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Power & temporality in pursuing transformative planetary justice

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ABSTRACT

Planetary justice discourse has emerged as a new approach for earth system governance which centers justice concerns within a particular temporal epoch, the so-called 'Anthropocene.' Here, we examine the distinctive features of the planetary justice framework, focusing specifically on the importance of the temporal dimensions relevant for understanding injustices beyond humans and at the planetary scale. We use two examples – PFAS and insurance – to demonstrate how the multiscalar, beyond-human approach adopted by planetary justice scholars, coupled with the discourse's embeddedness in existing earth system governance processes, could have meaningful influence in planetary decision-making processes. We argue that there is a need for (1) expanding the 'pro-poor' agenda of planetary justice research, and (2) cultivating space for inclusion of existing and alternative approaches to justice in pursuing a pluralized planetary justice. In closing, we suggest future areas of research and action for redressing power imbalances across space-time in the pursuit of planetary justice.

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Introduction¹

In recent years, justice-centric approaches to studying environmental concerns have flourished. Despite this, poorly and unmanaged environmental crises continue to imperil people and planetary health. While justice movements have challenged human-environment arrangements that create and exacerbate social inequalities and environmental degradation, progress has been slow and wins have been limited. Further, a lack of political will leaves needed large-scale, transformative structural changes unimplemented. Aiming to address this, planetary justice (PJ) scholarship focuses on how – in the context of the 'Anthropocene' – justice can be pursued at a planetary scale (Hickey and Robeyns 2020). San Martín and Wood (2022) note that

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a 'planetary' approach focuses on 'how inequalities are embedded in complex interactions of biogeochemical cycles, governance, and socio-political pressures to allocate resources and outline distinct development trajectories at multiple spatio-temporal scales' (San Martín and Wood 2022, p. 257).

Kashwan et al. (2020, p. 4) describe PJ as 'a system designed to secure the integrity of the planetary system as well as universal protection of basic human dignity for all people.' PJ aims to ensure that considerations of justice extend across borders and generations, transcending space-time (see Massey 1999), and for all living sentient and non-sentient entities (Dryzek and Pickering 2019). Scholars are in early phases of defining and refining the PJ concept and its distinctness and applicability for human-Earth relations and stewardship. At present, we identify five key characteristics that differentiate PJ from other approaches to justice and environmental governance: (1) scale – the approach emphasizes planet-level thinking, which moves beyond a focus on international governance, but, encapsulates justice and equity concerns across all sub-scales; (2) temporality – it is focused specifically on the 'Anthropocene' epoch; (3) it expands justice to incorporate non-humans (4) it suggests a need to re-orient our understandings of human-earth relations; and, (5) it diverges from other approaches to environmental governance (i.e. market liberal, bioenvironmentalist, ecomodernist, institutionalist, and social green) by focusing on social justice and inequality, in pursuit of a 'pro-poor' agenda (Kashwan et al. 2020).

Given temporality is integral to the development of PJ scholarship, we unpack the distinguishing factors of PJ here through a focus on temporality. We argue that PJ can be used as a tool for: (1) considerations of nonhuman and material timescales in understanding multispecies injustices of the past, present and future, (2) better connecting systems and experiences of power and inequality across space-time and multiple social scales, and (3) expanding the focus of 'pro-poor' strategies to account and redress injustice at the intersections of multiple systems of marginalization. We start by showing how the material timescales of PFAS can constitute injustices to both humans and non-humans on a planetary scale, both in the present and far into the future. Then, through the example of insurance, we demonstrate how powerful actors use meta-power to weaponize temporality in their favor, ultimately creating social inequalities that have dire consequences for marginalized communities and non-humans. Finally, we address important caveats about power, temporality, and PJ, suggesting the need for scholars and scholarship to be self-reflexive while interrogating power dynamics and the role of meta-power arrangements in tackling planetary injustices that impact humans and non-humans within and across generations.

In doing so, we advance existing scholarship on PJ by answering the call for grounding it as a theoretical and conceptual approach in concrete, practical examples (Kashwan et al. 2020) and demonstrating how this

distinctive approach is well-suited for uncovering the connectedness of injustice and inequity across space-time and scale. Further, we highlight the value of this approach as it is positioned to influence planetary-level governance processes and reach political actors who may be unfamiliar with existing justice movements and scholarship. At the same time, we demonstrate existing gaps, oversights and the need to challenge Western assumptions embedded in PJ conceptualizations.

