



Must a Just Distribution of Emissions Shares Respect Territorial Claims to Terrestrial Sink Capacity?

Alex Mathie¹

Accepted: 20 June 2022 / Published online: 5 August 2022
© The Author(s) 2022

Abstract

A central task of climate justice is to agree upon a just distribution of the right to emit greenhouse gases. According to the equal per capita shares view, the right to emit should be divided equally between every inhabitant of Earth, since to emit is to use up the resource of atmospheric absorptive capacity, and this is a resource to which no one person has any stronger claim than any other. The fact that a significant proportion of the Earth's ability to absorb and sequester greenhouse gases actually comes not from the atmosphere, but from terrestrial climate sinks that are located within national borders, and that are therefore plausibly subject to legitimate territorial claims, poses a serious challenge to the intuitive egalitarian simplicity of the equal per capita shares view. A defence of this view, then, is tantamount to a defence of the redistribution of terrestrial sink capacity, and therefore must involve either (1) an argument against the legitimacy of territorial claims to terrestrial sink capacity, or (2) an argument for why legitimate territorial claims to terrestrial sink capacity should nevertheless be ignored in favour of an equal per capita distribution of emissions shares. One strategy for doing so involves applying Charles Beitz's resource redistribution principle to terrestrial sink capacity. Some authors have argued that this strategy will fail due to important differences between the nature of 'conventional' natural resources, and the nature of a resource link climate sink capacity. In this paper, I consider five arguments to this effect that seek to establish the legitimacy of territorial claims to terrestrial sink capacity. Respectively, they appeal to attachment, identity, self-determination, improvement and fairness in order to do so. I argue that each one either fails to establish the legitimacy of territorial claims to terrestrial sink capacity, or, where they do plausibly establish legitimacy, they do so in a way that renders them vulnerable to type-(2) objections that suggest territorial claims to terrestrial sink capacity should nevertheless be ignored. I conclude that, if one is willing to adopt the resource redistribution principle, a just distribution of emissions shares need not respect territorial claims to terrestrial sink capacity.

Keywords Emissions shares · Equal per capita shares · Distributive justice · Climate justice · Territorial claims · Natural resources

Introduction

At bottom, anthropogenic climate change is the result of greenhouse gases (GHGs) being released into the atmosphere at a rate that exceeds the Earth's capacity to absorb and sequester those GHGs. The Earth's capacity to do so is a function of (1) the absorptive capacity of the atmosphere itself, and (2) the absorptive capacity of terrestrial climate sinks, such as oceans, sediments, soil, land plants, ocean algae and diatoms (Farmer and Cook 2013). Assuming that anthropogenic climate change is to be mitigated by *reducing* the rate at which GHGs are emitted (as opposed to, for instance, by finding ways to *increase* the Earth's capacity to absorb and sequester those GHGs by means of carbon dioxide removal technologies), then access to a finite resource—absorptive capacity—for which the demand outstrips the supply, must be distributed fairly between the emissions-producing inhabitants of Earth.¹ One of the central ethical dimensions of humankind's response to climate change, then, is deciding upon the *just distribution of emissions shares*.

One particularly well-known view on what a just distribution of emissions shares looks like is the *equal per capita shares view* (EPC). Proponents of this view argue that the right to emit GHGs, and so the right to use up absorptive capacity, is to be divided equally between every inhabitant of Earth. The EPC view has been widely criticised from a number of angles, and by a number of authors.² But a particularly devastating critique of the EPC view has been raised by Megan Blomfield (2013). Blomfield points out that while an equal per capita division of *atmospheric* absorptive capacity might be plausible on the basis that no one person has any greater claim to the atmosphere than any other, this is insufficient to justify EPC emissions since a large component of the Earth's overall absorptive capacity comes from terrestrial carbon sinks that lie within existing national borders. Insofar as we might think that the citizens of these sink-rich nations have a greater claim to their terrestrial sink capacity than others do, that gives us reason to think some people will, in fact, have a *prima facie* greater right to emit GHGs than others.

In this paper, I argue against Blomfield's critique. My contention is twofold: (1) I claim that the EPC proponent has several promising avenues for pushing back on the legitimacy of territorial claims to terrestrial sink capacity, and (2) that even if the EPC proponent must concede the legitimacy of those territorial claims, they nevertheless have pragmatic reasons to believe that those claims should not be reflected in a just distribution of emissions shares. Though these two contentions do not constitute a positive argument in favour of the EPC view, they do constitute a defence of the EPC view against the threat of territorial claims to the climate sink.

¹ Strictly speaking, this would include both human and non-human inhabitants of Earth. For reasons of space and simplicity, I shall focus only on human inhabitants here. Philosophers have acknowledged that these questions of distributive justice concern non-human persons (e.g. Caney 2012, p. 291), though to my knowledge no one in the philosophical literature has developed an account of how a just distribution of emissions shares is affected by the inclusion of non-human persons.

² For an informative review of the various objections to the EPC view, see §6.2 of Caney 2020.

The lessons of this paper extend beyond EPC, however. The question of whether territorial claims to terrestrial sink capacity are legitimate is one that every proposal for how we should distribute emissions rights must engage seriously with. Insofar as this paper provides a comprehensive overview of the arguments for the legitimacy of those territorial claims and finds them wanting, it potentially provides a broader normative argument against the inclusion of territorial claims to terrestrial sink capacity by any current or future proposal for how we should distribute emissions rights. For expositional simplicity, and for consistency with the existing literature,³ I will mainly discuss territorial claims to terrestrial sink capacity against the backdrop of the EPC view, but the broader normative import of the paper should not be forgotten.

The structure of the paper is as follows. I begin §2 by explicating the EPC view in greater detail, discussing its putative justification (or lack thereof), before expounding some of the more significant challenges that have been brought against it in the philosophical literature. I close the section by laying out Blomfield's critique. In §3, I consider in turn five arguments in support of territorial claims to terrestrial sink capacity that are supposed to undergird Blomfield's attack on the EPC view. I argue that each of them fails for either principled reasons (such that the legitimacy of those claims themselves is in doubt) or for pragmatic reasons (such that the legitimacy of those claims may nevertheless be insufficient to speak in favour of a just distribution of emissions shares needing to respect territorial claims to terrestrial sink capacity). Along the way, I address a number of objections to my arguments. By way of conclusion, §4 takes stock of the consequences of these arguments, both for the EPC view, and for emissions distributions more broadly construed.

Equal Per Capita Shares

For Equal Per Capita Shares

The starting point for EPC is typically the observation that the Earth's atmosphere is a global commons, i.e. a common pool resource to which every inhabitant of Earth is a potential appropriator. This terminology is from Elinor Ostrom (1990; see also Ostrom et al. 1994). We may say that a resource is a *global commons* when it has the following two characteristic properties:

(1) Subtractability/Rivalry

When one appropriator uses a resource unit from a global commons, this resource unit is no longer available for use by other appropriators. A global

³ The starting point for much of the existing literature on territorial claims to terrestrial sink capacity is the observation that one of the premises of a common form of argument for the EPC view is false. I say more about this in §2.

commons is therefore exhaustible,⁴ since it is possible for all available resource units to be used up such that the entire resource is denied to others.

(2) Difficulty of Exclusion

It is either impossible or severely impractical to restrict access to the resource. This may be for practical reasons (e.g. the prohibitively large cost of physically fencing off the atmosphere), principled reasons (e.g. how would such fencing off even be possible?) or for ethical reasons (e.g. access to clean air as a human right). Thus, the resource is susceptible to free-riding, whereby appropriators' use of the resource outweighs their contribution towards its upkeep, resulting in 'supply-side provision problems' (Ostrom et al. 1994, p. 14).

And when the potential appropriators from that resource are *all* human beings.⁵

Of course, in the case of climate change, emitters do not *remove* a piece of the atmosphere itself. Instead, what the EPC proponent claims is removed are *units of atmospheric absorptive capacity*:⁶ by emitting GHGs, an appropriator uses up a part of the atmosphere's finite ability to absorb GHGs, not a part of the atmosphere itself. Thus, it is not the atmosphere that is the relevant resource but rather the atmosphere's absorptive capacity. But no matter—we may treat the atmosphere's absorptive capacity as coextensive with the atmosphere itself, such that the former inherits the same subtractability/rivalry and difficulty of exclusion that is characteristic of the atmosphere. It follows, then, the atmospheric absorptive capacity is itself a global commons.⁷

From here, the argument for EPC consists of two steps.⁸ First, it is argued that the right to emit GHGs can be equated with the right to use up atmospheric absorptive capacity. As we have seen, the resource that one uses up when one emits GHGs is atmospheric absorptive capacity—or so it is claimed. The thinking, then, is that

⁴ Here I diverge slightly from Ostrom's nomenclature, since she reserves 'exhaustible' for global commons with no natural regenerative capacity. My use of the word 'exhaustible' includes temporarily exhaustible resources.

