

Sustainable Future-Making in the Democratic Anthropocene¹

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Part of what makes the Anthropocene significant for politics is its dramatic escalation of the reach and impact of human agency, but agency of a diffuse and often unintentional sort. As a species, our impact on the planet and its systems may be ubiquitous and epoch-defining, but such anthropogenic power is typically exercised with little coordination or direction, with agency of the kind that is needed for normative judgement decreasingly evident as the human collectives to which it might be attributed grow larger in size and scale. At the species level, human agency may entail brute geological force but lacks reflection, intention and direction. Insofar as politics is concerned with the coordination and direction of collective agency, or the reconciliation of the agency of groups with that of their individual members such that collective agency is possible, it would be difficult to identify an effective Anthropocene politics. Yet less likely would be an Anthropocene politics that is more than nominally democratic.

As McKibben (1989) announced over three decades ago in declaring the “end of nature,” Anthropocene conditions entail that we can no longer maintain that “comforting sense” that “our natural world” will only “change gradually and imperceptibly, if at all.” Our world is changing and will continue to do so, often dramatically, with human agency the main driver. However, democratically derived plans for such change nowhere in evidence. Pathways to avoiding more than 1.5 degrees C of warming are rapidly vanishing, with some possible planetary futures closing as we continue to stray from those paths. More sustainable futures will close if we also miss the 2 degrees C path, to be replaced by more catastrophic ones. We must now ask which changes to earth systems we can tolerate, perhaps by adapting to them or assisting others in doing so, which we might still feasibly try to resist, and which are simply inevitable. Where serious human-induced environmental change is now inevitable but still possible to mitigate, as with climate change, we must ask how much mitigation we believe that can afford, how much change we’re able to adapt if we cannot or choose not to mitigate, and how much loss and damage we can afford to suffer. In the Anthropocene, where human failures to restrain the

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geological agency of our species leave present and future humans with more limited options, only the magnitude of that failure remains to be determined.

Yet there remains some possibility that humanity's failure to live sustainably in the past and present will be corrected in a future that is less constrained by its past, and consequently more able to exercise agency over its present and future, than it might otherwise be. "Should we so choose" this more sustainable path, as McKibben suggests, "we could exercise our reason to do what no other animal can do: we could limit ourselves voluntarily, choose to remain God's creatures instead of making ourselves gods." This need not entail resurrecting an expired nature, to use McKibben's image, or exiting the Anthropocene by withdrawing our power over its processes. Rather, it could mean what Purdy describes as a *democratic Anthropocene*; one that is committed to the premise that "global ecology is everyone's" and therefore "that it should be everyone's authorship politically" (2015, p. 49). As a "common concern of humankind" the planetary future is everyone's business, but business as usual is foreclosing sustainable planetary futures as aggregate anthropogenic impacts approach and then exceed planetary boundaries. How does such a common concern translate into distributed decision-making authority and common authorship when the former is neither a necessary nor a sufficient condition for the latter?

Purdy's vision of a democratic Anthropocene would allow humans to retain an outsized influence over planetary systems but calls upon the species to exercise this power in a more restrained and democratically directed way, and with a commitment to more equitable sharing of planetary resources. This in contrast with what he terms the neoliberal Anthropocene, which is "implicitly committed to man-made ecologies that amplify existing inequality." The democratic Anthropocene is therefore not only one committed to democratic procedures but also one that generates democratic outcomes (with distributive equity and ecological sustainability involving egalitarian commitments similar those used to justify procedural democracy as well as providing material bases for maintaining democratic institutions). This tripartite vision for the planetary future raises questions about empirical relationships between its three imperatives, each of which may be normatively desirable on its own but must also be rendered at least compatible and ideally mutually reinforcing if the human future is to be democratic in this sense. Purdy's is thus a vision of *ecological democracy* but understood in terms of the reconciliation of three core imperatives (justice along with democracy and sustainability) instead of the usual two.

Existing institutions for governing earth systems are, as numerous scholars have observed, far from democratic, with nascent institutions for a more democratic Anthropocene still largely utopian aspirations at the earth system scale. Bracketing recurrently popular eco-authoritarian and technocratic visions for sustainable future-making, the question is whether and how humanity's "geological agency" (Eckersley 2017, p. 984) over planetary systems can be tamed and intentionally directed, and then what form of democracy this would take. The challenge is therefore not one of merely closing the numerous extant democratic deficits while also aiming to transition away from unsustainable patterns and practices and rectify pernicious inequalities, but of identifying and developing democratic forms that can be harmonized with the other two imperatives. Scholars of ecological democracy have mined multiple resources in the theory and practice of democracy in search of such forms. Without wishing to disrupt those ongoing mining operations, I aim in this paper to stake a claim in a somewhat different area of democratic theory and practice in hopes of uncovering new resources and in order to consider a category of interventions in environmental politics in terms of its democratic potential.