Literature review: temporality in existing environmental justice research

The EJ movement was born out of a confluence of several pre-existing social movements that note how environmental racism stemmed from long-standing historical arrangements in a society that treated (and continues to treat) some people and non-humans as expendable (Taylor 1998, Pellow 2000). In early EJ research, time and temporality were relevant to questions about whether residents of marginalized communities pre-dated polluting industries and locally unwanted land-uses (LULUs), or vice versa (Mohai and Saha 2015). Yet, researchers and activists have challenged this ‘chicken versus the egg’ debate for being a narrow theorization of injustice and how systems of power and privilege operate (*ibid*).

Scholars have shown how environmental and climate injustices stem from historical legacies of racism, capitalism and colonialism (Falzon and Batur 2018). At the same time, the continued patterns of racial, colonial and economic inequality perpetuate these injustices in the present and shape the conditions within which future injustices can be resolved or perpetuated (EPA 2021). Hence, EJ concerns are embedded in systemic and structural power arrangements, where, through the use of meta-power – the ability to structure the conditions within which social processes unfold – actors are able to create and control the circumstances within which (in)justice occurs across space and time (Ryder and Malin 2021). These aims can be achieved through rules, regulations, laws, and decision-making processes. Thus, meta-power is a useful lens through which we can examine how powerful actors can set the socio-environmental conditions of earth system governance – including whether justice issues are considered – both in the present and in the future.

In EJ contexts, longitudinal analysis is essential in order to trace toxic materials and exposure across space and time (Pellow 2000), and to conduct full life-cycle analyses of environmental harms (Healy et al. 2019). Moreover, environmental injustices are processes and practices that rob people of their time on earth, as hazardous exposures can dramatically shorten lives and lead to experiences of ‘oppressive uncertain temporalities,’ particularly those already facing other intersectional forms of marginalization (Davies 2018).

Walker et al. (2022) for example, examines the spatio-temporal patterning of unequal exposure to urban air pollution at the intersection of human and non-human scales of rhythms.

Time is also relevant for EJ struggles because processes, decisions and initiatives are often manipulated to speed up or slow down developments. EJ activists have engaged in delay tactics against proposed environmentally unjust decisions (Pellow 1999; Hayes 2006). At the same time, actors in positions of power within governments and corporations can also use time as a political strategy, dragging out legal processes or working to slow or stall timely access to data and information (Fent and Kojola 2020; Ryder and Devine-Wright, 2022). Complicating temporality in just decision-making processes further, Lejano and Funderburg (2016) point to the way that neutral rule-making in regulatory agencies produces spatial inequalities, and argue that taking more time to develop and implement ethics of care in regulatory processes would reduce these inequalities.

Anticipation and a focus on the future is also a crucial justice component in energy contexts, as anticipating injustices can create pre-emptive negative impacts on communities (Szolucha 2018; Ryder and Devine-Wright, 2022). Anticipating the potential of experiencing injustice in the future can create psychological harm, thus demonstrating the role that futures play in justice studies is crucial (Partridge et al. 2018, Szolucha 2018). An emphasis on future-focused literature also includes debates around the ‘urgency’ of climate action. On the one hand, unequal climate impacts are already being experienced and are devastating many communities – namely, Indigenous, global South, and low-income communities of color – suggesting the need for timely action to address injustice. On the other, the emphasis on urgency can be used as a means for ignoring other environmental and equity issues, or to gloss over the need to address within-population vulnerabilities, needs, capacities and inequities along with climate change (Whyte 2017, 2020, Partridge et al. 2018). For example, urgency is sometimes used to support the notion that there is simply ‘no time’ to address issues of inequity in pursuing climate solutions.

Still, concern over the ‘global’ scale of climate (in)justice has gained significant attention in scholarship, among social movements, and in climate change policy. Early climate justice (CJ) concerns tended to be hyper-focused on historical emissions and holding countries and corporations responsible for the unequal patterns of consumption that have ushered in the climate crisis (Bond 2010). CJ research has also been oriented around both intra- and inter-generational time (Weston 2007). As with EJ research, time and temporality are often manipulated to serve different actors in climate contexts. While CJ advocates make direct temporal claims in their focus on future generations and intergenerational justice (e.g. Fridays for Futures protests), oil companies like ExxonMobil engage in delay tactics, such as preventing

the public release of data affirming climate change (Supran and Oreskes 2020). Furthermore, researchers have critically analyzed proposed efforts at climate geoengineering, which could paradoxically help address the climate crisis more rapidly while slowing down energy transitions away from fossil fuels – and perpetuating existing forms of environmental and climate injustice (McLaren 2018). In fact, this approach can be understood as a delay tactic or a way to ‘buy time,’ though researchers suggest that stopgap measures like solar geoengineering should not be pursued without a plan to properly utilize the time that it buys us (Buck et al. 2020).