⁵ Here I follow Blomfield (2013, p. 287).

⁶ Cf. Vanderheiden: 'While the atmosphere itself is not something that can be parceled into shares and allocated among the world's people—there is, after all, only one atmosphere, which must be shared among all the planet's inhabitants—its capacity to absorb GHGs (a function that is technically performed by terrestrial carbon sinks, which provide the planet's respiratory functions of absorbing carbon and emitting oxygen, but which for parsimony are called here *atmospheric absorptive capacity*) is something that can at least conceptually be so divided in the form of GHG emissions caps.' (2008 p. 79, my emphasis). It is interesting to note that Vanderheiden himself acknowledges the role of terrestrial sinks here, going so far as to include them in talk of 'atmospheric absorptive capacity', but fails to acknowledge that such sinks, unlike the atmosphere, are subject to a different set of ownership claims that cause problems for his wider stance, as Blomfield (2013) rightly identifies.

⁷ Leigh Raymond (2008, p. 3) has noted that this usage does some violence to the idea of the commons as originally conceived, since, on his view, the atmosphere is not collectively owned, but is rather *beyond* ownership. This minor infelicity does not affect the argument for EPC.

⁸ My analysis glosses over the distinction between arguments for EPC access to the *atmosphere* and arguments for EPC access to *atmospheric absorptive capacity*, since I take the first sort of argument to be a coarse-grained version of the second—at least in the context of climate change. For a more detailed discussion of the two, see Blomfield 2013, pp. 284–286.

deciding upon the details of a just distribution of atmospheric absorptive capacity looks like it will be sufficient to fix the details of a just distribution of emissions shares. If atmospheric absorptive capacity is to be distributed on an EPC basis, then it follows that the right to emit GHGs must also be distributed among potential emitters on an EPC basis. And this is precisely what the second step of the EPC argument states: that atmospheric absorptive capacity should be distributed among potential appropriators on an EPC basis.⁹

One of the merits of the EPC view is its intuitive egalitarian simplicity. Indeed, some of those who ultimately reject the EPC view acknowledge its appeal in this regard (e.g. Margalioth and Rudich 2013, p. 194). But although some authors take EPC rights to atmospheric absorptive capacity to be self-evidently fair, some have offered a more considered defence. One prominent example is Steve Vanderheiden (2008), who argues for EPC on the basis of a restricted version of Charles Beitz's (1979) resource redistribution principle (RRP). The original RRP is motivated by Beitz's observation that the Rawlsian argument for our moral obligation to redistribute the advantages conferred by an unequal and morally arbitrary distribution of natural talents in society applies equally well to natural resources, which are distributed in a similarly unequal and morally arbitrary fashion across the globe. In fact, Beitz claims, the case for the redistribution of natural resources is *stronger* than the case for the redistribution of natural talents on two counts: First, while it may be argued that talents are *attached* to the person who possesses them, and therefore susceptible to prima facie ownership claims, the same is not true for natural resources, which must be *appropriated*. Second, talents are liable to become intertwined with a person's identity, such that their redistribution might be thought to impinge on personal identity. On the other hand, Beitz claims, resources 'seem more like contingent than necessary elements in the development of personality' (1979, p. 139). While resources may play a part in the development of personality, 'they are not there, as parts of the self, to begin with' (p. 140).

Beitz's RRP has received an enormous amount of attention, and many authors have resisted its specific articulation of cosmopolitan egalitarianism.¹⁰ One challenge it faces is the fact that, for many conventional resources such as deposits of precious metals or oil fields, redistribution stands in stark opposition to the principles of sovereignty. This challenge seems less acute in the case of the atmospheric resource, however, because 'unlike most other natural resources, there is no natural

⁹ This second premise is often considered basic, or at least in need of little further justification. Peter Singer (2010, p. 190), for instance, takes the principle that everyone has an equal claim to the atmosphere to be 'self-evidently fair', at least as a starting point, and Michael Grubb (1990) takes EPC access to the atmosphere to be a basic moral principle, even without (explicit) recourse to the atmosphere's status as a global commons. For Grubb, EPC is justified by the simple moral fact that 'every human has an equal right to use the atmospheric resource' (p. 83). Others have offered the justification that EPC access to the atmosphere follows by virtue of the atmosphere's status as a global commons. Anil Agarwal (2002, p. 377) for instance, states that 'the atmosphere is a common property resource to which every human being has an equal right'. Similarly, Tom Athanasiou and Paul Baer (2002, pp. 74–75) take equal access to common resources to be an essential requirement for equity, which is itself a 'foundational' ethical principle.

¹⁰ For a compelling critique of Beitz's arguments, see Caney 2005. See also Nine 2008.

“distribution” of atmospheric space’ (Vanderheiden 2008, p. 103). As such, EPC access to atmospheric absorptive capacity can be justified on the basis of a *restricted* version of the RRP, which is intended to apply only to goods not physically located within national borders.¹¹

The argument for EPC thus takes the following schematic form:

P1 Emitting GHGs is equivalent to using up atmospheric absorptive capacity.

P2 The right to use up atmospheric absorptive capacity should be distributed on an EPC basis.

C The right to emit GHGs should be distributed on an EPC basis.

Against Equal Per Capita Shares

The argument for EPC emissions shares has been resisted from a variety of angles. These angles can be divided into principled and pragmatic types, with the former resisting EPC on the grounds that it simply fails to constitute a desirable set of distributive principles, and the latter resisting EPC on the grounds that, even if it *were* a desirable set of distributive principles, it remains *unrealistic* for pragmatic reasons (Torpman 2019). Where principled objections question the soundness of the argument given above, pragmatic objections question whether the soundness of the argument is even sufficient to militate in favour of EPC. In this paper, I shall mostly be concerned with principled objections to EPC. My aim in this section is to explicate some of these principled objections and then, in subsequent sections, explore the prospects for the EPC proponent’s rebuttal.

A range of principled arguments against EPC target the argument’s second premise. Some of these arguments deny that the relatively spartan justification given for the EPC distribution of atmospheric absorptive capacity is sufficient. Thus, they argue, the EPC proponent is yet to actually supply a compelling reason to accept an egalitarian distribution of emissions rights (Caney 2012; Margalioth and Rudich 2013). Others focus on the fact that the position is predicated upon an overly isolationist picture of egalitarianism, according to which the distribution of emissions is—for some reason—a question to be settled independent of the wider context of equality (Caney 2012). Egalitarians, Caney tells us, ‘believe that the “total package” of goods should be equal: they do not believe that each item should be equalised’ (2012, pp. 265–266). We might believe that equality in the sense that matters (i.e. with respect to health, prosperity, opportunity and so forth) can be achieved without EPC access to atmospheric absorptive capacity. But believing this to be possible is, *ipso facto*, to believe that egalitarianism does not necessitate EPC access to atmospheric absorptive capacity. The EPC proponent is, of course, free to deny this—that

¹¹ Given that this is where Vanderheiden’s argument settles, one might question whether he has actually provided any deeper justification for EPC than those who take it to be self-evident. As a putative justification of EPC, there is a sense in which Vanderheiden’s argument begs the question, since he simply asserts that the atmosphere is something to which ‘no one has a valid claim to larger shares [...] than anyone else’ (2008, p. 225). If this is supposed to be self-evident, then it is not entirely clear that his argument is qualitatively different to Singer’s, for example.

is, if they are free to believe that EPC access to atmospheric absorptive capacity *in particular* is somehow essential for total package equality. But in that case, they must be able to articulate why this is the case.

Though both of these are trenchant criticisms of the EPC view, I intend to set them aside for the rest of this paper.¹² Instead, I wish to focus on another kind of principled objection to EPC, most forcefully articulated by Megan Blomfield (2013), which targets the argument's first premise. As I noted at the outset of §2.1, it is well known that the Earth's ability to absorb and sequester GHGs comes from two sources, only one of which is the absorptive capacity of the atmosphere. The other is the absorptive capacity of terrestrial climate sinks: forests, oceans, soil and so on. But Blomfield points out that this fact raises a problem for the first premise of the EPC proponent's argument, which seeks to equate the emission of GHGs with the use of atmospheric absorptive capacity alone. If emitting GHGs uses up terrestrial sink capacity too, then this premise is false. Even if we could agree that EPC was the correct set of distributive principles with which to govern access to the atmosphere, this would not by itself entail that EPC was the correct set of distributive principles with which to allocate emissions rights at large, because emissions do more than just use up *atmospheric* absorptive capacity.

