



The future of 'environmental' policy in the Anthropocene: time for a paradigm shift

Frank Biermann

To cite this article: Frank Biermann (2021) The future of 'environmental' policy in the Anthropocene: time for a paradigm shift, Environmental Politics, 30:1-2, 61-80, DOI: [10.1080/09644016.2020.1846958](https://doi.org/10.1080/09644016.2020.1846958)

To link to this article: <https://doi.org/10.1080/09644016.2020.1846958>



© 2020 The Author(s). Published by Informa UK Limited, trading as Taylor & Francis Group.



Published online: 22 Nov 2020.



Submit your article to this journal [↗](#)



Article views: 8016



View related articles [↗](#)



View Crossmark data [↗](#)



Citing articles: 3 View citing articles [↗](#)

The future of ‘environmental’ policy in the Anthropocene: time for a paradigm shift

Frank Biermann

Copernicus Institute of Sustainable Development, Utrecht University, The Netherlands


ABSTRACT

What is the future of ‘environmental’ policy in times of earth system transformations and the recognition of the ‘Anthropocene’ as a new epoch in planetary history? I argue that fifty years after the 1972 Stockholm Conference on the Human Environment, we need to revisit the ‘environmental policy’ paradigm because it falls short on five grounds. The paradigm (a) emphasizes a dichotomy of ‘humans’ and ‘nature’ that is no longer defensible; (b) is incompatible with more integrated research concepts that have overcome this human-environment dichotomy; (c) deemphasizes questions of planetary justice and democracy; (d) fails to deal with novel normative challenges of the Anthropocene; and (e) may risk political marginalization of central concerns of human and non-human survival. In the second part I discuss institutional implications, arguing for novel approaches in science collaboration, new institutional arrangements and a more central place for questions of planetary justice and earth-system risks in governance.

KEYWORDS Environmental policy; earth system governance; Anthropocene; environmentalism; socio-ecological systems; nature conservation

Introduction

Over the last fifty years the notion of ‘environmental’ policy has become a mainstay in public and academic discourse. As James Meadowcroft (2017, p. 53) wrote when reviewing the concept, ‘the notion of the environment is so ubiquitous that it is hard to imagine a world without it.’ Indeed, over the last half century we have witnessed a remarkable evolution of a concept that was hardly in use before the 1970s. Meadowcroft (2017, p. 61) suggested some of the success factors behind this rise of ‘environmentalism’. Major reasons are, in his analysis, the concept’s strong pedigree in numerous fields, from planning to engineering; its potential to span a vast range of phenomena, from air pollution to nature protection; its scalability; its ambiguity; and its ‘anthropic resonance’ that allowed for a continuum from an anthropocentric ‘our environment’ to the seemingly more ecocentric, autonomous ‘the environment’.¹

CONTACT Frank Biermann  f.biermann@uu.nl

© 2020 The Author(s). Published by Informa UK Limited, trading as Taylor & Francis Group. This is an Open Access article distributed under the terms of the Creative Commons Attribution-NonCommercial-NoDerivatives License (<http://creativecommons.org/licenses/by-nc-nd/4.0/>), which permits non-commercial re-use, distribution, and reproduction in any medium, provided the original work is properly cited, and is not altered, transformed, or built upon in any way.

Over the last decades, the ‘environment’ has become heavily institutionalized as well. Environmental policies have been firmly embedded across the globe in national political systems, from environmental ministries to environmental laws, planning agencies and national environmental plans (e.g. Jänicke and Weidner 1997, Jänicke and Jacob 2006). Internationally, the 1972 Stockholm Conference on the Human Environment led to the establishment of the United Nations Environment Programme and environmental divisions in many intergovernmental organizations. Numerous ‘environmental’ treaties have been concluded since then. The International Environmental Agreements Database (2020) at the University of Oregon includes more than 1,300 multilateral and 2,200 bilateral environmental agreements.

Academia has followed suit with a broad portfolio of university degree programmes in ‘environmental policy’, along with specialized professorial chairs, departments and institutes. We see similar developments across disciplines, with many social and natural sciences having developed ‘environmental’ sub-fields, from environmental economics, environmental sociology, environmental law, environmental history and environmental psychology to environmental sciences and environmental engineering. A strong infrastructure for academic debate has emerged through the launch of a wide array of environmental policy journals, with specialized titles such as *Global Environmental Politics*, *Global Environmental Change*, *Regional Environmental Change*, *Journal of Environmental Policy and Planning*, *Environment and Planning*, *Environmental Science and Policy* and so forth. *Environmental Politics*, founded in 1992, is one of the older and most prominent journals in this series of environmental-focused scholarly publications. It is heartening to see the development of the field and the contributions that *Environmental Politics* has made over the last thirty years – as is reflected in this Special Issue.

Nevertheless, I argue here that the notion of ‘environment’ has lost its lustre. A first conceptual competitor was ‘sustainable development’, popularized by the 1987 Brundtland Report of the World Commission on Environment and Development. The Brundtland Commission successfully sought to merge environmental concerns with global development² and this combination has been part and parcel of the discourse since then. More recently, the notion of ‘sustainability’ – while having a long history in forest management – has also become widely popular (Leach *et al.* 2018, Meadowcroft 2019). As Tim O’Riordan argued (2009, p. 313), ‘[e]nvironmentalism is morphing into sustainability’.

In addition, countless alternative concepts have been put forward, all inspired by a view that ‘environmentalism’ in its traditional formulation is conceptually unable to shed light on the socio-ecological systems dynamics on our planet, to focus our critique, and to shape political responses. Starting out from the earth sciences and geosciences, conceptual innovations such as ‘earth

system analysis' or 'earth system science' brought a fresh, more integrative perspective that looked at the entire earth system and included both humans and natural forces (Schellnhuber *et al.* 2004, Castree 2019). At regional and local levels of analysis, researchers started to expand ecological notions of ecosystems to 'social-ecological systems', which they analysed with a view to their resilience (Folke 2006, Folke *et al.* 2016) or more recently their transformative potential. Such complex, highly integrated systems left hardly any place for traditional dichotomies of 'humans' versus their 'environment'.

Finally, the recent notion of an Anthropocene, as a new epoch in geological history, has defined an entirely new position for humans: from a minor element in planetary evolution to a driving force at planetary scale that is now compared in its geological significance to ice ages (Zalasiewicz *et al.* 2011, Lewis and Maslin 2018). The recognition of the Anthropocene has again led to an avalanche of publications, conferences and debates, which effectively deemphasize the 'environmental policy' paradigm (Biermann and Lövbrand 2019). The Anthropocene debate has created its own academic journals as well; it was only a matter of time before the first university (Cambridge's Department of Geography) set up a graduate programme in 'Anthropocene Studies'.