The road less travelled by

Much of the theoretical work to democratize the Anthropocene has focused on the potential for *deliberation* to promote environmental performance while also improving the democratic qualities of governance institutions. Whether by developing new deliberative institutions or infusing existing ones with more deliberative processes, scholars working at the intersection of democratic theory and environmental politics have joined the streams of critical and normative inquiries into justification and legitimacy issues in reason-giving and deliberation with empirical analyses of deliberative polls, juries and mini-publics in preference transformation and political mobilization. Research suggests that such mechanisms or practices can narrow democratic deficits, deter symbolic manipulation by elites, link input and output legitimacy, and yield other advantages compared to institutions informed by alternate conceptions of democracy. Niemeyer (2011), for example, finds deliberation to have an "emancipatory effect" in allowing "citizens to develop a shared logic in relation to the issue at hand" and "buffers against distortion" by symbolic manipulation and so is more "resilient" against symbolic claims (p. 107). Baber and Bartlett (2016) cite its advantages for the development of *ecological rationality* that promises "a foundation of mutuality that has the

potential to expedite agreement at later stages of the policy process” (p. 174), while Dryzek and Pickering (2019) suggest its benefit for generating *ecological reflexivity* that “listens and responds to signals from the Earth system” as these are reflected through deliberative processes and “has the foresight to anticipate potentially catastrophic changes in the system” (p. 18).

The focus on speech and justification well-serve a conception of politics that is oriented around conflict and cooperation among human individuals and groups, while incorporation of metaphorical speech and practices of listening to ecosystems or nonhumans allows the extension of deliberative democracy beyond the human world, as befits a conception of ecological democracy, despite its emphasis on spoken communication. Whether as a critical or a normative concept, deliberation has emerged as a leading candidate for rethinking and reconstructing Holocene governance institutions to make them suitable for Anthropocene challenges.

Yet, questions remain about the ability to scale up deliberative mechanisms that have thus far primarily been deployed at the subnational or local levels to match the scope of earth systems. As Mert (2019) notes, a “second scalar revolution” would be needed in order “to fundamentally transform the practice and conception of democracy for the planet,” in reference to those earlier innovations in the theory and practice of democracy that allowed its extension from face-to-face participatory democracy within a small polity to a governance system for modern nation-states. Scaling up deliberative practices to the planetary or species level, as would be required of a democratic Anthropocene that is understood in deliberative terms, faces numerous other challenges, including its reliance on institutionalization and the state system for its mobilization of collective agency. As Niemeyer notes, incorporation of mini-publics into earth system governance at national and transnational scales “risks replicating exactly the same sort of processes that gave rise to symbolic politics in the first place” (2011, p. 128) if aggregate results rather than the reasoning and justification process behind them are transmitted from local-scale to global-scale bodies. Deliberative conceptions of democracy also struggle with cultural and linguistic differences, power inequalities, strategic or otherwise insincere speech, and the integration of expert knowledge with both alternative epistemologies and social ignorance.

One alternative to deliberative approaches for democratizing the Anthropocene has involved the concept of *representation*, which prototypically relies on indirect participation through representatives rather than direct participation by citizens in order to meet the needs of polities that are too large to feasibly allow direct participation. Since representatives can at least

hypothetically speak for millions of constituents, conceptions of democracy built around representation were essential to the first “scalar revolution” by which the democratic ideal was institutionalized within the modern nation-state and could potentially (if not without difficulties) be scaled up again to serve transnational or planetary constituencies. Accounts of ecological democracy based in representation rather than deliberation can also readily be found in green or environmental political theory (Dobson 1996, Eckersley 1996, 2004, Ball 2006), usually through proposals for expansion of representative institutions to also include parties that are typically excluded from existing institutions, providing additional models to consider for this project.

In its standard institutional and electoral conception and as found in existing state and multilateral manifestations, representation leaves a lot to be desired as a guiding normative ideal for democratizing the Anthropocene. Principle-agent models of delegation have representatives following rather than ever leading public opinion, making representation beholden to status quo norms and attitudes and thus slow to adapt to environmental change at the pace necessary for sustainable transitions. Short terms in office for elected representatives lead to time horizons that rarely extend past the next election cycle, which are compounded by the permanent campaigning that representatives in states like the US are typically required to do, as each election merely heralds the start of the next fundraising cycle for the next one. Reliance on fundraising like this can also bias the representative institution in favor of large donors, which are likely to oppose rather than support effective environmental policies, as well as undermining the democratic character of representation itself by making the system unresponsive to most of the demos. First-past-the-post elections in single-member and territorially-bound electoral districts reinforces a two-party system rather than allowing for viable third parties, further limiting the representative quality of the institution along with its discursive diversity as many groups and viewpoints lack any real representation in legislative bodies (a problem that is compounded by trends toward increasing partisan polarization). Beyond partisanship pressures that encourage representatives to view themselves as delegates only of voters that supported them in the last election, high rates of nonvoting effectively renders many legislative bodies as institutions of minority rule, as elected representatives effectively represent barely half of all voters, barely a quarter of the electorate as a whole, an even smaller percentage of the national community as a whole, and only a tiny fraction of those that are likely to be affected by many of the policies under consideration (or not under consideration) by the legislative body in question.

It is to this latter shortcoming that most proposals for expanding institutionalized forms of representation to make them simultaneously more democratic and more responsive to sustainability imperative have been addressed. Taking seriously the all-affected principle (and/or the narrower principle in application only to potential exposure to risk, as in Eckersley 2000) as the normative core of the democratic ideal requires representation beyond territorially-bounded electoral districts comprised of adult human voters when legislative bodies deliberate over policies that affect the entire planet, with various proposals emerging in the scholarly literature for “enfranchising the earth” (Goodin 1996), a “democracy of the affected” (Eckersley 2000), or a “biocracy” (Ball 2006). Whether through proxy representation of normally-excluded parties like residents of other states, future generations, and nonhumans within legislative bodies or elsewhere in government, or through other mechanisms for expanding the number and kind of constituent groups to be granted institutionalized forms of representation, scholars have been making the case for over a quarter century that ecological democracy (and indeed, unmodified democracy for any issue with potential neighborhood effects beyond enfranchised voters) requires fundamental reform to how representation is to be institutionalized but without calling into question the centrality of representation within democracy or its institutionalization.