PJ encapsulates ‘planetary-scale’ concerns about environmental issues, but also goes beyond the more narrowly focused concerns of the CJ community. As noted above, PJ theorists use the ‘inseparability’ of social and ecological systems within a defined time frame (the contested ‘Anthropocene,’) to develop a new concept of justice that ‘addresses the planetary-level social and environmental transformations advanced by humans,’ and the subsequent obligations across time, space, scale and species to solve threats to planetary boundaries within the Earth system (Johnson and Sigona 2022, p. 1). This effort moves justice concerns beyond their traditional anthropogenic focus toward consideration of non-humans, much in the same way that ecological and multispecies justice literatures have done (see Celermajer et al. 2021). While expanding justice considerations both beyond humans and across scales, PJ also focuses very specifically on how these injustices can be addressed through human-earth governance within our present temporal epoch (San Martín and Wood 2022).

Insofar as PJ is concerned, the crucial temporal focus of the growing body of work (beyond the Anthropocene) has been on anticipating futures and balancing the needs of present, near future and far future generations, of both humans and non-humans (Biermann 2020, Hickey and Robeyns 2020). Beyond generational concerns, however, there remain other aspects of planetary-level injustice where temporality and space-time are implicated. First, PJ’s focus on material assemblages at the planetary scale provides the opportunity to better incorporate non-living materials – their timescales, movements across space-time, and impacts – into justice considerations for earth-system governance. Second, PJ’s focus on the planetary-scale, and all of the sub-scales that that subsumes, can sharpen our understanding of how systems of power operate, manifest, and are connected across space-time, and how temporality can be manipulated to enact power. Below, we take up an exploration of these under-examined temporal aspects of PJ and their implications for earth system governance.

Beyond-human timescales and boundaries

A key argument for developing PJ is moving understandings of environmental justice (EJ) beyond a focus solely on humans, while also broadening

its spatial and temporal scales. One way we can do this is by thinking about planetary timescales that encompass but also go beyond human timescales, including temporalities of other living beings and non-living materials. Material timescales – such as the geological timescales of mineral development, climactic timescales, and the lifecycles of toxins are relevant for PJ. For example, the risks of acid mine drainage from hardrock mining extend into perpetuity as the chemical processes that generate acids when sulfides in waste rock are exposed to air and water cannot be stopped or reversed. The timescale of this pollution threat extends beyond the life of any single mining company and the lifespan of existing waste containment and water treatment systems (Kojola 2020).

As humans, non-humans and materials move through time, they simultaneously move across and through space, and climate change can shift and disrupt these patterns of movement (Robinson et al. 2009). Thus, Massey's (1999) concept of space-time becomes relevant for thinking about planetary injustice; where 'industrial' and material timescales mean that potential risks spread across and through space-time. Below, we demonstrate this phenomenon using the example of per- and polyfluoroalkyl substances (PFAS).

To Infinity and beyond: planetary justice and non-human timescales of "forever chemicals"

How do we comprehend infiniteness as a timescale? While difficult for humans to conceptualize, the planet is rife with materials that have no expiry date. Many of these materials (i.e. nuclear waste) are human-created phenomena; a product of capitalism, industrialism, and militarism. This includes chemical compounds that are now proliferating within the Earth system. This is an important temporal element of PJ as these materials were produced in mass quantities during the modern era, but will persist, harming humans and non-humans alike into perpetuity.

An example of these modern risks has come to light in recent years: PFAS – so called 'forever chemicals' – that are now widespread in our ecosystems and bodies. Public exposure to multiple PFAS compounds, which are commonly used in non-stick pans, waterproof fabrics, and flame-retardant carpets, is ubiquitous: national testing by the U.S. Centers for Disease Control (CDC) found PFAS in the serum of over 98% of the people tested (Calafat et al. 2007). PFAS have been linked to increased risk of thyroid, kidney, and liver disorders, infertility, various types of cancers, and developmental abnormalities in infants and fetuses (ATSDR 2021). These chemicals demonstrate the potential for low-dose toxicological and hormone disrupting effects, they have an unusually long half-life in blood serum, and they do not naturally degrade in the environment. Therefore, while these chemical compounds may be newly created, the time they spend

in bodies and ecosystems is ongoing with harms continuing into perpetuity. The decision to manufacture and use PFAS chemicals in a range of consumer products was made privately by corporations like Dupont, which sought short and medium-term profits without consideration, or accountability for, future impacts.