In sum, 'environmental policy' is today only one way of interpreting the global crises of climate change, biodiversity depletion, land degradation, deforestation and so forth. The question then becomes: is the framing of 'environmental policy', despite its historical value, still the most appropriate way to understand and transform the entanglements of modern societies in the Anthropocene?

In this intervention, I question the continued relevance of what I call the mainstream 'environmental policy' paradigm. I define this paradigm as a traditionally widely shared belief (a) that a definable 'environment' exists outside the human sphere that needs to be protected by humans and their political institutions; and (b) that 'environmental' institutions and policies are the right way of dealing with such challenges, as entities distinct from economic, health, food or agricultural institutions. As an example, the Encyclopaedia Britannica (2020) defines 'environmental policy' as 'any measure by a government or corporation or other public or private organization regarding the *effects of human activities on the environment*, particularly those measures that are designed to *prevent or reduce harmful effects of human activities on ecosystems*' (emphasis added). This 'environmental policy' paradigm has shaped much of the political activity *vis-à-vis* emissions of harmful substances or the protection of ecosystems, and in many ways, it has been successful in cleaning up rivers, restoring lakes or improving air quality in industrialized countries.

Nonetheless, the 'environmental policy' paradigm is meeting its limits in contributing to resolving the grand challenges of the 21st century. More

specifically, in the remainder of this contribution I identify five main challenges that the ‘environmental policy’ paradigm faces when dealing with earth-system transformations in the Anthropocene, followed by a discussion of implications for the future of the ‘environmental policy’ paradigm.

Challenges for the ‘environmental policy’ paradigm

In complex systems, there is no ‘environment’ of humans

First, the mainstream ‘environmental policy’ paradigm, I argue, builds on an outdated dichotomy of ‘humans’ and ‘nature’ that is no longer defensible as it reduces inherent system complexity. The concept of an ‘environment’ evokes two related dichotomies that are impossible to uphold.

The first problematic dichotomy is inherent in the word ‘environment’, which literally refers to the ‘surroundings’ of people. This is how the word entered the English language in the 14th Century from Old French, with ‘*to environ*’ originally meaning ‘*to encircle or surround*’ (*Collins English Dictionary*). The term is used in various fields, from sociology to computer science. In its political connotation, as ‘environmental policy’, it creates an ‘environment’ as the ‘natural’ surroundings of people, such as the forests, air and water around people – an ‘environment’ that needs protection (Meadowcroft 2017, p. 54). Similar lexicalist developments we find in other languages. In German, *Umwelt* is the ‘around-world’ and related words in Romance languages that derive from Latin *ambio/ambiens* – such as *el medio ambiente* in Spanish – have similar connotations.

This constructed dichotomy of humans and their environment, however, no longer aligns with advances in integrated system analysis and discussions of the ‘Anthropocene’. The more recent perspectives emphasize instead the complete *integration* of human and non-human agency in complex socio-ecological systems, from local scales – such as forests or water bodies – up to regional scales, such as the Alpine region, and the entire earth system. A socio-ecological system perspective breaks down conceptual barriers between humans and their ‘surroundings’ and integrates them in a complex understanding where agency is diffuse, interactions are dynamic, and boundaries become blurred.

The related problem with the ‘environment’ concept is the very question of what ‘the environment’ is. Traditionally the term ‘environment’ evokes a Cartesian dichotomy of humans versus ‘nature’. Nature and people are made conceptually distinct. This binary distinction, again, has met widespread critique. These critiques come, first, from the humanities and the posthumanist turn in that field, much reinvigorated by the Anthropocene debate (e.g. Arias-Maldonado 2013, 2019, Burke 2019, Latour 2015, Jon 2020). Here, numerous writers emphasize that ‘nature’ is a social construct

that can no longer be a reference point for political action, given that all ‘nature’ today has been shaped by human action or is affected by human activities. Terms like ‘nature conservation’, for instance, are inappropriate within an Anthropocene framing, as nothing is left outside the realm of human influence or reach. Consequently, ‘nature-based solutions’ refer to ‘nature’ merely as an integrated part of an essentially human world; an example is the European Commission (2019) arguing that ‘nature can help provide viable solutions that use and deploy the properties of natural ecosystems and the services that they provide in a smart, “engineered” way [providing] sustainable, cost-effective, multi-purpose and flexible alternatives for various objectives’. While the term Anthropocene was popularized only in 2000 (Crutzen and Stoermer 2000), the planetary impact of humans and the integration of humans and ‘nature’ dates back centuries, if not millennia, when people started to form and shape a ‘human planet’ (Lewis and Maslin 2018). All this adds a ‘deep-time perspective’ to both past and future (Galaz 2019, Hanusch and Biermann 2020) that the more static frame of the ‘environmental policy’ paradigm cannot capture. In the Anthropocene, nature, as we might have known it, ends.

In short, the dichotomy of humans and ‘nature’, constitutive for ‘environmental policy’, loses its significance. Ontologically, we should no longer see humans as a distinct unit surrounded by a non-human ‘natural environment’, but as integral part of complex ‘socio-ecological systems’ at various scales, from local systems up to the earth system. This fundamental critique of its very foundational notion of a ‘natural’ ‘environment’ challenges the ‘environmental policy’ paradigm.

‘Environmental policy’ is incompatible with social-ecological system approaches

As a consequence, the mainstream ‘environmental policy’ paradigm is incompatible with more integrated concepts that have overcome the human-environment dichotomy. Simply put, the ‘environmental policy’ paradigm struggles with responding to novel conceptualizations of the global entanglement of human and non-human agency. An ever-increasing complexity marks the global problematique of the Anthropocene, making it impossible to demarcate a clear set of ‘environmental’ issues. As Daniel Bodansky (2011, p. 12) noted, if ‘everything is interconnected, then everything becomes an environmental problem’. ‘Environment’ then becomes meaningless.

For example, over the last decade a major debate has revolved around the notion of ‘planetary boundaries’ (Rockström *et al.* 2009, Steffen *et al.* 2015; for a critique see e.g. Brown 2017, Biermann and Kim 2020), linking back to earlier notions of ‘planetary guardrails’ developed in the 1990s. Planetary boundaries are seen as threshold values in the planetary

system that would, if transgressed, move parts of the earth system into a new state. Some of these proposed planetary boundaries might still be viewed in terms of traditional environmental problems, linked to older debates on ‘environmental limits’. Most boundaries, however, are comprehensible only in a complex global-system perspective. Planetary boundaries on the human use of freshwater, or limitations on the use of land by humans at global scale, are hardly issues easily described as pure ‘environmental’ targets, given their economic, social and distributive complexities. The same holds for planetary boundaries of phosphorus and nitrogen, both linked to global food production, among other connections. In short, the concept of planetary boundaries goes far beyond ‘environmental’ targets. ‘Environmental policy’ is no longer a useful concept for shaping political responses and ‘protecting’ planetary boundaries.

