nicholas, K., 2022. A dozen effective interventions to reduce car use in European cities: lessons learned from a meta-analysis and transition management. *Case Stud. Transp. Policy* 10 (3), 1494–1513. <https://doi.org/10.1016/j.cstp.2022.02.001>.
- Lamb, W.F., Minx, J.C., 2020. The political economy of national climate policy: architectures of constraint and a typology of countries. *Energy Res. Soc. Sci.* 64, 101429. <https://doi.org/10.1016/j.erss.2020.101429>.
- Lansbury, N., Matthews, V., Atkinson, A.-R., Mohamed, J., Mosby, V., Ford, L., Nona, F., 2022a. COP27: on Country, health and Indigenous knowledges. *Croakey Health Media*. <https://www.croakey.org/cop27-on-country-health-and-indigenous-knowledges/>. (Accessed 17 December 2023).
- Lansbury, N., Redmond, A.M., Nona, F., 2022b. Community-led health initiatives for Torres Straits Island communities in a changing climate: implementing core values for mitigation and adaptation. *Int. J. Environ. Res. Public Health* 19, 16574. <https://doi.org/10.3390/ijerph192416574>.
- Lewis, G.B., Palm, R., Feng, B., 2019. Cross-national variation in determinants of climate change concern. *Env. Polit.* 28 (5), 793–821. <https://doi.org/10.1080/09644016.2018.1512261>.
- Littoz-Monnet, A., Osorio Garate, X., 2023. Knowledge politics in global governance: philanthropists’ knowledge-making practices in global health. *Rev. Int. Political Econ.* 1–26. <https://doi.org/10.1080/09692290.2023.2237041>.
- MacArthur, E., 2013. Towards the circular economy. *J. Ind. Ecol.* 2 (1), 23–44. <https://doi.org/10.1002/bse.3229>.
- Martiskainen, M., Sovacool, B., Lacey-Barnable, M., Hopkins, D., Jenkins, K., Simcock, N., Mattioli, G., Bouzarovski, S., 2021. New dimensions of vulnerability to energy and transport poverty. *Joule* 5 (10), 3–7. <https://doi.org/10.1016/j.joule.2020.11.016>.
- Matthews, V., Atkinson, A.-R., Lee, G., Vine, K., Longman, J., for the HEAL Network and CRE-STRIDE, 2021. Climate change and Aboriginal and Torres Strait Islander health. Discussion Paper. Lowitja Institute, Melbourne. <https://doi.org/10.48455/bthg-aj15>. [https://www.lowitja.org.au/wp-content/uploads/2023/06/Lowitja\\_Climate\\_ChangeHealth\\_1021\\_D10-1.pdf](https://www.lowitja.org.au/wp-content/uploads/2023/06/Lowitja_Climate_ChangeHealth_1021_D10-1.pdf). (Accessed 24 October 2024).
- Meadows, D.H., Meadows, D.L., Randers, J., Behrens III, W.W., 1972. The limits to growth. *Club of Rome*. <https://www.clubofrome.org/publication/the-limits-to-growth/>. (Accessed 19 December 2023).
- Meckling, J., Nahm, J., 2021. Strategic state capacity: how states counter opposition to climate policy. *Comp. Polit. Stud.* 55 (3), 493–523. <https://doi.org/10.1177/00104140211024308>.
- Muscat, A., de Olde, E.M., Ripoll-Bosch, R., Van Zanten, H.H., Metz, T.A., Termeer, C.J., van Itersum, M.K., de Boer, I.J., 2021. Principles, drivers and opportunities of a circular bioeconomy. *Nat. Food* 2 (8), 561–566.
- Mykhalovskiy, E., Frohlich, K.L., Poland, B., Di Ruggiero, E., Rock, M.J., Comer, L., 2019. Critical social science with public health: agonism, critique and engagement. *Crit. Public Health* 29 (5), 522–533. <https://doi.org/10.1080/09581596.2018.1474174>.
- Nahm, J., 2021. Green growth models. In: Baccaro, L., Blyth, M., Pontusson, J. (Eds.), *Diminishing Returns: The New Politics of Growth and Stagnation*. Oxford University Press, New York, USA, pp. 443–460.
- Orsini, A., Le Prestre, P., Haas, P.M., Brosig, M., Pattberg, P., Widerberg, O., Gomez-Mera, L., Morin, J.-F., Harrison, N.E., Geyer, R., 2020. Complex systems and international governance. *Int. Stud. Rev.* 22 (4), 1008–1038. <https://doi.org/10.1093/isr/viz005>.
- Oxfam International, 2023. *Climate Equality: A Planet for the 99%*. Oxfam International, Oxford, UK. <https://www.oxfam.org.au/2023/11/climate-equality-a-planet-for-the-99/#:~:text=The%20richest%201%25%20emit%20as,international%20climate%20change%20conference%20COP28>. (Accessed 22 November 2023).