PFAS has emerged as a threat to vulnerable populations and is associated with the amplification of nativist policies of the U.S. federal government. The Trump administration's Zero Tolerance Policy prosecuted asylum seekers and people attempting to cross the U.S. border without authorization, which also included separating children from their families and caging them in prisons on military bases. The Sierra Club discovered that at least five of the military sites under consideration for incarcerating migrant children have PFAS contamination. Children are particularly vulnerable to PFAS because exposure to these chemicals can reduce the body's capacity to produce antibodies and its response to vaccinations, which are important for fighting off diseases (Anderko and Pennea 2020). Thus, children are left at a greater risk of future infections. Furthermore, efforts to delay information about the impacts of PFAS by the Trump administration demonstrate how powerful actors weaponize time, using it as a mechanism of power that serves their interests.

In addition to the plethora of negative health impacts on humans, PFAS can be found in fish, sea birds, mammals, and even pine needles (Kirkwood et al. 2022). While there is still much to be learned about how PFAS impacts non-humans, there is evidence to indicate weakening of the immune system and reproductive damage (Levy 2020). Through waterway pollution, PFAS make their way into and across our oceans, traveling for days, weeks, months, years and decades – demonstrating the planetary scale of this socio-ecological problem. They travel to remote locations in the Arctic and Antarctica, and their presence within larger marine life circles back to human populations, even causing problems in the Faroe Islands' Indigenous population where PFAS are transferred to infants via breastfeeding (Timmermann et al. 2022).

The challenge of PFAS reveals multiple ways in which temporality is of great significance for PJ. There are clear mismatches in the timescales of living beings and PFAS timescales, and at the intersection of the two are risks that threaten the lifespan of present and future populations. Further, the case of immigrant children potentially exposed to PFAS highlights the vulnerabilities not only of immigrants and Latinx populations, but of *young* persons, children who have no formal voting power and who require adults and the state to act as their guardians. Thus, for humans, age is a crucial factor in vulnerability to PFAS, where the world's youth are jeopardized by exposure to chemicals whose future impacts are barely known but bring immediate profits to corporations.

Given that PFAS are ubiquitous, transcending space-time at a planetary scale, the PJ approach is appropriate for studying the impact of these hazardous materials that will seemingly exist forever. Further, PJ as an approach to earth system governance is well suited to inform action by stakeholders operating at the planetary governance scale to prevent the further infiltration of PFAS into our air, water, ecosystems and bodies. Thinking about how meta-power operates, where powerful people make decisions that create the conditions of the future – we understand that key economic and political actors have, up to this point, failed to enact appropriate environmental governance standards to address the potential planetary harms of PFAS. As a result, these previous decisions have created risks and curtailed future life opportunities for multiply marginalized populations and entities that will likely face shortened lifespans, in the ultimate example of time theft. Still, the prohibition or regulation of releasing even more everlasting chemicals could be achievable if influential actors in earth system governance center it as part of a PJ agenda.

Temporal privilege and the manipulation of time

Powerful actors can manipulate time spans to benefit themselves and in ways that negatively impact marginalized others. Environmental injustices contribute to the theft of time from those who suffer its harms because their quality of life, wellbeing, and lifespans are frequently reduced. How can PJ scholars identify and challenge these practices? Earth system governance scholars can help push powerful policy actors to expand the timescales at which they assess the impacts of their decisions and involve historically marginalized groups into decision-making processes. Governance actors must be challenged to think more broadly about who is involved in creating the future, as Kim (2021, p. 9) asks, ‘who is actively creating the imaginaries of the future, through what process, which imaginary becomes dominant, and why.’ In the following section we demonstrate the importance of the ‘who’ in understanding the relationship between power, space-time and PJ in the context of insurance and financialization of the future. Anticipatory governance and future-building is one of several key aspects of temporality that will be crucial for advancing a PJ research agenda and corresponding sociopolitical change.

Insurance and the monetization of risks and futures

Privileges and inequalities tied to the manipulation of time are relevant for environmental injustices across societal institutions, such as the economy. Returning to the concept of meta-power, the ability to ‘set the rules of the game’ across space-time, and the theft of time, we can analyze how powerful,

temporally privileged actors in capitalist systems create conditions for the manipulation of time through financial instruments. Insurance is a financial instrument for making uncertain futures knowable, quantifying and monetizing risk, and dispersing risk amongst actors across time and space; it is used increasingly in the context of disasters and climate change. Critical insurance studies scholars challenge taken-for-granted understandings of insurance and argue that it is not simply a series of actuarial and technical calculations. Instead it is better understood as a moral, political, and economic process that is shaped by tensions and contradictions that have implications for social justice (Booth 2021) because it involves powerful actors determining how risks, costs, and responsibility are assigned and distributed across spatial and temporal scales (Johnson 2015, Booth 2021).