Blomfield's argument is not fatal to EPC. Rather, it establishes that EPC is once again in need of additional justification. What its proponents must justify, in this case, is why—atmospheric absorptive capacity aside—we should *also* endorse EPC access to the absorptive capacity associated with terrestrial climate sinks. Absent such a justification, the EPC proponents argument provide, at best, only a reason to endorse EPC rights to the atmospheric component of overall absorptive capacity. They do not justify EPC rights to absorptive capacity *tout court*; to what Blomfield (2013, p. 289) calls the 'global GHG assimilation system'. And since it is the use of this global assimilation system to which emitting GHGs corresponds, EPC emissions shares would only follow from EPC rights to the use of *this* system.

Arguing for EPC rights to the non-atmospheric component of the global GHG assimilation system, however, is a much taller order for the EPC proponent. This is because a large proportion of terrestrial climate sinks fall within existing national borders, and are therefore subject to territorial ownership claims. While we might hold, with Singer, that it is 'self-evidently fair' that every person has an equal prima facie claim to the atmosphere's absorptive capacity, it seems much less obvious that every person has an equal prima facie claim to terrestrial sink capacity. Of course, one might object that this sort of argument gets things backwards: if we think that the global GHG assimilation system is a global commons, then so much the worse for territorial claims. Access to terrestrial sinks, the objection would go, is *a fortiori* to be distributed on an EPC basis by virtue of the fact that it forms part of a global commons. But as Vanderheiden (2008, p. 225) notes, 'the case for [EPC] is largely negative: Given that no defensible claim justifies unequal allocations, no departure from the default case for equality appears warranted'. The reason that Blomfield's

¹² The question of isolationism, however, will crop up again in §3.5. Defences of EPC in light of these two kinds of objections can be found respectively in Torpman 2019 and Torpman 2021.

argument from territorial claims to terrestrial sink capacity is so penetrating is because it establishes that there *is*, in fact, just such a candidate defensible claim to justify unequal allocations: territorial sovereignty over natural resources. In light of this, the EPC proponent must either reject territorial sovereignty, such that their ‘largely negative’ case suffices once more, or they must develop a *positive* case for EPC that bolsters the position against territorial claims to terrestrial sink capacity.

There are thus two forms that a defence of EPC might take (Blomfield 2013, p. 293):

- (1) *Deny* the legitimacy of territorial claims to terrestrial sink capacity, such that access to this resource may be allocated on an EPC basis after all.
- (2) *Concede* the legitimacy of territorial claims to terrestrial sink capacity, but explain why we should nevertheless allocate access to the global GHG assimilation system on an EPC basis.

In fact, there are really two different ways of going about a type-(2) defence of EPC. First, a type-(2a) defence would show that despite the legitimacy of territorial claims to terrestrial sink capacity, those claims are somehow nullified by more foundational principles of justice, such that we should still endorse EPC access to terrestrial sink capacity. Second, a type-(2b) defence would simply accept the legitimacy of territorial claims to terrestrial sink capacity, and accept that access to terrestrial sink capacity should therefore not be distributed on an EPC basis, but argue that we should *counteract* the resulting inequality of emissions rights by balancing it out elsewhere. The former is a ‘bottom-up’ approach, whereby we establish EPC access to overall absorptive capacity by establishing EPC access to each of the components of the global GHG assimilation system, and the latter is a ‘top-down’ approach, whereby we establish that there should be EPC access to overall absorptive capacity, and we fiddle the rights to the components in whichever ways are morally permissible to bring this about.¹³

Which of these strategies provides the most viable option for a defence of the EPC view? The answer will clearly depend upon the strength of the case for the legitimacy of territorial claims to terrestrial sink capacity. If this case is weak, then (1) remains a live possibility. If, on the other hand, the legitimacy of these territorial claims seems unassailable, then the EPC proponent’s best chances lie with one of the two varieties of (2). In the next section of this paper, I shall evaluate five arguments for the legitimacy of territorial claims, and argue that many of them do not withstand scrutiny. As we shall see, there are both principled and pragmatic reasons to deny that a just distribution of emissions shares must respect territorial claims to terrestrial sink capacity.

¹³ Top-down approaches are thus in the spirit of Rawls when he writes (1999, p. 247): ‘Two wrongs can make a right in the sense that the best available arrangement may contain a balance of imperfections, an adjustment of compensating injustices’. The top-down approach is what underpins the objection that the territorial claims argument gets things backwards: for the top-down EPC proponent, Blomfield’s argument is a *modus tollens* against territorial claims, not a *modus ponens* against EPC.

Unrestricting the Resource Redistribution Principle

Vanderheiden's argument made use of a *restricted* version of the RRP because the lack of territorial claims to the atmosphere rendered obsolete the aspects of the *unrestricted* RRP designed to resist territorial ownership claims. But once we recognise that there *are* territorial claims to components of the global GHG assimilation system, and not just to more obvious natural resources such as fish stocks or precious metals, we must also recognise that Vanderheiden's restricted RRP is simply inadequate to the task of justifying EPC rights to the global GHG assimilation system. Some components of that system sit within national borders, and are therefore resources that sit beyond the reach of the restricted RRP. One option for a type-(1) defence of EPC, then, is simply to retreat from the restricted RRP to Beitz's *unrestricted* RRP, under which territorial claims to terrestrial sink capacity are illegitimate.

Blomfield (2013), however, has argued that while Beitz's arguments might apply to natural resources abstractly construed, there are reasons to think that they will not apply to terrestrial sink capacity. If Blomfield's arguments are sound, then it would suggest that even the unrestricted RRP cannot overrule territorial claims. For unrestricting the RRP to be a viable type-(1) strategy, then, it must be the case that Blomfield's arguments fail. In this section, I aim to establish that they do so.¹⁴

Attachment

Are terrestrial sinks *attached* to persons with territorial claims over them? Certainly in nothing like the sense in which talents are physically attached to their owners. Blomfield argues that there is nevertheless a sense in which resources can nevertheless form a 'natural' attachment to collectives (2013, p. 295), citing Koler's contention that 'we are constituted by our interactions with places; we make ourselves by making places' (Koler 2009, p. 69). While it may plausibly be the case that (as Beitz contends) a community cannot be 'attached' to natural resources hidden deep under the Earth's surface, for example oil reservoirs, valuable ores or coal seams, the types of natural resources that instantiate terrestrial sink capacity are commonly more immediate parts of a community's natural environment. In Blomfield's words, a terrestrial sink 'does not just *happen* to be there, under the feet of already existing societies; it is composed of land and forests that have been influenced by—and have influenced—human populations for centuries' (2013, p. 295, original emphasis). This means that terrestrial sinks are plausibly the sorts of things that communities *can* be attached to: 'resources such as soil and trees are not just found "out there" by

¹⁴ In what follows, the subsections are ordered the way they are for two reasons. The first is historical: the argument from attachment and the argument from identity, which I begin with, are the two objections to Rawls's treatment of natural talents from which Beitz defends his RRP (1979, pp. 138–141). It thus makes sense, for historical reasons, to begin here when trying to judge whether a new type of resource (here, terrestrial sink capacity) falls within the purview of the RRP, since these might be considered the 'traditional' arbiters of that question. The remaining arguments from self-determination, from improvement and from fairness are ordered in accordance with the originality of the objections I give to them.

the group—the resources are there now because of the specific territorial decisions that that group has made over time’ (p. 295).¹⁵ This makes them liable to a stronger form of territorial claim on the basis of attachment that seems not to be the case for, for example, deposits of precious metals or fossil fuels.

Chris Armstrong (2015) has argued that these sorts of attachment claims remain compatible with a variety of ways to allocate sink capacity. This is because while an inhabitant of (say) a forested environment may feel attachment to the trees of that forest, and while that attachment may provide the basis for a legitimate territorial claim to that forest, it is not clear that that same claim extends specifically to the forest’s sink capacity. Thus, it is not clear that the use of this sink capacity by somebody else is, *eo ipso*, in tension with the relevant attachment-based territorial claim. While *destroying* forests or *excluding* communities from the use of soil would clearly threaten attachment-based claims, allowing a forest to absorb GHGs emitted by members of another community does not constitute a comparable threat to those same claims.

I take Armstrong’s argument to establish that:

- (a) There may be legitimate attachment claims to things such as forests, but that;
- (b) A forest’s sink capacity remains importantly distinct from the aspect of the forest which is subject to the attachment claim.

Thus, Armstrong’s argument suggests that attachment claims are not sufficient to ground territorial claims to terrestrial sink *capacity*. Here, however, I want to show that Armstrong’s argument can be supplemented in two different ways, such that one can deny (b) and still maintain that attachment cannot ground territorial claims to terrestrial sink capacity.