My prospecting for normative and theoretical resources around another conception of representation is not intended to dismiss the value for democratizing the Anthropocene from standard conceptions of representation deployed in innovative ways, but rather is motivated by the potential of other conceptions of representation in advancing the objectives of ecological democracy. In particular, I aim to call attention to non-institutional and non-electoral forms of representation as exercised by non-governmental actors that are highlighted by constructivist theories of representation, and especially as these involve visual rather than verbal or textual forms of communication. For illustration purposes I shall examine several such representations in the paper’s final section.

The constructivist turn in representation

Representation is a theoretically capacious concept in democratic theory that recognizes a variety of manifestations within environmental politics that could be productively associated with narrowing democratic deficits and democratizing the Anthropocene. As manifestations of representation that do not rely on conventional forms of speech and justification they may not be

captured by conceptions of democracy that focus on deliberation and would also be marginalized in accounts that focus on conventional forms of representation. For example (and building on Dryzek's theory of discursive representation and its association of ecological reflexivity with listening and responding to earth systems), Burke and Fishel (2020) call for "enormous investments in climate and ecosystem monitoring, science, and rapid information-sharing" in order to create "a kind of global intelligence system for ecological security and reflexive governance," which they describe in terms of political representation of the nonhuman. Such monitoring systems would allow "polities and governance systems" to "better listen to and understand the nature and pace of ecological change" as well as to better "appreciate both the rights and needs of ecosystems and non-human lives, and the human communities that are entangled with them" (p. 48). Here, what the authors follow Dryzek in referring to as a kind of "listening" would allow for development of capacities comparable to what he calls reflexivity.

However, Burke and Fischel do not conceptualize such monitoring and information sharing as itself a form of representation, describing it instead as an instrumentally useful means for pursuing the scheme of (institutionalized) proxy representation of nonhumans that they propose elsewhere in their chapter. Adopting a conventional account of representation that views the concept primarily in institutional terms, they follow other scholars noted above in arguing for innovations that would provide proxy representation for nonhumans and ecosystems as well as proposing creation of a UN "Earth Systems Council" and set of 15 "Ecoregion Assemblies." The latter would be distributed across the planet's major biomes and "anchored in the principles of Earth law and the rights of nature" and charged with "responsibility for the protection of the ecosystems and biodiversity in its region" (p. 48). In this way the authors hope to address the "in/visibility of the non-human" by advancing "a posthumanist argument for political inclusion via recognition of the material presence and agency of ecosystems and non-human lives" (pp. 34-35). Here, Burke and Fischel recognize that a core function of representation is to render visible that which is not present and link ecosystem monitoring with effective representation, but nonetheless rely on a conception that views representation as being performed by those proxy representatives rather than by the monitoring or presentation of the data that it generates. They connect the two but continue to rely upon the conventional institutional conception, whereas the account that I'm urging views both as (distinct if related) forms of representing nature.

Constructivist accounts of representation challenge the standard account, which views the relationship between representatives and their constituents as dyadic and static, with pre-existing interests to be represented and the quality of representation able to be assessed in terms of the accuracy of capturing and communicating them within political institutions (e.g. by elected or appointed representatives). According to the standard account, representatives must speak for their constituents when those constituents are unable to speak for themselves, allowing for the latter's indirect participation in democratic politics where their direct participation is impossible or infeasible but taking for granted that such constituents are already grouped as such and that the act of representing merely reflects rather than constructs their interests. Constructivists also view representation more capaciously by recognizing that it often occurs outside of formal state institutions and is often performed by nongovernmental actors. Legislative proxies for future generations and nonhuman nature would still be recognized by constructivists as engaging in one kind of political representation, but so would scientists that were charged with interpreting and presenting that monitoring data, and both would be seen as doing so in a way that constructed the thing to be represented (a category not limited to human groups, as in Latour's "Parliament of Things") as well as the nature of the relevant interests.

Whereas scholars often ground the standard account in Pitkin's (1967) *The Concept of Representation*, constructivists note that even Pitkin's work allows more conceptual nuance than is typically ascribed to it. Disch (2011), for example, emphasizes the performative dimension of representation, arguing that "representing is an activity that produces ontological effects while seeming merely to follow from an existing state of affairs" (pp. 107-08), where those ontological effects include the ascription of group identities and interests. As Disch suggests (and defends in her own work), Pitkin also developed a "mobilization conception" in holding that the aim of representation is "not to reproduce a state of affairs but to produce an effect: to call forth a constituency by depicting it as a collective with a shared aim" (p. 107). The notion that representation can construct groups and interests rather than merely reflect them was present in that seminar work, Disch argues, even if its popular reception suggests the opposite. Few early readers noticed the radicalism of Pitkin's arguments, from which Disch suggests she retreated near the end of her book, as she "sums up her unconventional argument in these conventional terms: 'representing here means acting in the interest of the represented, in a manner responsive to them' (208)" (p. 108). Allowing the act of representation to constitute groups and interests

rather than merely to reflect them “opens up the possibility for political elites to change voters' preferences” (p. 108), Disch suggests, which troubled scholars (perhaps including Pitkin) that saw such manipulation is hostile to democratic imperatives and so avoided conceptualizing its core normative component in terms that might allow for such manipulation. Normalizing it as well as conceding that representative systems often involve minority rule were implications of constructivism that Pitkin did not wish to pursue, according to Disch, and so might account for the proto-constructivist insights being obscured by both the author and her readers.