- Parker, C., Johnson, H., 2019. From food chains to food webs: regulating capitalist production and consumption in the food system. *Ann. Rev. L. & Soc. Sci.* 15 (1), 205–225. <https://doi.org/10.1146/annurev-lawsohci-101518-042908>.
- Player, L., Prosser, A., Thorman, D., Tirion, A., Whitmarsh, L., Kurz, T., Shah, P., 2023. Quantifying the importance of socio-demographic, travel-related, and psychological predictors of public acceptability of low emission zones. *J. Environ. Psychol.* 88, 101974. <https://doi.org/10.1016/j.jenvp.2023.101974>.
- Ralston, R., Godziewski, C., Brooks, E., 2023. Reconceptualising the commercial determinants of health: bringing institutions in. *BMJ Glob. Health* 8, e013698. <https://doi.org/10.1136/bmjgh-2023-013698>.
- Ratima, M., Martin, D., Castleden, H., Delormier, T., 2019. Indigenous voices and knowledge systems – promoting planetary health, health equity, and sustainable development now and for future generations. *Glob Health Promot* 26, 3–5. <https://doi.org/10.1177/1757975919838487>.
- Raustiala, K., Victor, D.G., 2004. The regime complex for plant genetic resources. *Int. Organ.* 58 (2), 277–309. <https://doi.org/10.2139/ssrn.441463>.
- Redvers, N., Celidven, Y., Schultz, C., Horn, O., Githaiga, C., Vera, M., Perdrisat, M., Plume, L.M., Kobei, D., Kain, M.C., Poelina, A., Rojas, J.N., Blondin, B., 2022. The determinants of planetary health: an Indigenous consensus perspective. *Lancet Planet. Health* 6, e156–e163. [https://doi.org/10.1016/S2542-5196\(21\)00354-5](https://doi.org/10.1016/S2542-5196(21)00354-5).
- Redvers, N., Faerron Guzmán, C.A., Parkes, M.W., 2023. Towards an educational praxis for planetary health: a call for transformative, inclusive, and integrative approaches for learning and relearning in the Anthropocene. *Lancet Planet. Health* 7 (1), E77–E85. [https://doi.org/10.1016/S2542-5196\(22\)00332-1](https://doi.org/10.1016/S2542-5196(22)00332-1).
- Riley, B., White, L., Quilty, S., Longden, T., Frank-Jupurrula, N., Morton Nabanunga, S., Wilson, S., 2023. Connected: rooftop solar, prepay and reducing energy insecurity in remote Australia. *Aust. Geogr.* 54 (3), 325–346. <https://doi.org/10.1080/00049182.2023.2214959>.
- Rockström, J., Gupta, J., Qin, D., Lade, S.J., Abrams, J.F., Andersen, L.S., Armstrong McKay, D.I., Bai, X., Bala, G., Bunn, S.E., Ciobanu, D., 2023. Safe and just Earth system boundaries. *Nature* 619, 102–111. <https://doi.org/10.1038/s41586-023-06083-8>.
- Rodrik, D., 2011. *The Globalization Paradox: Why Global Markets, States, and Democracy Can't Coexist*. Oxford University Press, New York, USA.

- Romanello, M., Napoli, C. di, Green, C., Kennard, H., Lampard, P., Scamman, D., Walawender, M., Ali, Z., Ameli, N., Ayeb-Karlsson, S., Beggs, P.J., Belesova, K., Ford, L.B., Bowen, K., Cai, W., Callaghan, M., Campbell-Lendrum, D., Chambers, J., Cross, T.J., Daalen, K.R. van, Dalin, C., Dasandi, N., Dasgupta, S., Davies, M., Dominguez-Salas, P., Dubrow, R., Ebi, K.L., Eckelman, M., Ekins, P., Freyberg, C., Gasparyan, O., Gordon-Strachan, G., Graham, H., Gunther, S.H., Hamilton, I., Hang, Y., Hänninen, R., Hartinger, S., He, K., Heidecke, J., Hess, J.J., Hsu, S.-C., Jamart, L., Jankin, S., Jay, O., Kelman, I., Kiesewetter, G., Kinney, P., Kniveton, D., Kouznetsov, R., Larosa, F., Lee, J.K.W., Lemke, B., Liu, Y., Liu, Z., Lott, M., Batista, M.L., Lowe, R., Sewe, M.O., Martinez-Urtaza, J., Maslin, M., McAllister, L., McMichael, C., Mi, Z., Milner, J., Minor, K., Minx, J.C., Mohajeri, N., Momen, N.C., Moradi-Lakeh, M., Morrissey, K., Munzert, S., Murray, K.A., Neville, T., Nilsson, M., Obradovich, N., O'Hare, M.B., Oliveira, C., Oreszczyn, T., Otto, M., Owfi, F., Pearman, O., Pega, F., Pershing, A., Rabbaniha, M., Rickman, J., Robinson, E.J.Z., Rocklöv, J., Salas, R.N., Semenza, J.C., Sherman, J.D., Shumake-Guillemot, J., Silbert, G., Sofiev, M., Springmann, M., Stowell, J.D., Tabatabaei, M., Taylor, J., Thompson, R., Tonne, C., Treskova, M., Trinanes, J.A., Wagner, F., Warnecke, L., Whitcombe, H., Winning, M., Wyns, A., Yglesias-González, M., Zhang, S., Zhang, Y., Zhu, Q., Gong, P., Montgomery, H., Costello, A., 2023. The 2023 report of the Lancet Countdown on health and climate change: the imperative for a health-centred response in a world facing irreversible harms. *Lancet* 402 (10419), 2346–2394. [https://doi.org/10.1016/S0140-6736\(23\)01859-7](https://doi.org/10.1016/S0140-6736(23)01859-7).