Insurance is a key political technology for governing climate risks and rendering future climate catastrophes as knowable, measurable, and quantifiable. Insurance can help people mitigate risk and enable collective cost-sharing. Yet, it can also be a tool to protect wealth and insulate powerful industries from the consequences of risky actions and catastrophe, even generating profit from disaster and death. At present, the insurance and reinsurance (insurance of insurance companies which provides a backstop for the global financial system) industries have developed ways to economize climate change and turn the likelihood of disaster into profits (Jarzabkowski et al. 2015). This results in the privatization and individualization of risk management, transferring power away from the public sector and limiting collective decision-making and accountability while turning to the market for solutions (Christophers 2019). Johnson (2015) finds that the insurance and reinsurance sectors are transforming climate change uncertainty into an investment opportunity that is likely to leave behind those who cannot afford rising premiums, while the state will have to manage the impacts on less wealthy communities (Foster et al. 2010). Christophers (2019) contend that insurance has expanded the temporal and spatial scales at which climate risk is created – re-scaling from the individual and the nation-state to the global. Yet, existing approaches to global earth system governance and planetary stewardship – such as market liberal, bioenvironmentalist, ecomodernist and institutionalist approaches (Kashwan et al. 2020) – are not equipped to achieve multiscalar structural transformations that can challenge these arrangements.

In addition to shaping and anticipating futures in the present, the temporal dimension of PJ includes analysis of historical processes and powerful actors which have created systems of oppression and long-standing injustices. It is vital to examine the insurance industry's role in financing and protecting various sectors that promote socio-ecological harms. For example, insurance was an integral part of the financial structures powering the transatlantic slave trade and the growth of racial capitalism that extracted

value from the labor, and even death, of people racialized as Black (Bride 2020). The speculative and racist dynamics of capitalism continue to play out in the climate crises where finance capital, and insurance in particular, enables speculative profiteering on future calamities and contributes to the unequal distribution of risk. Insurance has also propped up industrial sectors that have contributed mightily to climate disruption. Taken together, there are legitimate arguments for the descendants of enslaved persons and those suffering from the worst impacts of the climate crisis to receive reparations – particularly since some communities have suffered from both harms. Moreover, these harms are historic (meaning their origins are in decisions and experiences from generations past), contemporary, and are anticipated to be felt into the foreseeable future, indicating the importance of stakeholders in shaping how insurance is conceived and applied.

Current arrangements of power and decision-making are likely to exacerbate inequalities, disproportionately impacting future generations. Yet, PJ's approach to human-Earth governance could challenge the market status quo, and energize democratic, collaborative, and social forms of insurance that disperse the costs of future catastrophes more equitably and enable inclusive planning for the future. Given the unpredictability and instability of the Anthropocene epoch, it is necessary to re-think the utility of insurance schemes and the drive toward predictability, or, indeed if we must move beyond market-based solutions (O'Neill and O'Neill 2012). Further, it remains unclear the degree to which insurance schemes could potentially serve a purpose across longer, non-human timescales, to create a more just world for beyond-human entities. Given its multi-scalar, planetary governance focus, PJ is a key avenue for connecting inequalities and injustices across space-time and scales – from historical and persistent macro systems that perpetrate discrimination and injustice, to the micro-levels at which the consequences of these systems are experienced and anticipated by communities and individuals. Further, its emphasis on justice-based earth system *governance* also places PJ advocates in a position to address these injustices and inequalities through the pursuit of multi-scalar structural transformations via more inclusive decision-making processes.

Challenging Western conceptualizations of temporality: toward a more pluralized, relational and decolonial planetary justice

At the intersection of meta-power, temporality, and PJ is the question of 'who' drives these initiatives. In the example of insurance we lay out above, debates about risk focus on who pays. But part of the 'who' is the implicit and explicit values that actors embed in systems and processes, and, their on-the-ground implications. PJ scholarship directs our attention to this, asking the question: Whose imaginaries of the future are and will be built? (Dryzek and

Pickering 2019, Kim 2021). This question is important for thinking about who is leading PJ dialogues, who is excluded, and how the concept of PJ and its key characteristics, such as temporality, are understood. This necessitates PJ scholars to engage with activities of reflexivity and positionality as they pursue their scholarly and governance agendas. While the field is developing to be oriented to plural understandings of justice, it has emerged through a European-dominated area of scholarship, and as such, many concepts are still deeply embedded in Western ways of thinking, including temporality.