Other constructivists likewise reject the conventional principle-agent model of representation in favor of a triadic model through makers of representative claims present themselves as able to speak for and about some constituency and in the process can bring that constituency about and help to define its interests. Saward (2006), in developing the concept of what he terms the *representative claim*, argues that “at the heart of the act of representing is the depicting of a constituency *as* this or that, as requiring this or that, as having this or that set of interests” (p. 300). Elsewhere (2010), he suggests that claims “to represent or to know what represents the interests of someone or something” (p. 38) have a constitutive effect on both the putative representative and those they claim to represent. Similarly, Urbinati (2000) suggests that “representation highlights the *idealizing* and *judgmental* nature of politics,” which she describes as “an art by which individuals transcend the immediateness of their experience and interests, and ‘educate’ their political judgment on their own and others' opinion” (p. 760).

So conceived, representation need not be institutionalized (as it is in “representative government” or a “House of Representatives”) nor tied to elections or electoral accountability. As Saward suggests, non-elected representatives can include civil society leaders, scientists, and spiritual figures, and can supplement the claims of elected officials by “opening up new lines and styles of representation, which can be more sensitive to intensity of preference and particular lived experiences, often beyond territorially defined interests” (2010, p. 93). His approach “reminds us that representation ought to be seen as a social dynamic (an event) before it is an institutionalized fact (a presence),” and in focusing on the nature of claims themselves rather than their institutional instantiation he urges us to “resist the impulse to see institutionalization as more important than the articulation of claims” (p. 115). Similarly, Urbinati suggests that “the representative is an intermediary who can expand the space for political discussion beyond governmental institutions and at the same time bring political decisions to the people's attention

for scrutiny” (p. 767). Importantly, such “anticipatory” representation is future-oriented and has as a primary aim the construction of new social imaginaries as well as the constitution of groups and interests. As she notes, representatives “prefigure courses of action and project their deliberation in the future, which is, unavoidably, a dimension inhabited by *things* that have only a hypothetical or fictional nature” (pp. 109-10).

It is here that we can identify representation as crucial to democratic future-making while also allowing representation to be about rendering visible the invisible for purposes of imagining a more just and sustainable future. As Pitkin summarizes in her classic work, representation “means the making *present in some sense* of something which is nevertheless *not* present literally or in fact” (pp. 8-9), where the thing made present through its representation may not itself be a constituency but a state of affairs that affects or defines that constituency. Representatives may speak *for* some group of constituents, but in doing so may speak *about* concerns that affect them, and it is both the group and the concerns that must be made present through representation, as the concerns can constitute the group. As Saward notes, “it is the *rendering* of such a claim of presence that is most crucial” (p. 39), since its rendering of the thing (and not the thing itself) carries the potential to define, direct, galvanize and mobilize. Similarly, Mihai writes of “foundational moments” that “such moments represent crucial opportunities for representatives to orient the political imaginary and the institutions it underpins towards more or less ignorant directions – and implicitly towards more or less democratic directions – depending on what aspects of the common sense they tap into, reconfigure and deploy in outlining a vision of the collective future and the necessary constitutional transformations it requires” (2022, p. 964).

Representation, that is to say, manifests in many forms and can be vital to democracy in both routine and “foundational moments” as it brings into view what would otherwise be absent in both a physical and ontological sense, and understanding it as such allows for more effective harnessing of its potential to narrow democratic deficits, create and mobilize constituencies, and construct a richer set of social imaginaries concerning our shared environmental futures. To one particular way that such representations might be presented I shall now turn.

Representation and the visual

It is no accident that noninstitutional and anticipatory forms of representation are typically cast in visual terms, as “rendering visible the invisible,” since visual images offer a

potentially powerful means of communicating complex ideas as well as forming and mobilizing otherwise-underrepresented constituencies. Commenting on several proposals for the political representation of nonhuman nature, Saward writes: “What these writers do is make visible the object, nature. Visibility is essential to political or democratic or deliberative availability of value-based perspectives” (p. 118). To make an object visible in this way is to make available a normative resource that might not otherwise be available. As Saward notes, their arguments for schemes to include nonhuman nature in political institutions make implicit claims that then “become politically or deliberatively available” for use elsewhere, as they “can be picked up, disputed, developed, molded, and deployed” (p. 117). In making nature visible they vest it with meaning, Saward notes, developing “potentially powerful political arguments, aesthetically compelling and culturally resonant representations of nature” that perform this function of making present or visible that which otherwise would be absent or invisible and in so doing offer normative resources for more effective advocacy on its behalf.