First, a *reductio* against attachment-based claims. Suppose that we *did* think that allowing state A’s trees to absorb GHGs emitted by state B constituted a violation of the citizens of state A’s attachment to those trees. Even if, on this basis, we honour state A’s territorial claims to those trees, and thus give state A a proportionately higher right to emit GHGs, the fact remains that state A’s terrestrial sinks will continue to absorb GHGs from not just state B, but all manner of other states. It is simply a fact that emissions need not respect national borders; that the natural processes of carbon sequestration need not respect whatever foundational principles of justice we have agreed upon. If a person’s attachment to a terrestrial sink entails that that sink’s capacity must be reserved for that person’s use, then this attachment is generically violated by any distribution of emissions rights.¹⁶ The fact that absorption

¹⁵ It seems inevitable that this form of ‘attachment’ is going to be a weaker form than what Rawls had in mind for the physical attachment of talents to their owners. No doubt it is still sufficiently strong to warrant serious consideration, however.

¹⁶ One might think that this can be avoided by claiming that one is attached to the capacity of a given sink not as a token, but as a type. State A’s territorial claims are supposed to ensure that it will be compensated in kind, with absorptive capacity, even if that capacity is instantiated by another state’s sinks, and so whose emissions end up in whose sinks is besides the point. But it is not clear whether this sort of move is legitimate for the argument from attachment. Avery Kolers (2012, p. 278), for instance, consid-

and sequestration of GHGs is mediated by the atmosphere, and the fact that the atmosphere is a global commons, with all the concomitant difficulty of exclusion that entails, conspire to ensure that terrestrial sink capacity is at least *functionally* a global commons, and that it is impossible (or at least impractical) to track or police which emissions are absorbed by which sinks. If ought implies can, and if the argument from attachment commits us to the impossible—that is, if it commits us to ensuring that each state's emissions are absorbed only by that state's sinks—then so much the worse for the argument from attachment.

If one is unconvinced by the *reductio*, there is a second major problem with the argument from attachment: Although Blomfield's reasoning may apply to forests, it seems less applicable in the case of other terrestrial sinks, particularly soil. Soil, which globally contains more carbon than vegetation and the atmosphere combined (Swift 2001), and at least twice as much carbon as the atmosphere alone (Batjes 2016), is quite literally under our feet in exactly the way that Beitz appeals to. But while, as Blomfield suggests, it may plausibly be the case that *surface-level* soil is shaped by—and, in turn, shapes—a community, soil commonly extends to as far as eight metres below the Earth's surface and its carbon content typically increases with depth (Richter and Markewitz 1995). Even if communities can be attached to soil in the relevant manner, can a community be attached to soil eight metres below its members' feet in the strong way required to justify territorial claims? It seems unlikely. And if it cannot, how are we to decide what proportion of soil sink capacity these claims on the basis of attachment actually apply to? Where does one draw the line between soil to which a community is attached and soil to which a community is not? If the basis of territorial claims to terrestrial sink capacity is supposed to be attachment, but the argument from attachment seems not to apply to the largest source of terrestrial sink capacity, then these territorial claims warrant, at best, considerably less departure from an EPC status quo than is commonly supposed.

In sum, there are three reasons to deny that territorial claims to terrestrial sink capacity can be legitimised on the basis of attachment. First, there is Armstrong's point that those territorial claims apply to the entities that instantiate sink capacity, not the sink capacity itself. Second, there is the *reductio*: since the argument from attachment applies to resource tokens, not resource types, it commits us to the impossible task of policing which sinks absorb which emissions. Third, there is the point that even if attachment claims can extend to sink capacity, those claims seem (contingently) to extend only to spatially immediate parts of the global GHG assimilation system, and these parts comprise only a limited proportion of that system's overall capacity. It seems likely that Armstrong's argument remains the strongest of the three: nobody is actually claiming attachment to sink capacity, but rather to the objects that instantiate it. My arguments are intended to *bolster* Armstrong's case against territorial claims; not to replace it. In that sense, they establish that the

Footnote 16 (continued)

ers attachment-based territorial claims to natural resources to apply to resource *tokens* but not to resource *types*. This would seem to rule out being attached to sink capacity (a resource type), rather than the particular thing that instantiates it (sink capacity (a resource token)). Vanderheiden makes a point similar to this one in his 2017 (p. 1279).

case against attachment-based territorial claims to terrestrial sink capacity is even stronger than Armstrong's argument alone suggests.

Before continuing, it is worth pausing to consider two further problems for the argument from attachment that are logically prior to the three I have already articulated. Recall that Kolars (2009, p. 69) suggested that 'we are constituted by our interactions with places', and it was on this basis that Blomfield (2013, p. 295) suggested that communities may be *attached* to the terrestrial sink. There are two very immediate worries with this picture. The first is that it is not entirely clear that Kolar's point can do the work Blomfield needs it to. Even if we grant that our *interactions* with places somehow constitute a part of us, it does not follow that the places with which we interact are a part of us too. Kolar's argument may justify an attachment to *something*, but it is not the same thing that Blomfield's argument requires. A second problem is that redefining attachment in this sense collapses the argument from attachment into the argument from identity. After all, attachment must consist in something more than liking something very much if it is to ground considerations of justice.¹⁷ As Kolars notes, citizens' interaction with their territory are important because they are 'partly constitutive of the identity' of those citizens. This is not a problem, per se, but it opens the door to a wider range of objections, as we shall now see.

Identity

Are terrestrial sinks liable to become intertwined with personal identity in the same way that an individual's natural talents might? Again, Blomfield argues that they are. For her, this is a straightforward consequence of the 'mutually formative relationship between a territory and the group that inhabits it' (2013, pp. 295–296). The idea here is that since a community shapes—and is shaped by—its natural environment, and since a person's identity is at least partially shaped by the communities to which that person belongs, it follows by transitivity that a person's identity may be shaped by the natural environment they inhabit. This fact, the argument goes, is sufficient to block the unrestricted RRP's application to terrestrial sink capacity, since redistributing that sink capacity would mean redistributing the rights to a feature of the natural environment, and so may impinge on an individual's personal identity.

As I have noted, the argument from identity blurs into the argument from attachment when the argument from attachment is weakened in the way it must be in order to be applicable to natural resources. As a result, there are two ways to resist Blomfield's argument from identity. The first is simply to rehearse any of the arguments from the previous section. The second is to put pressure on the idea that the sorts of communities relevant to the territorial claims in question here are, in fact, the sorts of communities to which the argument from identity will apply. In the context of international negotiations over emissions rights, territorial claims to terrestrial sink capacity are presumably intended to apply to

¹⁷ I thank an anonymous reviewer for this point, and for this lovely way of phrasing it.

national communities (e.g. ‘the Brazilian people’), not to communities that exists on a smaller scale (e.g. ‘the Awá’), nor to those that exist transnationally (e.g. ‘rainforest conservation volunteers’). The relevant communities for evaluating the argument from identity, therefore, would seem to be those demarcated by international borders.

I contend, however, that a person’s official membership of a *national* community is neither a necessary nor a sufficient condition for that person’s identity being linked to the relevant natural environment. It is not a necessary condition because a person’s identity may be shaped by territory outside of the nation of which they are a citizen. Consider, for instance, a person from Hungary, who is passionate about rainforest conservation and who has, for the last 30 years, regularly spent large amounts of time volunteering with rainforest conservation charities in the Peruvian Amazon. Many people would share the intuition that such a person could legitimately claim that a part of their identity has been shaped by their time in the Amazon. And those who deny this claim are unlikely to deny it purely on the basis of that person being Hungarian, rather than Peruvian. But if a person’s identity can be shaped by the natural environment of a national community of which one is not officially a member, then official membership of a national community cannot be a necessary condition for a person’s identity to be shaped by that community’s natural environment.

Nor is official membership of a national community a sufficient condition for a person’s identity being shaped by that community’s natural environment. This is because the territories that shape one’s personal identity are commonly more fine-grained than those delineated by national borders. It is simply not the case, for instance, that every UK citizen has an aspect of their personality that has been shaped by the Cape Wrath trail, or by the M25 orbital, simply by virtue of their being an official citizen of the United Kingdom. For the very same reason, the indigenous people of the Amazon will have a stronger claim to the rainforest having shaped their identity than, say, someone who was born and grew up in the urban sprawl of São Paulo. (It even seems implausible that the claim of the latter is, in fact, any stronger than the claim of our Hungarian conservationist.)

International borders seem simultaneously too weak and too strong to capture the myriad ways that personal identity may be bound up in geographical community. As such, while an appeal to the ways in which the environment may shape personal identity may license *some* sort of territorial claim to terrestrial sink capacity, it is not clear that it would license the specific type of territorial claim that is relevant to the question of international negotiations over emissions rights—the territorial claims of nation states. Strictly speaking, then, this is an argument against a specific type of territorial claim, not against territorial claims *simpliciter*. But if the territorial claims proponent wishes to see territorial claims upheld on a more flexible basis, whereby ‘territory’ is to be construed in a way that can both exceed and be exceeded by the nation state, then the onus is on them to provide a more detailed account of how this should work. Moreover, the onus is on them to provide an account of how this complex picture remains compatible with the increasingly urgent requirement for international cooperation against climate change.