- Ruse-Khan, H.G., 2009. Policy space for domestic public interest measures under TRIPS. South Centre Research Paper (22). <https://doi.org/10.2139/ssrn.1542542>.
- Sahu, M., Chattopadhyay, B., Das, R., Chaturvedi, S., 2022. Measuring impact of climate change on Indigenous health in the background of multiple disadvantages: a Scoping review for equitable public health policy Formulation. *J of Prevention*. <https://doi.org/10.1007/s10935-022-00718-8>.
- Samantela, S.S., Maquiling, K.S.M., 2024. Examining institutional challenges of land value capture: the case of implementing land-based Taxes in the Philippines. *Journal of Human Ecology and Sustainability* 2 (1), 7. <https://doi.org/10.56237/jhes23021>.
- San Martim Portes, A., Venâncio, M.D., Gonçalves, L.R., 2021. Geographic indications in Brazil and their socio-environmental dimensions: gaps and opportunities of the Brazilian GI regulation for agricultural products. *J. Intellect. Prop. Law Pract.* 16 (4–5), 384–393. <https://doi.org/10.1093/jiplp/jpab008>.
- Sell, S., 2007. TRIPS-Plus free trade agreements and access to medicines. *Liverp. Law Rev.* 28, 41–75. <https://doi.org/10.1007/s10991-007-9011-8>.
- Sell, S.K., Williams, O.D., 2020. Health under capitalism: a global political economy of structural pathogenesis. *Rev. Int. Political Econ.* 27 (1), 1–25. <https://doi.org/10.1080/09692290.2019.1659842>.
- Sharmina, M., Edelenbosch, O., Wilson, C., Freeman, R., Gernaat, D., Gilbert, P., Larkin, A., Littleton, E.W., Traut, M., van Vuuren, D.P., Vaughan, N.E., Wood, F.R., Le Quere, C., 2021. Decarbonising the critical sectors of aviation, shipping, road freight and industry to limit warming to 1.5–2°C. *Clim. Policy*. 455–474. <https://doi.org/10.1080/14693062.2020.1831430>.
- Sievert, K., Lawrence, M., Parker, C., Baker, P., 2021. Understanding the political challenge of red and processed meat reduction for healthy and sustainable food systems: a narrative review of the literature. *Int. J. Health Policy Manag.* 10 (12), 793. <https://doi.org/10.34172/ijhpm.2020.238>.
- Sievert, K., Lawrence, M., Parker, C., Baker, P., 2022. What's really at 'steak'? Understanding the global politics of red and processed meat reduction: a framing analysis of stakeholder interviews. *Environ. Sci. Policy*. 137, 12–21. <https://doi.org/10.1016/j.envsci.2022.08.007>.
- Smith, K., 2013. *Beyond Evidence Based Policy in Public Health*. Palgrave Macmillan, London, UK.
- Sovacool, B.K., Martiskainen, M., Hook, A., Baker, L., 2019a. Decarbonization and its discontents: a critical energy justice perspective on four low-carbon transitions. *Clim. Change* 155, 581–619. <https://doi.org/10.1007/s10584-019-02521-7>.
- Sovacool, B.K., Hook, A., Martiskainen, M., Baker, L., 2019b. The whole systems energy injustice of four European low-carbon transitions. *Glob. Environ. Change* 58, 101958. <https://doi.org/10.1016/j.gloenvcha.2019.101958>.
- Sovacool, B.K., Turnheim, B., Hook, A., Brock, A., Martiskainen, M., 2021. Dispossessed by decarbonisation: reducing vulnerability, injustice, and inequality in the lived experience of low-carbon pathways. *World Dev.* 137, 105116. <https://doi.org/10.1016/j.worlddev.2020.105116>.