Indeed, such forms of representation have been commended as necessary interventions in political culture for marginalized groups and the problems they experience that had otherwise been rendered invisible. In describing the phenomenon of “slow violence,” Nixon (2011) calls for better representation of what might otherwise defy sensory observation and be obscured by the physical, social and temporal distance between subject and object. Casting it in visual terms, Nixon describes the book’s subject as “a violence that occurs gradually and out of sight, a violence of delayed destruction that is dispersed across time and space, an attritional violence that is typically not viewed as violence at all” (p. 2). For Nixon, the invisibility of such violence, which he associates quintessentially with climate change, entails a representational challenge: “how to devise arresting stories, images, and symbols adequate to the pervasive but elusive violence of delayed effects” (p. 3). In both its causes and effects, climate change challenges conventional visual forms of representation because its impacts are “low in instant spectacle but high in long-term effects” but occurs in a world with a short attention span and which is reliant on “sensation-driven technologies of our image-world” for feedback. In his book, Nixon seeks effective representations of such violence in written narrative rather than visual imagery, but his call for intervention is nonetheless appropriate for visualization efforts that involve “devising iconic symbols that embody amorphous calamities as well as narrative forms that infuse those symbols with dramatic urgency” (p. 10), which visual images of carbon and climate also do.

As Nixon suggests, visualization of phenomena like climate change is necessary for such invisible forms of violence to be represented to a public that cannot otherwise perceive its causes or effects, with such representation giving it a palpable social reality. Another way of expressing the same idea is to identify visual representation's purpose as the construction of a new social imaginary, within a constellation of constructed identities as constituencies in a shared fate as well as constructions of collective aspirations and threats, since representation of the kind that Nixon calls for are aimed at the collective imagination. In linking visual imagery with social imaginaries he invokes Taylor, who casts modernity itself as a kind of social imaginary, which he describes as including "the ways people imagine their social existence, how they fit together with others, how things go on between them and their fellows, the expectations that are normally met, and the deeper normative notions and images that underlie these expectations" (2003, p. 23). This merging of causal accounts of reality with normative terms of evaluation constitutes an imaginary and enables the interpretive and prescriptive power of representations.

While Taylor's focus in tracing the development of a distinctively modern and Western social imaginary is on the past, the shared vision of social imaginaries can also have a future orientation, where past experiences are connected to alternative possible futures and animated by either hope or fear associated with those futures. Milkoreit (2017), for example, defines "socio-climatic imaginaries" as "collectively held visions of the future, both desirable and undesirable, that are informed by science and can support deliberation and decision-making in the present." Here, such imaginaries result from meaning-making activities, can motivate changes to current behaviors, institutions and structures through their ideational power, and depend on "mental representations of what is not yet present" – in this sense they could equally well be described as representations of planetary futures. Milkoreit's socio-climatic imaginaries utilize what she calls "transformational narratives" that are designed to capture "dimensions of the world that are real but simply not open to sensual experience" (which is also the core objective of visualizing carbon and climate), including "abstract ideas like democracy" as well as abstract phenomena like climate change. They link past to possible futures, capture "causality beliefs" that associate actions with outcomes and define both the possible and the desirable. Such imaginaries are the product of effective representation of otherwise-invisible phenomena and enable the democratic engagement with sustainable future-making required of a democratic Anthropocene.

Rendering the invisible visible

Among those invisible things that can by this conception be represented in politics is anthropogenic climate change, which is a thing rather than a constituency but a thing that could potentially construct a constituency and help to define its interests. As Hulme notes of its invisibility, climate (as opposed to weather) “cannot be experienced directly through our senses” (2009, p. 3), relying as it does on patterns and probabilities rather than anything that can be seen or felt. Climate itself is an abstraction of weather that requires decades of monitoring data in order to construct and thus to represent. It can only be attributed to any place upon accumulation of monitoring data sufficient to control for natural variation and anomalies—for the US National Oceanic and Atmospheric Administration (NOAA), this requires 30 years of data.² Of the abstraction involved in observing climate (through monitoring stations and instruments, which have the attention spans that human cognition does not), Hulme notes that “the farther back in time we look” at results of meteorological processes that we experience as rain or wind events in real time, “the more our reconstructions of the past rely upon notions of climate rather than weather” (p. 9). Unless *climate* can be represented (with visual representations built from scientific monitoring data one of several ways to represent it), the very possibility that human activities can affect it (through our “geological agency”) remains ontologically unavailable.

Climate *change* requires even longer time scales to apprehend, since dynamism within an abstract temporal phenomenon like climate requires still more temporality to manifest. It occurs over geologic rather than human time, which explains why paleoclimatology must rely upon indirect measurements of the planet’s historical climate from tree rings or ice sheets to charts changes to that climate. Weather events (or their impacts) that we attribute to climate change may be visible to us but both their source and atmospheric drivers defy direct sensory experience. We cannot *experience* climate, much less climate change, so the reality of either (and certainly also the meaning and motivational force of experiencing either in this way) requires representation of phenomena that would otherwise have no reality for us, given constraints of human perception. Without a way to represent climate change—and, in what requires further representation, given this additional layer, anthropogenic climate change—it would remain out of sight and therefore also out of mind for purposes of mobilizing or directing a climate politics.

² <https://www.noaa.gov/education/resource-collections/climate/climate-data-monitoring>

Given constructivist insights about representation of something like climate change, we can expect its political representation to be hotly contested, as it does not merely report a neutral set of external facts and reflect preexisting interests of a predefined constituency but rather creates a new fact (or cluster of related facts), constructs new constituencies and defines their newly-constructed interests, shapes how the problem is understood and largely determines what (if any) solutions become ontologically available, how success or failure in addressing the problem gets defined, and how the urgency and relative priority associated with addressing this problem are understood relative to others. To paraphrase Klein (2014), it is not quite the climate change “changes everything,” but that its effective socio-political representation (without which it would still be invisible and ontologically unavailable) has forced these changes. As she writes, embracing the visual metaphor on which this kind of representation typically relies, “before any of these changes can happen—before we can believe that climate change can change us—we have to stop looking away” (p. 10). But we can only look away until the object of our gaze can be constructed, with more effective forms of representation drawing and retaining the eye in a way that makes unseeing them difficult.