Self-Determination

An alternative argument for the legitimacy of territorial claims to terrestrial sink capacity appeals to self-determination. On this view, even if terrestrial sinks are the kinds of things to which the unrestricted RRP may apply (as would be the case if the arguments from attachment and identity fail, as I have argued in §3.1 and §3.2 respectively that they do), the redistribution of terrestrial sink capacity threatens a political community's right to self-determination, and so—the argument goes—its adoption should be considered an unattractive strategy for the EPC proponent. The crucial idea here is that to deny a state ownership of the natural resources that lie within its borders is to deny that state the right to self-determination.

The feasibility of the argument from self-determination will naturally depend sensitively on how one perceives the relationship between resource rights and self-determination. As Armstrong (2015, p. 64) notes, no credible view would stipulate that *full* control over all of a state's natural resources is essential for that state's self-determination. But many, including Blomfield (2013, p. 296; 2019, ch. 6), would insist that *some* control over natural resources will be essential. This is particularly clear for functionalist accounts of self-determination, such as that advanced by Cara Nine (2012).¹⁸ According to Nine, a state's rights to its natural resources are legitimised by the state's use of its control over those resources to establish justice. In her own words, 'resource rights may be acquired and held by collectives that demonstrate the capacity to use the resources to establish minimally just institutions' (2012, p. 144). The establishment of minimally just institutions may not require a state to have *full* control over its natural resources, but it plausibly requires *some* control, and this control plausibly extends to whatever resources might be required to sustainably emit GHGs in the pursuit of establishing or maintaining minimally just institutions. If the unrestricted RRP conflicts with the level of control required for the establishment and maintenance of minimally just institutions in a given state, then the unrestricted RRP conflicts with that state's right to self-determination, and should be abandoned by the EPC proponent.

But is it the case that redistributing terrestrial sink capacity might conflict with a state's ability to establish and maintain minimally just institutions? There is a certain credibility to this claim: insofar as a non-zero quantity of GHG emissions may be necessary for whatever economic activity is associated with the establishment and maintenance of minimally just institutions, or with ensuring that the basic needs of a community's members are met (e.g. by providing heating, or electricity or water purification), *removing* a state's access to sink capacity, and thereby removing a state's ability to ensure those GHGs emitted in these pursuits are sustainably sequestered *would* appear to threaten self-determination. But there are two significant problems here. First, economic activity is becoming increasingly decoupled from GHG emissions, particularly in the developed world (Wu et al. 2018), a trend which is expected to continue with improvements in the affordability and efficiency

¹⁸ On functionalist accounts of self-determination, see also Stilz (2011). For another defence of territorial claims to natural resources from a functionalist self-determination perspective, see Banai (2016).

of renewable energy technology. As it does so, it seems reasonable to expect that the emissions (and therefore the associated sink capacity) required for a state to meet the basic needs of its citizens or to establish and maintain minimally just institutions will also decrease. So although the claim that territorial claims to terrestrial sink capacity are directly connected to the right to self-determination, the connection is both contingent and dynamic, and active efforts to weaken it further are arguably an essential part of our response to anthropogenic climate change.¹⁹

Second, while some amount of sink capacity may be essential for self-determination, it may not be the case that the establishment and maintenance of minimally just institutions requires the use of *all* of a given state's sink capacity. In fact, as Armstrong (2015, p. 66) notes, the very fact that some states (a) currently have per capita emissions *under* what would be allocated on an EPC basis, (b) stand to have their emissions budgets increased *further* by an emission distribution that respected territorial claims to terrestrial sink capacity and (c) are *already* recognised as legitimate states that have used their resources to establish minimally just institutions, suggests that self-determination will not always be threatened by denying additional emissions rights beyond those that would be allocated by the EPC view.²⁰ Of course, the existence of some states for whom full resource rights to terrestrial sink capacity is not essential for self-determination does not establish that there is *never* such a requirement. But it does give us reason to eye the argument from self-determination with suspicion. The level of resource rights to terrestrial sink capacity that a given state requires for self-determination may be the sort of thing that varies from state to state and with scientific progress. As such, the prospects of the argument from self-determination may need to be determined on a case-by-case basis, and could, therefore, only be deployed as a counterargument to the unrestricted RRP in specific situations. (Once again, the territorial claims proponent would also need to say more in support of how such a finely tuned emissions distribution is practically compatible with the urgent need for international cooperation on climate change mitigation.)

There is, however, a much more general and considerably more severe challenge to the argument from self-determination. I contend that honouring territorial claims to terrestrial sink capacity plausibly *leads to*—not *avoids*—states failing to meet the basic rights of their citizens, or failing to establish or maintain minimally just institutions. Thus, if the territorial claims proponent wishes self-determination to be the means by which we adjudicate between different allocations of emissions shares, they will end up adjudicating *against*—not *for*—their position.

¹⁹ Climate change could, in principle, be mitigated without any weakening of the correlation between economic activity and GHG emissions. For instance, this would be the case if there were a drastic reduction in the size of the global population. Most such situations, however, are likely to be morally impermissible.

²⁰ Armstrong gives the examples of Cameroon and Ecuador. Note that this objection applies equally well to the same argument rehearsed with emissions *credits* instead of emissions capacity. A state cannot claim that it requires tradeable emissions credits for its sink capacity in order to be self-determining, because if no such credits are currently recognised, then the state has already proven its ability to be self-determining without them.

Under a distribution of emissions shares that honours territorial claims to terrestrial sink capacity, states that are sink-rich will have their emissions allowances commensurately increased from what they would have received on the EPC view. States that are sink-poor, on the other hand, will have their emissions allowances reduced from what they would have received on the EPC view. But it is a simple pragmatic fact that different states have different political feasibility constraints for fossil fuel phaseout (or drawdown to sustainable levels).²¹ This could be for all kinds of reasons: it could have to do with the extent to which the state's existing energy infrastructure, or the lifestyle of its citizens, relies upon fossil fuels (i.e. the level of what the IPCC refer to as 'scope 1 + 2' emissions²²); it could have to do with the extent to which the state's economy relies upon the production, refinement and export of fossil fuels (i.e. the level of 'scope 3' emissions); and it could have to do with features of the state's political landscape.²³ If the most just distribution of emissions shares is one that is so incompatible with these differing political feasibility constraints that big emitters do not consider its adoption politically feasible, then it is unlikely that this distribution could form part of *effective* climate change policy.²⁴ In order to be effective, after all, policy must actually be adopted and adhered to. To quote Henry Shue:

Members of the rich minority who do not care about justice will almost certainly veto any change they consider too great an infringement upon their comfort and convenience, and they may well have the power and wealth to enforce their veto. The choice at that point for people who are committed to justice might be between vainly trying to resist an almost certainly irresistible veto and temporarily acquiescing in a far-from-ideal but significant improvement over the status quo.
(Shue 2014, p. 58)

The severe challenge facing the argument from self-determination is this: in many instances, sink-richness correlates with low emissions, and sink-poverty correlates

²¹ I take these constraints to be something like Lawford-Smith's 'soft constraints' on scalar feasibility. Rather than being (agent-relative and possibly time-indexed) 'facts about what is logically, conceptually, metaphysically or nomologically possible' (2013, p. 252), soft constraints are fixed by 'economic, institutional, and cultural' facts (p. 255).

²² See Eggleston et al. (2006) for a discussion of scope 1 + 2 and scope 3 emissions. See also Moss (2015).

²³ The United States, for instance, has been a continual thorn in the side of international climate change negotiations. For instance, the first major climate treaty of which it was even a signatory was the Paris Agreement, from which it later withdrew. It is not my intention to discuss the political reasons for US climate recalcitrance, nor to imply that the US is the only state that has impeded climate change mitigation—far from it. Rather, I aim only to make the point that different states have different Overton windows, and that some of these are more compatible with a sudden and drastic reduction in GHG emissions than others.