More generally, traditional environmental policies are irrelevant when it comes to the key issues of earth system transformation. Global sea-level rise, for instance, threatens to become a central concern of regional devastation, local strife and eventually world politics – yet it is hard to be conceptualized, in its transformative impact, as a purely environmental policy problem. Ocean acidification is a matter of life and death for coastal fishing communities and puts immense pressure on the world’s coral reefs, but, in its global connectivity, it goes beyond traditional environmental policy. A variety of factors – biofuels, the global transition into more meat-based diets, the commercial demand for global land for negative emissions technologies, to name a few – all put huge new pressures on land and food security, especially for the poor. Food security, global land degradation and resource overuse, however, are not issues well-aligned with traditional understandings of ‘environmental’ policy.

As a further example, some scientists have called for research on the utmost epitomization of Anthropocene governance – the artificial engineering of our climate by systematically spraying sun-blocking aerosols into the stratosphere (Crutzen 2006, on policy e.g. Reynolds 2019). Proponents speak here at times about a ‘good Anthropocene’: an epoch of human ingenuity, rapid and rationale progress and planetary ‘management’. Numerous critics, however, see such ideas as a terrible mistake, full of technocratic hubris and unmanageable risks. Climate engineering is still related to traditional environmental policies, such as the underlying need to limit the emission of carbon dioxide from cars or industries. Yet as a concept and potential policy programme, climate engineering, the artificial purposive interference in global climate systems, goes far beyond the discursive space of traditional ‘environmental policy’.

Finally, earth system transformations call for a novel approach to science organization and research cooperation. The traditional distinction between

humans and their ‘natural environment’ has been long broken down in the practice of research programmes that study global warming (see the Global Carbon Project) or land degradation (Global Land Project). And yet, integration needs to be strengthened even more between ever greater numbers of natural scientists and scholars from the social sciences, humanities and arts who work on issues of global change and transformation. Again, the integrated perspective of socio-ecological systems at local and regional level, or of the entire earth system with all its human and non-human component parts at planetary scale, needs a novel perspective beyond what traditional ‘environmental’ policy has covered (programmatic here e.g. Leemans *et al.* 2009). As John Schellnhuber argued (1999, p. C20) when he called for ‘a Second Copernican revolution’, we need a cognitive shift that ‘will enable us to look back on our planet to perceive one single, complex, dissipative, dynamic entity [...] – the “Earth System”’. The ‘environmental policy’ paradigm does not contribute to an integrated understanding and analysis of socio-ecological systems at planetary scale. Quite tellingly, the ‘2025 Vision’ of the leading global research platform Future Earth (2014) does not mention ‘environmental policy’ even once.

‘Environmental policy’ deemphasizes questions of justice and democracy

Third, mainstream ‘environmental policy’ deemphasizes questions of planetary justice and global democracy. The dichotomy of ‘humans’ surrounded by an ‘environment’, so central to the ‘environmental policy’ paradigm, suggests a harmonious connectedness and comparability of all of ‘humankind’. It lends itself to a technocratic approach that focusses on reducing emissions or managing ‘nature areas’, as opposed to a deeper critique of underlying societal conflicts and injustices; and it might entrench hubris (‘we can manage all problems’) and human mastery over a non-human world.

I do not deny that there has been for decades a strong critique of mainstream environmental policies, for example in the deep-ecology or de-growth movements. Nevertheless, the mainstream practice of the ‘environmental policy’ paradigm has remained largely immune to such fundamental critique. The ‘environmental policy’ paradigm, at its core, has revolved around notions of ‘humans’, their ‘environment’ and the effectiveness of policies to limit the impacts of the first on the other. System-immanent solutions such as ‘ecological modernization’ or ‘green growth’ have been prioritized as a consequence. Social inequalities among humans – among citizens and among countries – have often been marginalized in environmental policy research and practice. At times, considerations of justice are even actively denied as legitimate concerns for

environmental policy scholars (see here the debate between Keohane 2016 and his critics in, Klinsky *et al.* 2017). In the mainstream environmental policy paradigm, the emphasis on ‘effectiveness’ has usually been narrowed down so as to exclude fundamental questions of ‘effectiveness for whom?’

In contrast, the novel challenges of earth system transformation now force us to revisit the notion of justice – as a political concept, as a political challenge and as an object for scholarly analysis. There is a history of scholarship on ‘environmental justice’ seeking to shed light on the unjust implications of environmental pollution and degradation, and associated social conflicts. This includes concerns with racial discrimination and local environmental injustice, dating back to the 1980s and the work of Robert D. Bullard (for a comprehensive treatment including historical overviews, see contributions in Coolsaet 2020; also overviews in Agyeman *et al.* 2016, Schlosberg 2007, Ehresman and Okereke 2015).

Nevertheless, the *planetary* transformation that our species has set into motion requires a much broader notion of justice. Risks of earth system transformations are truly – as Gardiner (2011) argued with regard to climate change – a ‘perfect moral storm’. When it comes to earth system risks, issues of intergenerational justice (Schuppert 2011, Lawrence 2014), justice in adaptation (Adger *et al.* 2006) or interspecies justice (Agyeman *et al.* 2016) – to name but a few – go beyond traditional conceptualizations of the environment. Earth system transformation creates an entirely new context for what is increasingly being referred to as ‘planetary justice’ (Hickey and Robeyns 2020, Biermann and Kalfagianni 2020). What is required is further conceptual and empirical work on these planetary-level concerns. The mainstream ‘environmental policy’ paradigm is ill-equipped to take on this challenge.

There is a second, related point: the increasing recognition of the ‘Anthropocene’, along with earth system transformations such as climate change or species extinction, create new challenges for the accountability and legitimacy of governance (Biermann and Gupta 2011) and more generally for democracy itself (Dryzek and Stevenson 2011, Dryzek and Pickering 2018, Pickering 2019, Schlosberg *et al.* 2019, Mert 2019a). As Ayşem Mert (2019b, p. 291) convincingly argued, ‘[w]ith the Anthropocene, democracy must be reinterpreted once more. A second scalar revolution is needed to fundamentally transform the practice and conception of democracy for the planet’. The constituting triad inherent in the mainstream ‘environmental policy’ paradigm – humans, environment and policy effectiveness in reducing the impact of the former on the latter – cannot rise up to the challenge of securing democracy under Anthropocene conditions.