How can anthropogenic climate change be represented such that we can no longer keep looking away? This invisibility—whether of CO₂, of climate, or of climate change—is viewed by environmental scholars as contributing to the lack of attention to or urgency for the problems with which these unseen things are associated. What is out of sight, as is often said, remains out of mind. But these three things can be *visually represented*—that is, rendered visible through images and other forms of representation that are disseminated in politics and society—and the visualization of carbon and its interaction with climate to produce climate change is intended to enable this attention and generate this urgency. Human interaction with carbon and the carbon cycle, with its impact on climate manifesting as climate change, can be visually represented through images that convey information but also generate affect and meaning. Effective visualization has been an objective of a range of disciplines, not least of which is the cluster of physical science specialties often referred to as *climate science*.

Climate science seeks to render the invisible phenomenon of climate change visible, whether through the Keeling Curve of increasing atmospheric concentrations of carbon dioxide (figure 1) or the “hockey stick” of increasing global mean temperatures (figure 2). Both of these visualizations intend to communicate facts about the human relationship with carbon and the

carbon cycle, where human activities are now changing the planet’s climate, but both are also normative in their general implications for action. Anthropogenic climate change is presented not as a neutral fact that should be received within indifference but as a warning that should motivate at least a precautionary stance about the trends that the visualizations identify. This normative dimension is widely recognized by the scientists responsible for these efforts to render the invisible phenomenon visible, the public that views it, and critics that would prefer that the phenomenon remains invisible. According to Mann, who developed the hockey stick graph and would later be required to defend it against such critics, those attacking his graph well understood its normative force. As he would later write about those critics, “perhaps they were afraid that general acceptance of the facts behind global warming and the risks it poses would lead the public to demand action to protect the future” (2012, p. 22).