²⁴ It could be objected that this admits a status quo bias into the discussion much too easily. While this may be the case, it is worth remembering that any such bias could be admitted *temporarily*, as Shue suggests, as part of what he calls a 'transitional' distribution but not as part of a 'goal' distribution. The territorial claims proponent might then object that the question of whether territorial claims should be honoured in a *goal* distribution remains. The other arguments against territorial claims to terrestrial sink capacity considered in this paper strongly suggest the answer to this question would be no.

with high emissions. Qatar, for instance, has the highest per capita emissions rate of any state in the world, and yet has vanishingly small quantities of forest sink capacity (FAO 2020; World Resources Institute 2021). On the other hand, the Democratic Republic of the Congo has the lowest per capita emissions of any state, and yet is the seventh most densely forested state on Earth (FAO 2020; World Resources Institute 2021). Depending on how widespread this trend is, it may suggest that honouring whatever territorial claims a state may have to terrestrial sink capacity would result in a shift of emissions rights from states with comparatively stringent political feasibility constraints for fossil fuel phaseout or drawdown, to states with comparatively lenient political feasibility constraints for the same process. Insofar as we can expect that shift to result in a higher likelihood of Shue's veto being exercised, honouring territorial claims to terrestrial sink capacity risks moving effective climate action further out of reach.²⁵

How and why does this relate to self-determination? For the following reason: actively creating an obstacle to effective climate change mitigation arguably poses a far greater threat to many vulnerable states' right to self-determination than the redistribution of some of their sink capacity would. In extreme cases, obstructing climate change mitigation could lead to some such states vulnerable to sea-level rise, or wildfires, or crop failure or severe flooding suffering to such an extent that their ability to meet the basic rights of their citizens, or to maintain minimally just institutions is compromised. In such cases, there would be a clear sense in which it is *honouring*—not *denying*—territorial claims to terrestrial sink capacity that poses a threat to self-determination.²⁶

This practical argument against territorial claims is a type-(2a) strategy: it concedes that there may be legitimate territorial claims to terrestrial sink capacity, but points out that honouring those claims raises such severe concomitant challenges that they should instead be denied, in spite of their legitimacy. Note, however, that this is not necessarily an argument in favour of EPC. Rather, it is an argument in favour of emissions rights being assigned in a way that takes into consideration the different emissions requirements of different states for fossil fuel phaseout or drawdown. Developing this account further is beyond the scope of this paper, but what I have said above gives at least a reason to be sceptical of the practical value of the argument from self-determination as a justification for territorial claims to terrestrial sink capacity.

²⁵ See also Margalioth and Rudich (2013, p. 194): 'The equal per-capita principle would require developed countries to transfer hundreds of billions of dollars, possibly much more, to developing countries [...] requesting such amounts would doom the negotiations to failure'. My contention is that the negotiations are *more* doomed in the context of an emissions distribution that respects territorial claims to terrestrial sink capacity than they are in the context of the EPC view.

²⁶ An interesting avenue for future research would be to examine whether this trend is, in fact, more widespread. Are sink-rich states generally low emitters, with lower emissions requirements for a green transition? And does this stand in any sort of relationship with the vulnerability of the state to the effects of dangerous climate change? I have not been able to find any research addressing these questions.

Improvement

If the unrestricted RRP is to apply to terrestrial sink capacity, then it must be the case that the distribution of terrestrial sink capacity is morally arbitrary. None of the arguments considered above have applied direct pressure to this point. Instead, they have tried to point out more foundational principles of justice that might be thought to undergird territorial claims to terrestrial sink capacity, and with which the unrestricted RRP might conflict. Another way for the territorial claims proponent to put pressure on the unrestricted RRP, then, is to appeal to desert. Some have argued that the current distribution of terrestrial sink capacity is actually a reflection of choices that certain communities have made, such as choosing to *improve* a sink (e.g. by cultivating phytoplankton in bodies of water), choosing to *maintain* a sink (e.g. by rotating crops to reduce soil depletion, or by regulating grazing livestock so as to avoid soil erosion) or choosing to destroy a sink in the pursuit of economic gain (e.g. by aggressive deforestation). Similarly, a state's terrestrial sink capacity *per capita* depends on the choices that state makes with regard to population growth (Blomfield 2013, p. 296). In these cases—the argument goes—the distribution of terrestrial sink capacity cannot be considered morally arbitrary, and nor, therefore can territorial claims to that sink capacity. Rather, those territorial claims are legitimised by the existence of a causal relation between the policy decisions of a state and the health, or extent, of that state's terrestrial climate sinks.

For some authors, the argument from improvement fails on pragmatic grounds. Even if it is the case that states or their citizens *could* be responsible for the terrestrial sink capacity to which their state may lay territorial claim, the fact remains that it is generally not true that (say) the forests of the world were planted by the citizens of the states in which they are found (Armstrong 2015, p. 68). In other words, the argument from improvement is a good *potential* justification of territorial claims to terrestrial sink capacity; it is not a good *actual* justification of those same claims. A further pragmatic issue is raised by the fact that there is no clear way to stipulate a baseline level of sink health to which modern sinks may be compared (Armstrong 2015, p. 68). Since humankind did not simply pop into existence at some point in time and start extracting from, or adding to, terrestrial sink capacity, one cannot clearly quantify a state's original sink capacity. Nor, therefore, can one quantify the extent to which that state is responsible for having improved or worsened that sink capacity. (It is worth noting, however, that an analogous baseline complaint can be made against the EPC view itself: assigning a per capita allowance for emissions rights can only be done relative to some fixed background population (Jamieson 2001, p. 301; Singer 2002, pp. 43–49), and it is not clear what the baseline for this should be, nor how we should deal with that background population changing with future births and deaths.²⁷)

Pragmatic arguments aside, I submit that there are deeper conceptual issues with the argument from improvement. As expressed above, the argument from improvement is an appeal to desert: states with territorial claims to terrestrial sink capacity

²⁷ See also Cripps (2017). I thank an anonymous reviewer for pointing this out to me.

deserve privileged access to that sink capacity since they have done work to maintain or improve it. Conversely, states without such claims often lack them by virtue of having opted to destroy their original sink endowment in the pursuit of economic gain. The crucial idea is that one can *earn* emissions rights, and that this means that the geographical distribution of terrestrial sink capacity is not morally arbitrary. Thus, the thinking goes, the geographical distribution of terrestrial sink capacity is impervious to the unrestricted RRP. The problem with this argument is that it creates a new sort of resource—the *opportunity* to earn emissions rights by improving a carbon sink. And this resource, I contend, is certainly distributed in a morally arbitrary fashion.

Imagine, for example, an environmentally responsible Qatari musician, who dearly wishes to tour the world playing their music, but who recognises that the international travel this would entail is incompatible with the emissions rights given to a Qatari citizen on the territorial claims view. The argument from improvement asserts that additional emissions rights may be earned by the active improvement of terrestrial sink capacity. But what options does the Qatari musician have for doing so? If any, they are certainly less straightforward than the options available to the average citizen of a sink-rich state.²⁸ The opportunity to earn additional emissions rights by improvement is distributed across the globe in an extremely inhomogeneous way, and moreover, in a way that has no moral basis. Even if we grant that the Qatari musician is responsible for supporting or voting for certain policy decisions that are causally connected to the state of the climate sink, they are not responsible for having been born Qatari. The fact that improving a climate sink is more difficult for them than it is for a Brazilian citizen is not something that can be justified by desert.²⁹

Insofar as this new resource falls under the remit of distributive justice at all (a point that some may contend, since it is not clearly a ‘natural resource’ of the sort that Beitz has in mind), *it* will therefore fall within the purview of the unrestricted RRP, even if terrestrial sink capacity itself does not. One cannot, of course, physically redistribute a part of the Amazon basin to Qatar. But just as we recognise the need to compensate sink-rich states for the opportunity cost they incur by having to

²⁸ They could, for instance, try to increase the health or extent of Qatar’s practically non-existent natural sink capacity. Alternatively, they could travel at their own expense to a sink-rich state and work to increase the health or extent of another state’s sinks. The latter option, though more plausible, would be blocked by the argument from identity (see §3.2), which seems to assert that *national* identity is what justifies territorial claims to terrestrial sink capacity. It might also be objected that, in a globalised world, the Qatari musician could pay someone else to improve sinks for them (I thank an anonymous reviewer for this objection). Even if this is the case, it cannot be used to justify *territorial* claims. If a Qatari citizen pays the Congolese government to maintain their forests, this may well justify a claim to increased emissions rights by the Qatari citizen, but this would not be a *territorial* claim. Quite the opposite, in fact: this provides another example of how maintenance of sinks may be decoupled from geographic proximity to sinks, along the lines of Armstrong’s objection that the forests of a state need not have been planted by citizens of that state.

²⁹ In defence of EPC, Axel Gosseries (2005, p. 296) writes ‘there is no reason for a Chinese or a Peruvian not to have a right to emit CO₂ equal to that of a Canadian or Hungarian’. My point is that there is similarly no reason for a Chinese or a Peruvian not to have a right to *earn the right to emit* CO₂ equal to that of a Canadian or a Hungarian.

maintain or improve climate sinks when they could instead destroy them in pursuit of economic gain, perhaps we should also recognise the need to compensate naturally sink-poor states for the opportunity to earn additional emissions rights that they forego. These are two sides of the same coin; it seems to me that one cannot argue for the former without needing to accept the latter.