First and foremost, if we return to the defining features of PJ, one key aspect is the focus on the Anthropocenic epoch. Yet much about the Anthropocene is contested, the least of which is what time or event marks its start. Beyond this, a social justice, pro-poor oriented approach to earth system governance must examine how the 'Anthropocene' concept is contested for its failure to portray who got us into this situation and how. While various terms are used – the Capitalocene, the Plantationocene, the Chthulucene (Haraway 2015) – all approaches rightfully critique the idea of the Anthropocene for failing to capture that a select group of powerful, privileged humans (primarily White Western men) and systems of capitalism, colonialism, patriarchy, and racism are responsible for so drastically altering our shared Earth system.

Temporality is often taken for granted, underscrutinized, and embedded in Western approaches to time. It is essential to recognize that dominant, Western understandings of time are social constructs themselves. Further, these social constructions reflect whose understanding of time becomes dominant and how systems of power use time to discipline and control human and non-human lives. These patterns of domination mean that people's experiences of time and temporality differ significantly; and, as Walker et al. (2022) point out, impact the ability to shape space-time rhythms and avoid exposure and harm. Colloquially, we speak of time in ways that highlight a wide variety of conceptions, for example: saving/wasting/buying/taking/doing/having/losing/running out of time. But these are not neutral experiences. The wealthy are often able to buy themselves more time by employing people to complete time-consuming daily tasks. Further, powerful actors and entities are able to engage in tactics that can speed up positive outcomes (e.g. the speed of travel, moving to the front of queues, general administrative processes) while simultaneously being able to stall, slow and avoid outcomes that might negatively impact them (i.e. denial campaigns by tobacco, oil and gas industries). Essentially, elites use their political and economic privileges to buy or build *temporal* privilege. For marginalized populations, the opposite is true, and time is often taken from them or owed to the state or others (i.e. see Mahadeo 2018).

This means that time can also be weaponized both to enhance the position of the privileged and to exacerbate inequalities, further marginalizing

historically oppressed groups and waging environmental destruction. This can be seen in Barbara Adam's (1998) work on the dominance of 'industrial time,' which assumes objectivity and linearity with an emphasis on time as repetition, clocks and calendars, rationalization, economic commodification, and time as a scientific measurement of abstract motion. However, it is this approach to time that Adam suggests has material consequences such as ecological degradation, revealing its incompatibility with temporalities of life and cycles of nature. Among other examples, Adam (1998) points to the timescale of nuclear radiation and its materiality to demonstrate this phenomenon.

Rob Nixon's (2011) concept of 'slow violence' is also useful here, as he argues that, in seeking to represent the unique nature of global environmental harm across time and space, we must pay closer attention to the often hidden and non-spectacular forms of ecological damage that impact low-wealth communities over time. Confronting slow violence is made even more difficult precisely because the needs of low-wealth communities are rarely a priority for policy makers. More broadly, when we consider how the industrialization and contamination of ecosystems and human bodies has produced devastation across species, space, and time, Adam (1998) concludes that this process has thoroughly eroded any remaining distinctions between nature and culture, revealing a common set of threats that we might view as a basis of multi-species unity.

Processes of slow violence are frequently sustained through state power, the exercise of which offers generative opportunities to explore the significance of PJ for humans and nonhumans beyond a 'pro-poor' focus. For example, recent research demonstrates that carceral institutions – perhaps the most obvious exercise of state power – are sites of heightened exposure to air and water pollution, climate change-driven extreme weather risks, and hazardous waste (Gribble and Pellow 2021). Since the vast majority of incarcerated persons around the world are low-income and ethnic minorities, this is a clear example of environmental injustice. The additional dimension of forced immobility in the total institutions of carceral spaces amplifies risk for these already marginalized persons. While it is commonly understood that incarcerated persons are serving time for their alleged crimes, we contend that time is being forcibly extracted from them, their families, and their communities across generations (i.e. see Wildeman 2009). Moreover, because the environmental, climate, and other health risks in prisons and jails are so severe, incarcerated persons' longevity and wellbeing are dramatically reduced by spending time behind bars, in what can be said to constitute a direct and double form of time theft. Yet incarcerated persons' experiences are not currently centered in PJ's 'pro-poor' agenda (Kashwan et al. 2020). This myopic focus on poverty is a barrier to achieving a more pluralist approach to PJ, as it overlooks patterns of racial and gender

discrimination which are intimately intertwined with our economic system, demonstrated above.