'Environmental policy' cannot address the broader normative challenges of the Anthropocene

Fourth, the 'environmental policy' paradigm fails to deal with the broader normative challenges of the Anthropocene. As the Anthropocene concept emphasizes, people are no longer reactive to the 'forces of nature' but have assumed a power that equals traditional forces of nature such as ice ages. If humans – in all their inequalities and injustices – are now the 'driving force' on planet Earth, this raises the unprecedented normative question of how we want our planet to be. The most prominent example is the 2015 Paris Agreement of 'holding the increase in the global average temperature to well below 2°C above pre-industrial levels and pursuing efforts to limit the temperature increase to 1.5°C above pre-industrial levels'. This target hence combines positive acceptance of global temperature change *vis-à-vis* the world of the 1800s with the parallel agreement of limiting this warming to the 'acceptable' 2 degrees. In short, this is a normative political agreement on the 'optimal temperature' of planet Earth (Morsetto *et al.* 2017).

Such normative debates and decisions are central to the Anthropocene and an earth-system perspective; we cannot avoid them (Schmidt 2019). The 'environmental policy' paradigm does not help because of its inherent construction of an 'environment' out there that is ill-defined. It is true that environmental policy worked traditionally with target values – for instance, for water quality – that are not much different from the 2-degree climate target. However, through its ontological separation of 'the environment' and humans, the 'environmental policy' paradigm does not resolve the normative debates of the Anthropocene that emphasize the systemic, non-binary character of human-nature entanglements. Thus, it is no surprise that all recent key attempts of framing the normative 'operating space' for humanity in the 21st century – such as the planetary boundaries approach mentioned above, the alternative 'doughnut' approach that sets a number of additional social boundaries within the planetary boundaries (Raworth 2017) and most centrally the 2015 Sustainable Development Goals of the United Nations that integrate economic, social and traditional environmental objectives in each goal (Kanie and Biermann 2017) – are all incompatible with the old 'environmental policy' paradigm and its human-environment dichotomy.

This does not mean that the 'end of environmentalism' logically leads to what has become known as 'ecomodernism', that is, the active, enthusiastic embrace of the Anthropocene and the resulting 'politics of possibility', to paraphrase the title of one of the key publications of ecomodernism (Shellenberger and Nordhaus 2004, Nordhaus and Shellenberger 2007). Politics beyond the 'environmental policy' paradigm can and must embrace humility about the ability of human understanding; acceptance of the intricacies of global value conflicts and inequality; and acknowledgement of the

limits in setting up effective global and national political institutions and steering mechanisms. Accepting the breakdown of the human-nature binary and the emergence of humans as driving forces at planetary scale does not need to lead to technocratic ‘earth management’ by expert elites of the Global North. Nonetheless, the traditional ‘environmental policy’ paradigm does not resolve the normative conundrums of the Anthropocene. Novel approaches and concepts are needed.

‘Environmental policy’ may marginalize central concerns of survival

Fifth, the mainstream ‘environmental policy’ paradigm may lead to political marginalization of central concerns of human and non-human survival. In short, an ‘environment’ framing does not do justice to the scale of today’s global crisis. Survey after survey has shown that environmental issues are felt as important by many, but rarely on a par with issues such as economic crises, terrorism, migration and identity. And yet, the unprecedented heating of our planet or species mass extinction are issues fundamentally important for survival. The traditional framing of these risks as ‘environmental’ problems has consistently downplayed the issue from an existential threat to something that is a more ordinary policy challenge. It is no coincidence that the largest youth movements of recent times march under the banners of ‘climate emergency’ and ‘extinction rebellion’ and are rarely described, in their own outlets or by the media, as ‘environmentalist’ movements. The climate crisis is at its core more than an environmental problem, as we see in the recent call to declare states of ‘climate emergency’ at municipal levels and even in European Parliament. Continuing to frame the climate crisis as an ‘environmental’ problem would harm rather than help to shape political and societal responses.

In sum, the challenges of the Anthropocene are systemic. They need integrated thinking and acting, as well as integrated policies. The new discourses of the last two decades have shown that we are not dealing with ‘the environment’ as a distinct entity that surrounds ‘humans’. Instead, complexities and systemic interdependencies define the dynamic world of the Anthropocene that we are encountering. A new, more systemic, more integrative approach is needed for the theory and practice of earth system governance. It is questionable whether the old ‘environmental policy’ paradigm can cope with these challenges. I will turn to this question, and to its implications, next.

Implications

What is the future of the ‘environmental policy’ paradigm? Two directions are conceivable. Both we can observe in practice.

First, we see attempts *to expand the notion of environmental policy* to better respond to the challenges laid out above, and hence to preserve its core. This is to be expected, given the long-standing community of ideas, agencies and people that has grown and become institutionalized over the last half century around this concept. For example, key papers on the Anthropocene, the governance of planetary boundaries or even geoengineering have been published recently in mainstream environmental journals, including *Environmental Politics*. Numerous climate-related publications have pushed the boundaries of the old ‘environmental policy’ paradigm by including broader topics such as migration and refugees, water shortages and poverty, war and conflict, or ‘climate suffering’. Most leading scholars who have broadened the debate beyond the ‘environmental policy’ paradigm still hold positions as professors of environmental policy or remain affiliated with environmental studies departments. Historians note that much of what is presented today as novel has been talked about already in the 20th century, from the 1992 ‘Earth Summit’ to early references to planetary scales or system analysis in the 1970s (e.g. Sluga [forthcoming](#)).

However, the current expansion and partial adjustment of the ‘environmental policy’ paradigm may not suffice. Newly created institutions are now exploring and supporting new paradigms, from the Stockholm Resilience Centre to the Earth Institute (one at Columbia, one in Kiel) or the global research platform ‘Future Earth’. While we do find articles on earth-system challenges in traditional environmental policy journals, most of these debates are published today in journals grounded in different paradigms, such as *The Anthropocene Review*, *Anthropocenes*, *Ecology and Society*, *Global Sustainability*, *Nature Sustainability*, or *Earth System Governance*. None of the larger interdisciplinary networks in this field – such as the Resilience Alliance, the Earth System Governance Project, the Sustainability Transitions Research Network or the science platform Future Earth – operate with any prominent reference to the old ‘environmental policy’ paradigm. Moreover, new education programmes rarely link back to ‘environmental policy’ but use instead titles that refer to global change, climate, sustainability and so on. In the Netherlands, for instance, new and highly popular study programmes lead to degrees in *Future Planet Studies* (Amsterdam), *Earth and Economics* (Amsterdam) or *Global Sustainability Science* (Utrecht); all offered by institutions originally located within the ‘environmental policy’ paradigm. One finds similar developments all over, for instance in Australia with new programmes in Interdisciplinary Studies (Sustainability) at the Australian National University or the Bachelor of Sustainability at the University of New England. In short, the ‘environmental policy’ paradigm is losing its attractiveness also in education.