Of course, this is more complicated than it first appears, since as we have seen, many contemporary states are not *naturally* sink-poor, but rather are plausibly so as a result of certain political decisions. But then, one might object, this argument falls prey to Armstrong's pragmatic objections: most acutely, there is no clear way to establish a baseline 'natural' sink capacity for each state. Much as there is no way to quantify the compensation owed to sink-rich states for the maintenance of those sinks, there is, for the very same reasons, no way to quantify the compensation owed to sink-poor states for the opportunity to earn emissions rights that they are denied. It might reasonably be objected, on similarly pragmatic grounds, that the fact we are in a climate emergency necessitates taking seriously such non-ideal market-based solutions. I am sympathetic to this objection (indeed, I make a similar point in §3.3).³⁰ But in such cases we may still wish to choose the *least* non-ideal solution. One such solution, and one that I think is in the spirit of Armstrong's own conclusion, is that the compensation of sink-rich states by sink-poor states for the opportunity cost incurred by maintenance or improvement of the climate sink should not take the form of additional emissions rights.³¹ Compensation in some other form would still run afoul of the pragmatic baseline objection, but it could be adopted as a non-ideal solution without introducing the further problem of the need for (and attendant difficulties with) compensation flowing the other way.³²

Fairness

A final defence of territorial claims to terrestrial sink capacity appeals to fairness. Irrespective of whether we can articulate the basis for territorial claims to terrestrial sink capacity, the fact remains that territorial claims to *other* valuable natural

³⁰ I thank an anonymous reviewer for pressing me on this point.

³¹ Another reason to think that any compensation for the maintenance or improvement of terrestrial climate sinks should *not* take the form of additional emissions rights is that if it did, this may lead to perverse incentive structures that actually serve to increase global emissions. Climate scientists have shown that the proportion of the global GHG assimilation system that is made up of terrestrial sink capacity changes with overall emissions levels (IPCC 2021). Proportionally, the atmosphere is responsible for more carbon sequestration at higher global emissions levels. This suggests that the comparative disadvantage of sink-poor states to sink-rich states is minimised at high emissions levels, where the privileged access to sink capacity afforded to sink-rich states constitutes a proportionally smaller amount of global GHG assimilative capacity. This phenomenon is well known in the case of cap and trade emissions permits (see, e.g. Broome 2012, ch. 3). Perhaps this does not matter, so long as the overall emissions level stays at sustainable levels. But it is interesting to note that such incentive structures suggest that emissions would tend towards the highest allowable value.

³² Monetary compensation, for instance, seems not to face this problem. The opportunity to earn money, while not homogeneously distributed by any stretch, is arguably less unhomogeneously distributed than the opportunity to improve a climate sink.

resources have been honoured in the past and continue to be honoured today (Blomfield 2013, p. 297). As Blomfield notes, ownership of fossil fuel deposits, for example, has historically been assigned on the basis of territorial claims. Why, then, should we deny territorial claims to this newly valued natural resource, terrestrial sink capacity? States that are sink-rich but lacked fossil fuels would justifiably feel aggrieved at this double standard. A simple appeal to fairness, coupled with the observation that there is ample historical precedent for honouring territorial claims to natural resources, should suffice to justify a distribution of emissions shares that honours territorial claims to terrestrial sink capacity.

A first problem with this argument is that it assumes that the decision (conscious or otherwise) to honour territorial claims to fossil fuel stores is a correct one that should be upheld, rather than an erroneous one that should be rectified. In other words, the argument from ‘fairness’ is not so much about fairness as it is about consistency, and it overlooks the fact that consistency can go either way: either we decide to uphold territorial claims *consistently*, or we decide that it was a mistake to have honoured territorial claims in historical cases and that we should reject those claims in the future, making whatever reparations are necessary to those who were disadvantaged by that erroneous past decision.³³ The former option may indeed militate in favour of territorial claims to terrestrial sink capacity, but the latter option is plausible too. But if both options are plausible, then the argument from fairness is only an argument in favour of territorial claims to terrestrial sink capacity because it begs the question—it will not convince anyone of the need to honour territorial claims to terrestrial sink capacity *unless* that person already thinks that such territorial claims are something that should be upheld more generally. That is an assumption that many EPC proponents deny. Thus, while I agree with Blomfield that fossil fuel-poor, sink-rich states would have a legitimate complaint if they were doubly disadvantaged by both the decision to honour territorial claims to fossil fuel deposits and the decision not to honour territorial claims to terrestrial sink capacity, I do not think that this is a compelling argument in favour of honouring territorial claims to terrestrial sink capacity. These complaints can just as well be addressed by deciding to compensate for the decision to honour territorial claims to fossil fuel deposits as they can by deciding to uphold the decision to honour territorial claims to terrestrial sink capacity.

A second problem for the argument from fairness comes from the ‘isolationism’ critique that we saw in §2.2. Is it not possible to have overall fairness without

³³ An anonymous reviewer has suggested that this might be taken to suggest that Blomfield’s argument from fairness is better expressed in the language of ‘legitimate expectations’, rather than the language of fairness. On this view, sink-rich countries might legitimately expect ownership of terrestrial sink capacity to be assigned in the same way that ownership of fossil fuel deposits was. How does one distinguish legitimate from illegitimate expectations? Meyer and Sanklecha (2017) suggest that in the case of climate change, one should employ the Rawlsian notion of ‘pure procedural justice’ to answer this question. Legitimate expectations are those that are in keeping with pure procedural justice; illegitimate expectations are those that contradict it. Recasting the argument from fairness in terms of legitimate expectations goes beyond the scope of this paper, but would be an interesting avenue for future research. I elect to use ‘fairness’ here only to be consistent with the existing literature on this argument.

needing fairness in a specific resource such as atmospheric absorptive capacity or terrestrial sink capacity? As we have seen, many would say yes (Caney 2011, p. 90; 2012 pp. 265–271; Bell 2008, p. 250), and on this basis reject the EPC view. The problem with the argument from fairness is that it is vulnerable to the very same objection: does fairness require fairness at the level of territorial claims to each specific natural resource? No. Territorial claims to natural resources are only valuable to the extent that they contribute to some more general basic interest, and so provided that there is fairness with respect to this more general basic interest, there is no *prima facie* reason why territorial claims to each specific natural resource should also be fair.

Perhaps, the territorial claims proponent might claim, closer scrutiny would reveal such a reason. But what could this be? Possibly, it might be argued that honouring territorial claims to terrestrial sink capacity would counteract the unfairness in the more general basic interest (e.g. ‘prosperity’ or ‘standard of living’ or something else) that has been brought about by the historical honouring of states’ territorial claims to fossil fuel stores, and so there *is* a sense in which the specific fairness of honouring territorial claims to terrestrial sink capacity is in the service of the more general kind of fairness that really matters. It does, after all, seem to be the case that many sink-rich states are in the Global South, and many fossil fuel-rich states are in the Global North. But this is not always the case. Many fossil fuel-rich states would benefit *again* from their territorial claims to terrestrial sink capacity (Russia, Canada and the United States, for instance), and many fossil fuel-poor states would lose out again from their lack of natural sink capacity.³⁴ In other words, it is not generally the case that fossil fuel poverty entails sink richness, or vice versa. And so it is not generally the case that the demand for specific fairness here can be justified by appealing to its ability to bring about fairness with respect to some more general basic interest, such as economic prosperity. The upshot is this: if the motivation for territorial claims to terrestrial sink capacity is fairness, then those territorial claims are as susceptible to the isolationist critique as the EPC view to which they stand opposed.

The argument from fairness is not intended as an argument for the legitimacy of territorial claims to terrestrial sink capacity. Rather, it is a plea for consistency. But the two problems I have raised suggest that this plea is nevertheless inadequate to motivate territorial claims to terrestrial sink capacity. Not only does it provide no way to arbitrate between the two different ways in which we might *be*

³⁴ What I say here might be thought to stand in direct tension with my contention in §3.3 that sink-richness was negatively correlated with emissions. There are two things to point out. First, my argument in §3.3 requires that there are many sink-rich states with very small *emissions*, but my argument here is that there are many sink-rich states that are fossil-fuel rich, too. While there may be a relation between these two things, it is not necessary for a state to be fossil-fuel rich in order for that state to have very high emissions per capita. Second, my argument here only requires that there exist states which would ‘double benefit’ from territorial claims to both fossil fuel deposits and to terrestrial sink capacity. The argument in §3.3, similarly requires that there are some states for which terrestrial sink capacity does *not* correlate with fossil fuel deposits. These claims are compatible with one another, since the states satisfying the first condition are need not be the same ones satisfying the second condition.

consistent—either by consistently *honouring* territorial claims to natural resources, or by consistently *rejecting* them—it also fails to be any less isolationist than EPC itself. A territorial claims proponent may not be discouraged by this charge of isolationism, of course, since this is not the only problem with the EPC view, and some have argued that it is not a problem at all (Torpman 2021). But they must have something to say about why territorial claims should be consistently respected rather than consistently rejected, and in this sense the argument from fairness will only work when coupled with another of the arguments above, which *do* aim to give an account of the independent legitimacy of territorial claims to terrestrial sink capacity. This means, however, that the argument from fairness will inevitably inherit some of the challenges discussed in previous sections. Intuitive though it may seem, the argument from fairness provides little basis, *eo ipso*, upon which to adjudicate between EPC and alternative distributions of emissions shares that respect territorial claims to terrestrial sink capacity.