To move toward a more plural or decolonial PJ (San Martín and Wood 2022) we must focus on people, bodies, spaces and entities who have been threatened and cast aside as expendable, but are actually – according to Pellow’s (2016) critical EJ approach – indispensable for building just and resilient-shared futures. A decolonial ecological approach to PJ would entail exploring how histories of human enslavement, white supremacy, and speciesism have shaped the present and possible futures for social and multi-species justice (Ferdinand 2022). Various decolonial frameworks could be instrumental for thinking through the contributions of Indigenous and marginalized/minoritized peoples toward building critical knowledge for sustainable and equitable futures. In particular, the ethic of indispensability offers a framework that acknowledges the broad spectrum of beings and things that have been deemed disposable by socioecologically destructive states and corporations, and presents a normative counterpoint that contends that ‘to change everything we need everyone.’ In other words, this is a perspective that begins with the proposition that our multispecies societies are more resilient and sustainable if they reflect more democratic, inclusive, and equitable tendencies.

This brings us to a second important point about the potential usefulness of a PJ agenda. The potential for PJ research to embrace perspectives that deepen and extend distributional, procedural, and recognitional justice approaches is considerable, but is contingent on scholars’ ability to pay deeper attention and respect to foundational histories of justice research and activism which have already established several of the tenets that it aims to promote. This perspective requires building with these researchers and ensuring that influential scholars are not simply re-packaging work of the marginalized and using it for their own professional benefit. Thus, there is a need for PJ to be focused on future-building by not just looking forward, but looking back and situating themselves and their work within the long history of environmental and social justice movements.

For example, the field of disabilities studies offers myriad opportunities for PJ scholars to rethink and redefine justice and temporality through a lens that explores the ways that global socioecological threats combined with ableism have shaped our view of intra-human and human-nonhuman relations (Jampel 2018). Climate change and a spectrum of environmental threats (including PFAS) contribute to mass disabling events in that they create widespread harm across ecosystems, species, and time (Taylor 2021). Humans and nonhumans are routinely disabled as a result of exposure to toxic chemicals and climate change-driven extreme weather events, presenting scholars with an opportunity to link PJ frameworks and EJ and disability justice research and movements. Mass disabling events reinforce existing

inequalities, highlighting additional ways of thinking about how distributional, procedural and recognition injustices impact humans, nonhumans, and the built environment. A disability-environmental justice lens would also require attention to temporality because disabling events are often generations in the making (for example, climate change-driven events) and the consequences for people, nonhumans, and ecosystems are evident for generations into the future. A disability-environmental justice lens would also provide a space for engaging with the ethic of indispensability in a concrete fashion because people with disabilities generally live in contexts where they are less valued and are viewed as burdensome regardless of the impact of ecological events. Finally, given that people with disabilities makeup the largest minority population on Earth and are routinely excluded from decision making around environmental and climate change policies, their inclusion in such practices would be a crucial step forward for recognitional and procedural justice (IDA 2022).

Further, PJ could enhance understandings of intergenerational justice through the application of alternative understandings of time and temporality. Many Indigenous approaches to temporality are non-linear, non-categorical, relational, and beyond human scales and constructs, where past, present and future are holistic and simultaneous (Awâsis 2020; Pascoe et al., 2021). Winter (2020) describes time as ‘spirally-bound,’ where ancestors, as well as living and future generations co-exist as part of a recurrent pattern. Yet these approaches are often subordinated to more hegemonic conceptualizations of temporality, which can serve as mechanisms of power (Pascoe et al. 2021, Parsons et al. 2021). As Earth system processes work to ‘cycle materials and energy in non-linear, complex and dynamic ways’ (Kotzé 2020, pp. 82–83) in a world where ‘social and ecological systems have become inseparable and where obligations are owed to nonhuman entities as well’ (Biermann and Kalfagianni 2020, p. 2), PJ goals may be better achieved by incorporating circular and regenerative understandings of time that simultaneously account for and challenge the extension of relational power across space-time. This aim could be achieved by drawing on existing approaches by material feminists and Indigenous environmental and climate scholars who highlight the importance of relationality in thinking about and pursuing justice (Johnson and Sigona 2022). This could include learning from Indigenous peoples and scholars about concepts like *kincentricity* and *radical relationality*, which are meant to reflect the worldview that humans and nonhumans are part of an extended ecological family, and the ethical practices that follow (Yazzie and Risling Baldy 2018, Whyte 2020, Martinez et al. 2023, p. 203). These concepts point to the invaluable potential of an ethic of accountability, respect and responsibility to the land, nonhuman relatives, and humankind, which can promote intergenerational and multi-species justice. Along these lines and in this special issue, Bendik-Keymer