- Tham, R., Morgan, G., Dharmage, S., Marks, G., Cowie, C., 2020. Scoping review to understand the potential for public health impacts of transitioning to lower carbon emission technologies and policies. *Environ. Res. Commun.* 2 (6). <https://doi.org/10.1088/2515-7620/ab9526>.
- The Commission on Global Governance, 1995. *Our Global Neighbourhood: the Report of the Commission on Global Governance*. Oxford University Press. ISBN: 9780198279976.
- Tidemann, C., Engerer, N., Markham, F., Doran, B., Pezzey, J.C.V., 2019. Spatial disaggregation clarifies the inequity in distributional outcomes of household solar PV installation. *J. Renew. Sustain. Energy* 11 (3), 035901. <https://doi.org/10.1063/1.5097424>.
- Toledo, V., Barrera-Bassols, N., 2017. Political Agroecology in Mexico: a path toward sustainability. *Sustainability* 9, 268. <https://doi.org/10.3390/su9020268>.
- Tosun, J., Lang, A., 2017. Policy integration: mapping the different concepts. *Policy Stud.* 553–570. <https://doi.org/10.1080/01442872.2017.1339239>.
- Trebeck, K., Williams, J., 2019. *The Economics of Arrival: Ideas for a Grown-Up Economy*. Bristol University Press, Bristol, UK.
- Trebeck, K., 2023. Why a compassionate economy is a wellbeing economy and why a wellbeing economy is a compassionate one. Edinburgh Futures Institute. The University of Edinburgh. <https://efi.ed.ac.uk/why-a-compassionate-economy-is-a-wellbeing-economy-and-a-why-a-wellbeing-economy-is-a-compassionate-one/>. (Accessed 22 November 2023).
- Tu'itahi, S., Watson, H., Egan, R., Parkes, M., Hancock, T., 2021. Waiora: the importance of indigenous worldviews and spirituality to inspire and inform planetary health promotion in the Anthropocene. *Global Health Promotion* 28, 175797592110622. <https://doi.org/10.1177/17579759211062261>.
- Turok, I., 2014. The Evolution of National Urban Policies: a Global Overview. United Nations Human Settlements Programme (UN-HABITAT), Nairobi. <https://unhabitat.org/the-evolution-of-national-urban-policies>. (Accessed 2 January 2024).
- Turok, I., Parnell, S., 2009. Reshaping nations: the role of national urban policies. *Urban Forum* 20 (2), 157–174. <https://doi.org/10.1007/s12132-009-9060-2>.
- United Nations, 2017. New urban agenda. <http://habitat3.org/wp-content/uploads/NUA-English.pdf>. (Accessed 24 November 2023).
- United Nations, 2022. World cities report 2022: Envisaging the future of cities. [https://unhabitat.org/sites/default/files/2022/06/wcr\\_2022.pdf](https://unhabitat.org/sites/default/files/2022/06/wcr_2022.pdf).
- Vogelpohl, T., Töller, A.E., 2021. Perspectives on the bioeconomy as an emerging policy field. *J. Environ. Policy Plan.* 23 (2), 143–151. <https://doi.org/10.1080/1523908X.2021.1901394>.
- von Möllendorff, C., Welsch, H., 2017. Measuring renewable energy externalities: evidence from subjective well-being data. *Land Econ.* 93 (1), 109–126. <https://doi.org/10.3368/le.93.1.109>.
- Walpole, S., Barna, S., Richardson, J., Rother, H.-A., 2019. Sustainable healthcare education: integrating planetary health into clinical education. *Lancet Planet. Health* 3 (1), e6–e7. [https://doi.org/10.1016/S2542-5196\(18\)30246-8](https://doi.org/10.1016/S2542-5196(18)30246-8).
- Wiedmann, T., Lenzen, M., 2018. Environmental and social footprints of international trade. *Nature Geosci* 11, 314–321. <https://doi.org/10.1038/s41561-018-0113-9>.
- Wohlfahrt, J., Ferchaud, F., Gabrielle, B., Godard, C., Kurek, B., Loyce, C., Therond, O., 2019. Characteristics of bioeconomy systems and sustainability issues at the territorial scale: a review. *J. Clean. Prod.* 232, 898–909. <https://doi.org/10.1016/j.jclepro.2019.05.385>.
- World Trade Organization, 2024. Intellectual property (TRIPS) - geographical indications. [https://www.wto.org/english/tratop\\_e/trips\\_e/gi\\_e.htm](https://www.wto.org/english/tratop_e/trips_e/gi_e.htm). (Accessed 21 October 2024).
- Zürn, M., 2012. Global governance as multi-level governance. In: Levi-Faur, D. (Ed.), *The Oxford Handbook of Governance*. Oxford University Press, New York, USA, pp. 730–744. <https://doi.org/10.1093/oxfordhb/9780199560530.013.0051>.