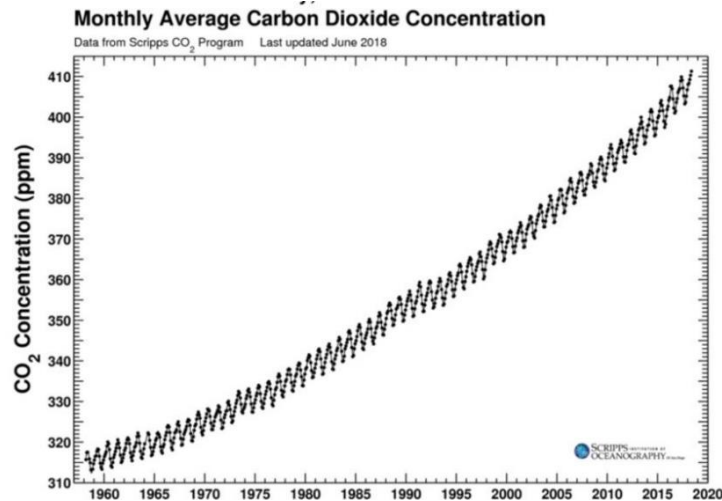


Figure 1: the Keeling Curve graph

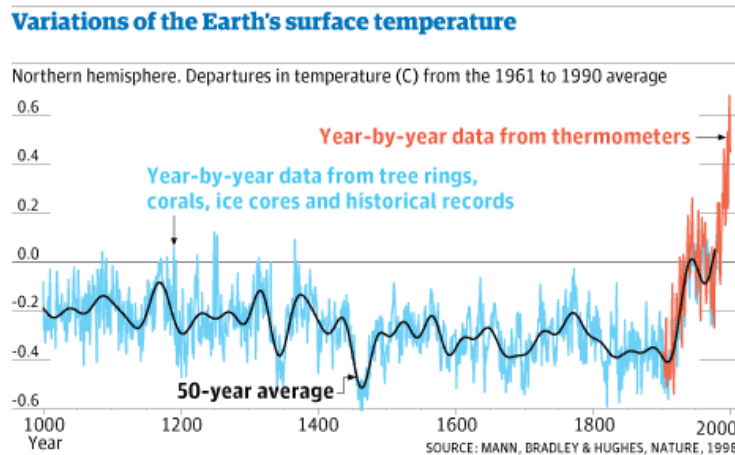


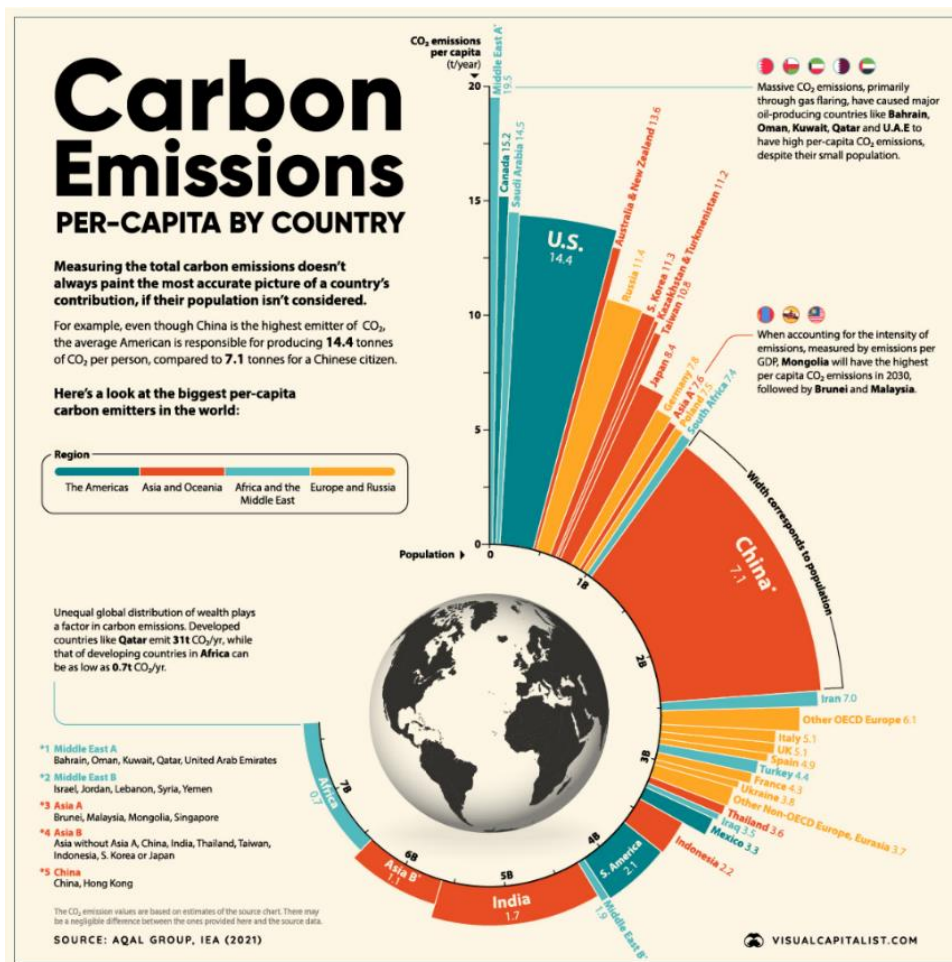
Figure 2: the “hockey stick” graph

The visualization of climate change by climate scientists like Keeling and Mann is also to attribute *agency*—as an *anthropogenic* phenomenon, climate science seeks to link categories of human activities (e.g. fossil fuel combustion, deforestation, etc.) or sectoral impacts (e.g. those from transport, electrical generation, agriculture, etc.) to this invisible abstraction such that human agency becomes an inextricable part of its narrative. While creating a powerful picture of human agency over the planet’s ecology, the project of visualizing climate change (along with the carbon and climate that constitute and define it) through climate science has been less successful at redirecting that agency away from the catastrophic outcomes that it predicts. To be sure, awareness of and concern about anthropogenic climate change has increased, partly as the result of such visualization, resulting in changes from “business as usual” emissions trajectories (another abstraction that has been given form through visualization), and such mitigation efforts are tremendously important in beginning a sustainable transition away from fossil fuels, but taken together they remain insufficient for meeting even the modest climate goal of avoiding more than 2 degrees of warming set through the 2015 Paris Agreement. Insofar as the *raison d’être* for visualizing climate change through climate science has been to motivate and/or exert control over human activities that contribute toward its problems, which is assumed to result from humanity’s becoming *aware* of its agency in this context, the presumed link from recognition to redirection of such agency has not yet occurred on a sufficient scale.

Visualizations from climate science like the Keeling Curve and hockey stick graph are able to capture an undifferentiated anthropogenic agency, through which humanity as a whole is responsible for disrupting the planet’s ecology by changing its climate, but crucial to the equity dimension of climate change is the differentiated responsibility by which persons and groups differ widely in their historical and ongoing contributions to the phenomenon. Capturing and visually conveying the highly inequitable carbon access or carbon footprints among persons and groups would not only help to connect local actions and global practices to climate change, which as noted above is key to establishing high levels of perceived efficacy but might also be able to articulate the injustice of climate change, which underscores its salience or seriousness. As Whittington (2016) notes, focusing on differentiated carbon access “increasingly serves to sort out the highly unequal but collective effects of human affairs on the atmosphere” (lending substance to the recognition of “common but differentiated responsibilities”), but also connects

persons to larger structures, since “even people with very little direct responsibility for carbon emissions are dependent on an economy that requires continued fossil energy consumption.”

How can such differentiated responsibility for climate change be visually represented, and how might its effectiveness be assessed? Key to capturing the relevant facts is the ability to convey multiple comparative dimensions of such responsibility. Focusing on disparities in per capita emissions across nation-states offers a common metric for differentiated responsibility, which in combination with population size yields a visual image that conveys relative national contributions. The image below captures and conveys differentiated national and regional CO₂ emissions, visualizing variation in per capita emissions as well as national shares of the total.