As a consequence, many recent terminological interventions suggest *alternative framings* of governance and policy in the Anthropocene. These

include ‘Anthropocene governance’, ‘new earth politics’ (Nicholson and Jinnah 2016), ‘earth governance’ (Bosselmann 2015), ‘planet politics’ (Burke *et al.* 2016), ‘politics of the Anthropocene’ (Dryzek and Pickering 2018) or ‘Anthropocene geopolitics’ (Dalby 2019). In legal science, the Anthropocene debate has led to a series of conceptual innovations as well (e.g. Stephens 2019), with a recent attempt to chart a new legal field called ‘earth system law’ (Kotzé and Kim 2019, Cardesa-Salzman and Cocciolo 2019; see also Petersmann 2018) and even *lex Anthropocenae* (Kotzé and French 2018).

An alternative concept advanced two decades ago is ‘earth system’ governance (Biermann 2002, 2007, 2014), which integrates the new focus on *integrated socioecological systems at planetary scale* with the widely-used notion of *governance*. Earth system governance as a concept is integrative by opening up to different disciplines, such as political science, sociology and law. It is also conceptually scalable as it allows the study of local- or regional-scale systems within a planetary perspective of the entire earth system. In fact, many scholars have come to use the term in its plural, more scalable version, as ‘earth systems governance’. The Earth System Governance Project, an interdisciplinary international research network of several hundred researchers, has since 2007 organized twelve international conferences, set up three book series on earth system governance with MIT Press and Cambridge University Press, and maintains its own journal, *Earth System Governance*. In 2018, the network published its second 10-year Science and Implementation Plan (Burch *et al.* 2019).

The jury is out as to whether any of these new concepts will eventually supersede the ‘environmental policy’ paradigm. In the end, *coexistence* and *conceptual pluralism* might well be the outcome for the years to come.

Conceptual pluralism is needed, for one, because the academic debate that I sketched has barely left a trace in daily politics. At national level as well as in the United Nations, we still encounter the long-standing array of environmental ministries, departments, assessment agencies, consultancies and so forth. Notably, in 2019 the United Nations was discussing a global charter with the highly traditional working title, ‘Global Pact for the Environment’ (for a critique, see Kotzé and French 2018). The term Anthropocene, instead, is hardly used in policy documents, and the notion of planetary boundaries was dropped from draft documents negotiated at the 2012 United Nations Conference on Sustainable Development (Saunders 2015). While the terminology of earth system governance has entered global diplomacy – e.g. in a 2014 report from the United Nations Secretary-General (UNGA 2014) – it is still largely located in academic discourse. The resilience concept seems most successful in terms of impact upon policy documents. Yet also here, concrete institutional or policy change under a resilience banner is hardly observable.

Internationally, much political resistance to these newer concepts stems from a general fear and mistrust in the Global South *vis-à-vis* the Northern academic community that is the main ‘producer’ of widely-published new terminology and concepts (e.g. Oguamanam 2015). For example, anything that combines with ‘earth’ or ‘planet’, or ‘global constitutionalism’, easily raises the spectre of ‘green colonialism’ through encroachments on national sovereignty combined with Northern domination. Also, many new concepts – including the Anthropocene – might suffer from the same blindness *vis-à-vis* social injustice and inequality (for this critique see Biermann *et al.* 2016).

In addition, traditional environmental institutions are still functional, to some extent. While the climate crisis is too complex to be resolved by environmental ministers – and its initial framing as an ‘environmental’ problem contributed to the current lack of policy effectiveness – issues such as local water pollution can probably still be resolved within the traditional system of environmental policy-making, although global interdependencies and complexities require a new perspective also here. Overall, in times of global climate emergencies and earth-system transformations there is no need to tear down an ‘environmental policy’ infrastructure that has been built over fifty years.

Nevertheless, it does not follow that a post-environmental ‘earth system’ paradigm does not urgently need new institutions, structures and policies, beyond the traditional environmental policy institutions.

First, we need new approaches in science and scientific assessment that go beyond the traditional mainstream ‘environmental policy’ framing. Science institutions that centre around ‘environmental policy’ need to be replaced by institutions that work within an integrated, system-oriented and transformative paradigm (Van der Hel 2016, Beck 2019). Second, sectoral policies must be better integrated, and it is here where current governance falls short. For instance, from all planetary boundaries that have been identified by earth system analysts, only few are covered by political institutions. The management of nitrogen and phosphorus cycles, to give just one example, is hardly internationally institutionalized (Ahlström and Cornell 2018), nor are issues of freshwater use, land use or novel chemicals. An earth-system perspective is needed to identify shortcomings in current institutional architectures and point towards reform (e.g. Nilsson and Persson 2012).

Third, understanding global change and earth system transformation as a crisis of social injustice – within and across nations – with high levels of material overconsumption by some and widespread deprivation of the rest, calls for novel approaches. The agreement on the United Nations Sustainable Development Goals in 2015 has crossed a major boundary by stipulating, for the first time in Goal 10, that governments and other actors shall reduce inequality among and within countries. Despite this striking normative

development, the implementation of this ambition lacks concrete institutional arrangements and policies, which will eventually require a restructuring of the entire economic system that goes far beyond mainstream ideas of ‘environmental modernization’.

Fourth, earth system transformations threaten to expose people, especially poor, vulnerable and marginalized communities, to unprecedented risk and harm. Climate change has been discussed for long as a major migration driver for millions of people in the second half of the century (Biermann and Boas 2010). Land degradation and competition for land – among others for the use of biofuels and cattle farming for meat production – put additional pressures on the poor. Global warming exceeding 3 or 4 degrees Celsius might lead to a world of more conflict and devastation. Again, current institutions are poorly prepared to cope with such impacts of earth system transformation, including their dynamics, feedback effects and unanticipated effects. The ‘environmental policy’ paradigm does not help to better understand these novel risks of global disaster.