(2023, p. 5) discusses the philosophical and moral aspects of taking up self-work toward PJ, highlighting the long history of Indigenous approaches to relationality and ‘attending to our relations.’ In other words, a decolonial approach to PJ could push scholars to engage with key elements of Indigenous and traditional ecological knowledge concerning temporality and human–nonhuman relations. Further, it should create the space for Indigenous people and those who have historically been seen as ‘expendable’ to lead in this scholarship and governance effort toward transformational structural change.

Discussion and conclusion

Planetary justice is a distinctive framework at the intersections of earth system governance and EJ. In this paper, we delineate its value for more effectively linking injustices across space-time and scale, and discuss how the approach can deploy its emphasis on governance to also challenge these inequities across multiple scales. In addition, we demonstrate how the PJ approach to seeking justice for humans and non-humans further opens the door for accounting for timescales of non-living materials, particularly harmful materials with a planetary reach and no expiration date. We explore these issues with a particular focus on temporality.

For Bopp and Bercht (2021, p. 30) a temporal lens makes ‘certain things visible (and therefore available for resolving injustices) which would otherwise remain hidden, unexplored and unresolved.’ In this paper, we highlight important, underexplored temporal dimensions of injustice relevant for developing a PJ framework. We frame our discussion of PJ around two points of temporality: (1) considerations of materiality and nonhuman timescales in understanding injustices of the past, present and future and (2) the relationship between power, space-time, and the manipulation of futures. In doing so, we highlight the need for PJ to interrogate power dynamics and the role of meta-power arrangements in tackling planetary injustices that impact humans and non-humans within and across space-time, scale and generations.

There remain several key areas of importance for future research on temporality and PJ, some of which we have briefly touched on here: (1) overlapping and inconsistent planetary timescales; (2) inter and intragenerational justice; (3) power, oppression and temporal privilege; and (4) alternative approaches to temporality. Global-level changes encompass a wide range of timescales that are ‘highly variable’ (Kotzé 2020) and there is a mismatch between the speed of global human processes (i.e. economic growth and technological advancements) and natural cycles of restoration and regeneration. As a result of the former outpacing the latter, we currently face planetary challenges including ‘a climate

emergency, mass species extinction, ocean acidification and other interconnected and global problems' (van Dijk 2021, p. 1). As such, PJ scholars must address overlapping and conflicting timescales. Fruitful areas of inquiry could include evaluating the possibilities and limitations for pursuing solutions through short-term governance timescales, as well as examining how new 'rights to nature' laws may conflict with or shift our orientation to time and scale. This also opens up opportunities for PJ scholars to interrogate dominant approaches to time and temporality and pursue alternative conceptualizations, as we discuss above. For example, Eisen et al. (2018, p. 8) suggest that framing generations as having distinct and competing interests could be replaced by 'an account of embodied subjects who are constituted by interwoven threads of personal, institutional, material, and ecological relationships – each of which connect persons and responsibilities over time.' Other important questions of generational justice, power and temporality deal with how future entities, as well as their needs, capacities and interests are represented. Power imbalances exist between those being represented and those doing the representation in decision-making processes (van Dijk 2021).

In a similar vein, another important question for future PJ research is: Whose futures are protected and whose futures are being stolen or sacrificed through the necropolitics (Mbembe 2020) of climate decision-making? It is essential that these understandings of how power is wielded across multiple scales to create privilege, oppression and inequality within and across societies remain at the heart of PJ studies. Further, PJ must work toward transformative change to prevent these patterns from persisting and being exacerbated within the climate crisis. To achieve transformative change requires the pursuit of justice relentlessly within and outside of formal processes, through alternative frameworks, movements, and forms of governance, such as just transitions, a recuperation of the commons, Buen Vivir, and degrowth. It also involves acting across micro- to macro-scales, from self-work (Bendik-Keymer 2023) and everyday practices of convivial labor (Valle 2021) to breaking institutional boundaries and establishing new collective, global institutions to take responsibility for planetary justice (Hickey and Robeyns 2020).

Note

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