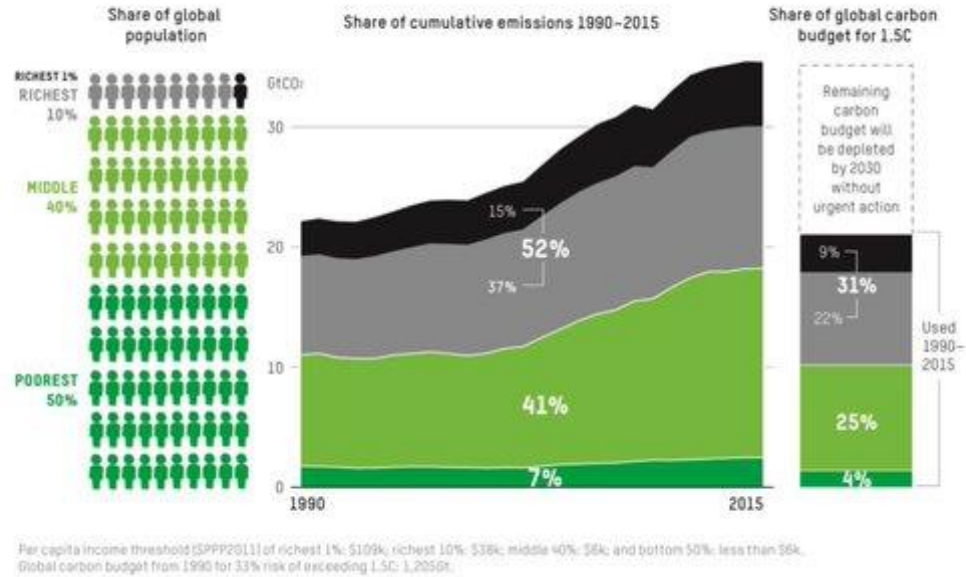
Source: <https://www.visualcapitalist.com/visualizing-global-per-capita-co2-emissions/>

Along with its explanatory key, which links economic inequality to inequities in carbon access, this visual image captures two important ways in which CO₂ emissions might be differentiated

among nation-states (which are parties to the UN Framework Convention on Climate Change and thus the parties to which the CBDR principle is directed): by per-capita emissions, which would make the US among the world's most responsible parties for purposes of assessing remedial liability, or by total emissions (controlling for population), which identifies China as the most responsible national party. While the image effectively captures these disparities, it lacks any narrative connection between this inequality in national contributions to climate change and its expected impacts, which are also likely to be highly differentiated, focuses on national emissions and so fails to capture links between economic and carbon inequality within such states, and lacks an explicitly normative claim about equitable carbon access.

The following visual image (from Oxfam) capture and convey several elements of carbon inequity that the above graphic ignores. By focusing on income rather national membership, the image more accurately represents links between economic and carbon inequality, visualizing the shares of cumulative emissions between 1990 and 2015 by income group (by the richest 1%, by the top 10%, by the middle 40%, and by the poorest 50%), showing also the total shares of each group over the period. By including a temporal dimension in the middle graphic, the image shows not only the overall growth in CO₂ emissions over the period but also growth within each income group. By capturing the increases in overall emissions over a period in which the global community had acknowledged the importance of climate change mitigation (with the UNFCCC having been adopted in 1992, the Kyoto protocol in 1997 and the Paris Agreement in 2015), both the failure of such mitigation efforts and the increasing urgency of decarbonization and visually captured and conveyed. Finally, the visual depiction of each income group's share of historical emissions within a carbon budget framework shows not only that current emissions trends will exhaust the remaining carbon budget for the 1.5° C temperature target set at Paris, but show also the relatively large shares of this budget used by the richest 10% and 1% (which together account for 40% of the post-1990 emissions that humanity can afford) alongside the relatively small (4%) share for which the poorest half of humanity is responsible. While the image does not explicitly identify an equitable emissions share for all persons, it clearly condemns existing disparities in carbon access as highly inequitable, thereby conveying a climate justice narrative through which climate change is cast as primarily about inequity in causation or differentiated responsibility.

Figure 1: Share of cumulative emissions from 1990 to 2015 and use of the global carbon budget for 1.5C linked to consumption by different global income groups



Source: Oxfam (2020), “Confronting Carbon Inequality”

By combining an equity-based normative analysis of differentiated responsibility for climate change within a visualization of carbon access over time combined with a finite carbon budget necessary for meeting established global temperature targets, the image represents some of the most important normative dimensions of climate change. While its presentation primarily conveys factual information, its narrative and meaning-making value improves upon those images that convey only undifferentiated anthropogenic human agency by identifying the core challenge of responding to climate change as one of equity. This climate justice framing ought to convey seriousness and salience, but as noted above must also convey a sense of personal or social efficacy and engagement if it is to effectively motivate remedial action. Whether the stark reality of wide inequality in carbon access overwhelms viewers with a sense of the enormity of the problem and difficulties in gaining leverage on such an intractable driver as global inequality or instead connects climate change with other experiences of injustice in a potentially generative way is a question for further research. Likewise with visualization of imperatives of connecting local causes to global impacts and conveying wide inequities in impacts and vulnerabilities, but these images evoke of the potential for capturing and conveying a richer narrative with greater critical purchase on harmful social practices about the causes and effects of climate change.

(Very Brief) Conclusions

Purdy's call for a democratic Anthropocene requires its democratization, or infusion of politics and society with the capacity to bring humanity's geological agency under democratic control and direction. Scholars of ecological democracy continue to seek the conceptual and theoretical resources to reconcile imperatives of sustainability, democracy and distributional equity, having largely focused on the potential role for deliberation or innovations in standard conceptions of representation in this role, but here I have endeavored to justify consideration of a constructivist conception of representation that recognizes as a form of political representation the creation and dissemination of visual images of the kind examined above. Insofar as we as a species must address climate change in any form of Anthropocene politics, and if possible do so democratically, its visual representation as both an anthropogenic problem and one with highly differentiated causes and effects becomes vital for that effort. Here I hope only to suggest that its visual representation be viewed as contributing democratic value in itself as well as through its ability to inform and mobilize affected constituencies to act appropriately.

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