Conclusion

In sum, the mainstream ‘environmental policy’ paradigm, shaped in the 1970s and 1980s, falls short when dealing with the novel challenges of the Anthropocene. Admittedly, fundamental critique and radical visioning has been part of the green political discourse since the 1970s, with integrated system thinking, social justice concerns and deep ecology approaches. Nonetheless, forward-looking ideas have often remained marginalized and constrained by stronger forces of political conservatism and neoliberal capitalism.

The current mainstream ‘environmental policy’ paradigm still operates from a dichotomy of ‘humans’ and ‘nature’ that is outdated. It is incompatible with innovative approaches that seek to overcome the human-environment dichotomy, from planetary boundaries to the circular economy. With its inherent focus on narrow problem-solving and policy effectiveness, it deemphasizes questions of planetary justice and global democracy, and it does not provide conceptual guidance to address novel normative challenges of the Anthropocene. Politically, framing earth system transformations such as climate change as ‘environmental problems’ might have harmed their standing in the policy system, which, for example, the new discourses of ‘climate emergency’ seek to address.

This does not mean, however, that we need to throw the baby out with the bathwater. The environmental policy paradigm has shaped and created over half a century a vast array of institutions, policies and actor networks across the globe, and it is pointless and risky to argue for the total replacement of such institutions through new types of ‘Anthropocene institutions’. At the

same time, major reforms in discursive framings, institutional arrangements and policy approaches are also needed to cope with the novel challenges of earth system transformation. We need novel approaches in science and assessment; better integration of sectoral policies that follow an earth-systems approach; new approaches to deal with the injustices of our economic system and the challenges to our democracies that come with global change and earth system transformation; and institutional realignments to prepare for the worst impacts of earth system transformations that we cannot stop.

What does this all mean for this journal, *Environmental Politics*, at its thirtieth anniversary? While the mainstream framing of ‘environmental policy’ is today incapable of addressing the larger planetary transformations that need a more integrated, systems-oriented, interdisciplinary and politically radical approach, many areas and issues can still be dealt with as traditional environmental problems, from urban air standards to the cleaning up of rivers from chemical pollution; *Environmental Politics* will remain a prominent outlet for such debates. In addition, the *Environmental Politics* journal will continue adapting to new discourses by publishing papers that fall outside the traditional environmental policy paradigm. In short: the journal *Environmental Politics* will continue to prosper – within a broader network of newer publication outlets that focus on the more systemic, interdisciplinary, transdisciplinary and planetary challenges and approaches.

Notes

1. The latter understanding allowed the notion of ‘the environment’ since the 1960s to broadly replace the previously preferred and possibly more ecocentric term ‘nature’, which was more prominent in earlier movements for ‘nature protection’ and ‘nature conservation’.
2. The conceptual history here is of course much more complex, especially regarding how environmental and development agendas clashed in the 1970 and 1980s, with the eventual compromise term ‘sustainable development’ as an outcome that allowed global summits and political programmes to continue. For an explicitly Southern perspective see for example the contributions in Alam *et al.* (2015). I am grateful for Marie Petersmann for emphasizing this.

Acknowledgments

I am grateful for valuable comments received on earlier versions by Aarti Gupta, Rakhyn E. Kim, Louis J. Kotzé and Marie C. Petersmann; by the participants in a panel discussion at the 2019 Mexico Conference on Earth System Governance in Oaxaca, Mexico, on 6 November 2019, notably Karin Bäckstrand, Steven Bernstein, and Paul Wapner; and the anonymous reviewers and editors of *Environmental Politics*.

Disclosure statement

No potential conflict of interest was reported by the author(s).

Funding

I am grateful for funding by the European Research Council (Advanced Grant No. 788001).

References

- Adger, W.N., *et al.*, eds, 2006. *Fairness in adaptation to climate change*. Cambridge, MA: MIT Press.
- Agyeman, J., *et al.*, 2016. Trends and directions in environmental justice: from inequity to everyday life, community, and just sustainabilities. *Annual Review of Environment and Resources*, 41, 321–340.
- Ahlström, H. and Cornell, S.E., 2018. Governance, polycentricity and the global nitrogen and phosphorus cycles. *Environmental Science and Policy*, 79, 54–65. doi:10.1016/j.envsci.2017.10.005
- Alam, S., *et al.*, eds. 2015. *International environmental law and the Global South*. Cambridge, UK: Cambridge University Press.
- Arias-Maldonado, M., 2013. Rethinking sustainability in the Anthropocene. *Environmental Politics*, 22 (3), 428–446. doi:10.1080/09644016.2013.765161
- Arias-Maldonado, M., 2019. The ‘Anthropocene’ in philosophy: the neo-material turn and the question of nature. In: F. Biermann and E. Lövbrand, eds. *Anthropocene encounters. New directions in green political thinking*. Cambridge, UK: Cambridge University Press, 50–66.
- Beck, S., 2019. Coproducing knowledge and politics of the Anthropocene: the case of the Future Earth Program. In: F. Biermann and E. Lövbrand, eds. *Anthropocene encounters. New directions in green political thinking*. Cambridge, UK: Cambridge University Press, 191–211.
- Biermann, F., 2002. Johannesburg plus 20: from international environmental policy to earth system governance. *Politics and the Life Sciences*, 21 (2), 72–77.
- Biermann, F., 2007. ‘Earth system governance’ as a crosscutting theme of global change research. *Global Environmental Change: Human and Policy Dimensions*, 17 (3–4), 326–337. doi:10.1016/j.gloenvcha.2006.11.010
- Biermann, F., 2014. *Earth system governance. World politics in the Anthropocene*. Cambridge, MA: MIT Press.
- Biermann, F., *et al.*, 2016. Down to earth: contextualizing the Anthropocene. *Global Environmental Change: Human and Policy Dimensions*, 39, 341–350. doi:10.1016/j.gloenvcha.2015.11.004
- Biermann, F. and Boas, I., 2010. Preparing for a warmer world: towards a global governance system to protect climate refugees. *Global Environmental Politics*, 10 (1), 60–88. doi:10.1162/glep.2010.10.1.60
- Biermann, F. and Gupta, A., 2011. Accountability and legitimacy in earth system governance: A research framework. *Ecological Economics*, 70 (11), 1856–1864. doi:10.1016/j.ecolecon.2011.04.008
- Biermann, F. and Kalfagianni, A., 2020, in press. Planetary justice: A research framework. *Earth System Governance*, 100049. doi:10.1016/j.esg.2020.100049

- Biermann, F. and Kim, R.E., 2020, in press. The boundaries of the Planetary Boundary framework: a critical appraisal of approaches to define a “safe operating space” for humanity. *Annual Review of Environment and Resources*, 45 (1), 497–521. doi:10.1146/annurev-environ-012320-080337
- Biermann, F. and Löwbrand, E., eds., 2019. *Anthropocene encounters. New directions in green political thinking*. Cambridge, UK: Cambridge University Press.
- Bodansky, D., 2011. *The art and craft of international environmental law*. Cambridge, MA: Harvard University Press.
- Bosselmann, K., 2015. *Earth governance. Trusteeship of the global commons*. Cheltenham: Edward Elgar.
- Brown, K., 2017. Global environmental change II: planetary boundaries – a safe operating space for human geographers? *Progress in Human Geography*, 41 (4), 118–130. doi:10.1177/0309132515604429
- Burch, S., et al., 2019. New directions in earth system governance research. *Earth System Governance*, 1 (1), 100006. doi:10.1016/j.esg.2019.100006
- Burke, A., et al., 2016. Planet politics. A manifesto from the end of IR [International Relations]. *Millennium: Journal of International Studies*, 44 (3), 499–523. doi:10.1177/0305829816636674
- Burke, A., 2019. Blue screen biosphere: the absent presence of biodiversity in international law. *International Political Sociology*, 13 (3), 333–351. doi:10.1093/ips/olz015
- Cardesa-Salzmann, A. and Cocciolo, E., 2019. Global governance, sustainability and the earth system: critical reflections on the role of global law. *Transnational Environmental Law*, 8 (3), 437–461. doi:10.1017/S2047102519000098
- Castree, N., 2019. The ‘Anthropocene’ in global change science: expertise, the earth and the future of humanity. In: F. Biermann and E. Löwbrand, eds. *Anthropocene encounters. New directions in green political thinking*. Cambridge, UK: Cambridge University Press, 25–49.
- Collins English Dictionary*, 1993. Glasgow, UK: HarperCollins Publishers.
- Coolsaet, B., eds., 2020. *Environmental justice: key issues*. Abingdon: Routledge.
- Crutzen, P.J., 2006. Albedo enhancement by stratospheric sulfur injections: A contribution to solve a policy dilemma. *Climate Change*, 77 (3–4), 211–219. doi:10.1007/s10584-006-9101-y
- Crutzen, P.J. and Stoermer, E.F., 2000. The ‘Anthropocene’. *Global Change Newsletter*, 41, 17–18.
- Dalby, S., 2019. *The new context for sustainability: anthropocene geopolitics*. Paper presented at the Western Social Science/Association of Border Studies Conference, San Diego, 26 April 2019. On file with author.
- Dryzek, J.S. and Pickering, J., 2018. *The politics of the Anthropocene*. Oxford: Oxford University Press.
- Dryzek, J.S. and Stevenson, H., 2011. Global democracy and earth system governance. *Ecological Economics*, 70 (11), 1865–1874. doi:10.1016/j.ecolecon.2011.01.021
- Ehresman, T.G. and Okereke, C., 2015. Environmental justice and conceptions of the green economy. *International Environmental Agreements: Politics, Law and Economics*, 15 (1), 13–27. doi:10.1007/s10784-014-9265-2
- Encyclopaedia Britannica, 2020. *Environmental policy*. Online encyclopaedia. Available from: <https://www.britannica.com/topic/environmental-policy>. [Accessed 21 April 2020].

- European Commission, 2019. *Nature-based solutions: the challenge*. Official EU web site. Available from: <https://ec.europa.eu/research/environment/index.cfm?pg=nbs> [Accessed 21 April 2020].
- Folke, C., 2006. Resilience: the emergence of a perspective for social-ecological systems analysis. *Global Environmental Change: Human and Policy Dimensions*, 16 (3), 253–267. doi:10.1016/j.gloenvcha.2006.04.002
- Folke, C., et al., 2016. Social-ecological resilience and biosphere-based sustainability science. *Ecology and Society*, 21 (3), 41. doi:10.5751/ES-08748-210341
- Future Earth, 2014. *Future Earth 2025 Vision*. Paris: Future Earth Interim Secretariat.
- Galaz, V., 2019. Time and politics in the Anthropocene: too fast, too slow? In: F. Biermann and E. Löwbrand, eds. *Anthropocene encounters. New directions in green political thinking*. Cambridge, UK: Cambridge University Press, 109–127.
- Gardiner, S., 2011. *A perfect moral storm: the ethical tragedy of climate change*. Oxford: Oxford University Press.
- Hanusch, F. and Biermann, F., 2020. Deep-time organizations: learning institutional longevity from history. *The Anthropocene Review*, 7 (1), 19–41. doi:10.1177/2053019619886670
- Hickey, C. and Robeyns, I., 2020, in press. Planetary justice: what can we learn from ethics and political philosophy? *Earth System Governance*, 100045. doi:10.1016/j.esg.2020.100045
- International Environmental Agreements Data Base, 2020, ed. Ronald B. Mitchell. *University of Oregon, 2002–2020. Version 2020.1*. Available from: <http://iea.uoregon.edu/Date> [Accessed 17 April 2020].
- Jänicke, M. and Jacob, K., eds., 2006. *Environmental governance in global perspective: new approaches to ecological modernization*. Berlin: Center for Environmental Policy Analysis.
- Jänicke, M. and Weidner, H., 1997. *National environmental policies: A comparative study of capacity-building*. Berlin: Springer.
- Jon, I., 2020. Deciphering posthumanism: why and how it matters to urban planning in the Anthropocene. *Planning Theory*, 19 (4), 392–420. doi:10.1177/1473095220912770
- Kanie, N. and Biermann, F., eds., 2017. *Governing through goals: sustainable development goals as governance innovation*. Cambridge, MA: MIT Press.
- Keohane, R.O., 2016. Keohane on climate: what price equity and justice. *Climate Change News* (online). Available from: <https://www.climatechangenews.com/2016/09/06/keohane-on-climate-what-price-equity-and-justice> [Accessed 21 April 2020].
- Klinsky, S., et al., 2017. Why equity is fundamental in climate change policy research. *Global Environmental Change*, 44 (May), 170–173. doi:10.1016/j.gloenvcha.2016.08.002
- Kotzé, L.J. and French, D., 2018. A critique of the global pact for the environment: a stillborn initiative or the foundation for Lex Anthropocenae? *International Environmental Agreements: Politics, Law and Economics*, 18 (6), 811–838. doi:10.1007/s10784-018-9417-x
- Kotzé, L.J. and Kim, R.E., 2019. Earth system law: the juridical dimensions of earth system governance. *Earth System Governance*, 1 (1). doi:10.1016/j.esg.2019.100003
- Latour, B., 2015. Fifty shades of green. *Environmental Humanities*, 7 (1), 219–225. doi:10.1215/22011919-3616416
- Lawrence, P., 2014. *Justice for future generations. Climate change and international law*. Cheltenham, UK: Edward Elgar.

- Leach, M., *et al.*, 2018. Equity and sustainability in the Anthropocene. A social-ecological systems perspective on their intertwined futures. *Global Sustainability*, 1, 1–13. doi:10.1017/sus.2018.12
- Leemans, R., *et al.*, 2009. Developing a common strategy for integrative global environmental change research and outreach: the Earth System Science Partnership (ESSP). *Current Opinion in Environmental Sustainability*, 1 (1), 4–13. doi:10.1016/j.cosust.2009.07.013
- Lewis, S.L. and Maslin, M.A., 2018. *The human planet: how we created the Anthropocene*. London: Penguin.
- Meadowcroft, J., 2017. The birth of the environment and the evolution of environmental governance. In: J. Meadowcroft and D.J. Fiorino, eds. *Conceptual innovation in environmental policy*. Cambridge, MA: MIT Press, 53–76.
- Meadowcroft, J., 2019. Epilogue: continuity and change in the Anthropocene. In: F. Biermann and E. Lövbrand, eds. *Anthropocene encounters. New directions in green political thinking*. Cambridge, UK: Cambridge University Press, 228–242.
- Mert, A., 2019a. Democracy in the Anthropocene: a new scale. In: F. Biermann and E. Lövbrand, eds. *Anthropocene encounters. New directions in green political thinking*. Cambridge, UK: Cambridge University Press, 128–149.
- Mert, A., 2019b. Democracy in the Anthropocene. In: A. Kalfagianni, D. Fuchs, and A. Hayden, eds. *Routledge handbook of global sustainability governance*. Abingdon: Routledge, 282–295.
- Morseletto, P., Biermann, F., and Pattberg, P., 2017. Governing by targets: reduction and evolution of the two-degree climate target. *International Environmental Agreements: Politics, Law and Economics*, 17 (5), 655–676. doi:10.1007/s10784-016-9336-7
- Nicholson, S. and Jinnah, S., eds., 2016. *New earth politics: essays from the Anthropocene*. Cambridge, MA: MIT Press.
- Nilsson, M. and Persson, Å., 2012. Can earth system interactions be governed? Governance functions for linking climate change mitigation with land use, freshwater and biodiversity protection. *Ecological Economics*, 75, 61–71. doi:10.1016/j.ecolecon.2011.12.015
- Nordhaus, T. and Shellenberger, M., 2007. *Break through. From the death of environmentalism to the politics of possibility*. Boston: Houghton Mifflin Harcourt.
- O’Riordan, T., 2009. Reflections on the pathways to sustainability. In: W.N. Adger and A. Jordan, eds. *Governing sustainability*. Cambridge, UK: Cambridge University Press, 307–328.
- Oguamanam, C., 2015. Sustainable development in the era of bioenergy and agricultural land grab. In: S. Alam, *et al.*, eds. *International environmental law and the Global South*. Cambridge, UK: Cambridge University Press, 237–255.
- Petersmann, M.-C., 2018. Narcissus’ reflection in the lake: untold narratives in environmental law beyond the Anthropocentric frame. *Journal of Environmental Law*, 30 (2), 235–259.
- Pickering, J., 2019. Ecological reflexivity: characterising an elusive virtue for governance in the Anthropocene. *Environmental Politics*, 28 (7), 1145–1166. doi:10.1080/09644016.2018.1487148
- Raworth, K., 2017. *Doughnut economics: seven ways to think like a 21st-century economist*. White River Junction, VT: Chelsea Green Publishing.
- Reynolds, J., 2019. *The governance of solar geoengineering: managing climate change in the Anthropocene*. Cambridge: Cambridge University Press.

- Rockström, J., *et al.*, 2009. A safe operating space for humanity. *Nature*, 461 (7263), 472–475. doi:10.1038/461472a
- Saunders, F., 2015. Planetary boundaries: at the threshold ... again: sustainable development ideas and politics. *Environment, Development and Sustainability*, 17 (4), 823–835. doi:10.1007/s10668-014-9577-y
- Schellnhuber, H.J., *et al.*, 2004. *Earth system analysis for sustainability*. Cambridge, MA: MIT Press, in cooperation with Dahlem University Press.
- Schellnhuber, H.-J., 1999. ‘Earth System’ analysis and the second Copernican revolution. *Nature*, 402 (S6761), c19–c23. doi:10.1038/35011515
- Schlosberg, D., 2007. *Defining environmental justice: theories, movements and nature*. Oxford: Oxford University Press.
- Schlosberg, D., Bäckstrand, K., and Pickering, J., 2019. Reconciling ecological and democratic values: recent perspectives on ecological democracy. *Environmental Values*, 28 (1), 1–8. doi:10.3197/096327119X15445433913541
- Schmidt, J.J., 2019. The moral geography of the earth system. *Transactions of the Institute of British Geographers*, 44 (4), 721–734. doi:10.1111/tran.12308
- Schuppert, F., 2011. Climate change mitigation and intergenerational justice. *Environmental Politics*, 20 (3), 303–321. doi:10.1080/09644016.2011.573351
- Shellenberger, M. and Nordhaus, T., 2004. *The death of environmentalism: global warming politics in a post-environmental world*. N.p., The Breakthrough Institute.
- Sluga, G., *forthcoming*. “The forgotten history of planetary thinking,” EUI Past and Futures of International Order Working Paper 2021/1.
- Steffen, W., *et al.*, 2015. Planetary boundaries: guiding human development on a changing planet. *Science*, 347 (6223), 736–746. doi:10.1126/science.1259855
- Stephens, T., 2019. *What is the point of international environmental law scholarship in the Anthropocene?* University of Sydney Law School, Legal Studies Research Paper Series no. 19/25. Sydney: The University of Sydney.
- UNGA (United Nations General Assembly), 2014. *Harmony with nature. Report of the Secretary-General*. United Nations Doc. A/69/322 of 18 August 2014. Available from: <https://undocs.org/A/69/322>
- Van der Hel, S., 2016. New science for global sustainability? The institutionalisation of knowledge co-production in Future Earth. *Environmental Science and Policy*, 61, 165–175. doi:10.1016/j.envsci.2016.03.012
- Zalasiewicz, J., *et al.*, 2011. The Anthropocene: A new epoch of geological time? *Philosophical Transactions of the Royal Society A*, 369 (1938), 835–841. doi:10.1098/rsta.2010.0339