Conclusion

According to the EPC view, the right to use up the capacity of the global climate sink by emitting GHGs should be divided equally between every inhabitant of Earth, since no one person has any stronger claim to the atmosphere than any other person. The fact that a significant proportion of the Earth's ability to absorb and sequester GHGs actually comes not from the atmosphere, but from terrestrial climate sinks that are located within national borders, and that are therefore plausibly subject to legitimate territorial claims, poses a serious challenge to the intuitive egalitarian simplicity of the EPC view. A defence of this view, then, must involve either (1) an argument against the legitimacy of territorial claims to terrestrial sink capacity, or (2) an argument for why legitimate territorial claims to terrestrial sink capacity should nevertheless be ignored in favour of an EPC distribution of emissions shares.

I have considered five arguments from the literature for the legitimacy of territorial claims to terrestrial sink capacity. Respectively, these appealed to attachment, identity, self-determination, improvement and fairness in order to do so. I have argued that each one either fails to establish the legitimacy of those territorial claims, or, where they *do* plausibly establish legitimacy, they do so in a way that renders them vulnerable to type-(2) objections that suggest territorial claims to terrestrial sink capacity should nevertheless be ignored. There are two lessons one can draw from this. The first is a 'narrow' lesson: though it seems to be the case that Vanderheiden's restricted RRP is too weak to withstand Blomfield's critique of EPC on the basis of territorial claims to terrestrial sink capacity, the *unrestricted* RRP seems strong enough to do the job of motivating the redistribution of terrestrial sink capacity. While this cannot fully rehabilitate the EPC position, it does improve its plausibility, especially in conjunction with recent work by Olle Torpman (2019, 2021), who defends EPC from the charge of isolationism.

The second lesson is a wider one, towards which I gestured in the Introduction. This paper has examined each of the existing arguments for territorial claims to terrestrial sink capacity given in the literature. It has found each of them wanting, often

in a number of respects. Since the question of whether territorial claims to terrestrial sink capacity are legitimate is one that any serious proposal for an emissions distribution must engage with, the wider lesson seems to be that, as things stand, no distribution of emissions rights need respect these claims. Indeed, the fact that some of the objections I have made against territorial claims—such as the pragmatic baseline objection to the argument from improvement—seem to apply at least as well to the EPC view may suggest that the wider conclusion is the more robust of the two.

I am conscious that there are two major limitations with this paper. The first is that some will argue that many of the challenges I have raised can be addressed by something like an emissions trading agreement. The pragmatic argument of §3.3, for instance, could be addressed by sink-rich states selling their additional sink capacity to those countries with higher emissions requirements for fossil fuel phaseout or drawdown. However, while I agree that this is plausible, I think it still stands in unacceptable tension with the desperate need for a drastic and immediate reduction in global emissions.³⁵ As I have intimated at several earlier points, perhaps what is required is some small amount of acquiescence in the pursuit of climate justice that satisfies the kinds of ‘political feasibility constraints’ discussed in §3.3. Such a solution would be highly non-ideal, and we may only wish to adopt it in a transitional capacity. But to quote Simon Caney (2016, p. 40): ‘the need for those with the political power to exercise leadership to reduce non-compliance, and for those with the greatest ability to pay to take on extra responsibilities, could not be greater’. In many cases, this burden will unequivocally fall on the shoulders of rich states with high historical GHG emissions. But in the very specific case of absorptive capacity, the reverse may be true: it is sink-rich states that have a greater ability to pay. Their doing so may buy precious time that might otherwise have been wasted on designing a perfect emissions trading system to remedy an avoidable problem.

The second limitation is that retreat to the unrestricted RRP might simply be considered too high a cost. Given that a large part of the EPC view’s original appeal stemmed from the intuitive egalitarian simplicity of the claim that no single person has a greater claim to atmospheric absorptive capacity than any other, the EPC proponent may be rightfully concerned if their position stands and falls with the radical cosmopolitan opposition to territorial sovereignty that Beitz’s RRP represents. It may be the case that a different defence of EPC against territorial claims can be made. But I take my arguments to establish that a retreat to the unrestricted RRP remains an option for the EPC view, even if it is only attractive as a last resort. It may, of course, be possible to provide a novel basis for distinguishing between terrestrial sink capacity and more conventional natural resources that are subject to territorial claims, and articulate a newly modified version of the RRP that applies to the former but not the latter. One such basis might be the fact that terrestrial sink capacity is necessarily mediated by the atmosphere: one does not emit GHGs *directly* into vegetation, or into soil. Rather, one emits GHGs into the *atmosphere*, which are later

³⁵ Not to mention the fact that there is little in the way of consensus on the moral status of emissions trading. See, for instance, Ott and Sachs (2002), Caney (2010) and Dirix et al. (2016) for a range of views.

sequestered by terrestrial sinks. What this means is that it is possible to ‘redistribute’ terrestrial sink capacity without crossing borders or physically appropriating the resources that instantiate that sink capacity. In order to give, say, a citizen from one state access to the sink capacity of another state, one does not need to physically enter the state containing the sink, or remove physical resources from the territories in which they are located. This makes sink capacity importantly different from the kinds of natural resources to which we might be reticent about applying the unrestricted RRP, whose redistribution *may* require physical appropriation. Thus, one might argue that the tension between territorial sovereignty and the RRP is less severe in the case of sink capacity than in the case of, say, a diamond mine. Exploring a version of the RRP which is *less* restricted than the restricted RRP, but *more* restricted than the unrestricted RRP may be an interesting avenue for future study.

Funding Open Access funding enabled and organised by Projekt DEAL. Ludwig-Maximilians-Universität München.

Open Access This article is licensed under a Creative Commons Attribution 4.0 International License, which permits use, sharing, adaptation, distribution and reproduction in any medium or format, as long as you give appropriate credit to the original author(s) and the source, provide a link to the Creative Commons licence, and indicate if changes were made. The images or other third party material in this article are included in the article’s Creative Commons licence, unless indicated otherwise in a credit line to the material. If material is not included in the article’s Creative Commons licence and your intended use is not permitted by statutory regulation or exceeds the permitted use, you will need to obtain permission directly from the copyright holder. To view a copy of this licence, visit <http://creativecommons.org/licenses/by/4.0/>.

References

- Agarwal, A. 2002. A southern perspective on curbing global climate change. In *Climate change policy: A survey*, ed. Stephen H. Schneider, Armin Rosencranz, and John O. Niles, 373–391. Washington, DC: Island Press.
- Armstrong, C. 2015. Climate justice and territorial rights. In *Climate change and justice*, ed. Jeremy Moss, 59–72. Cambridge: Cambridge University Press.
- Athanasίου, T., and P. Baer. 2002. *Dead heat: Global justice and global warming*. New York: Seven Stories Press.
- Banai, A. 2016. Self-determination and resource rights: In defence of territorial jurisdiction over natural resources. *Res Publica* 22: 9–20. <https://doi.org/10.1007/s11158-015-9308-8>.
- Batjes, N.H. 2016. Harmonized soil property values for broad-scale modelling (WISE30sec) with estimates of global soil carbon stocks. *Geoderma* 269: 61–68. <https://doi.org/10.1016/j.geoderma.2016.01.034>.
- Beitz, C.R. 1979. *Political theory and international relations*. Princeton, NJ: Princeton University Press.
- Bell, D. R. 2008. Carbon justice? The case against a universal right to equal carbon emissions. In *Seeking environmental justice*, ed. Sarah Wilks, 239–257. Amsterdam: Brill-Rodopi. https://doi.org/10.1163/9789401205689_014.
- Blomfield, M. 2013. Global common resources and the just distribution of emission shares. *Journal of Political Philosophy* 21 (3): 283–304. <https://doi.org/10.1111/j.1467-9760.2012.00416.x>.
- Blomfield, M. 2019. *Global justice, natural resources, and climate change*. Oxford: Oxford University Press.
- Broome, J. 2012. *Climate matters: Ethics in a warming world*. New York: W. W. Norton & Company Inc.

- Caney, S. 2005. Global interdependence and distributive justice. *Review of International Studies* 31 (2): 389–399. <https://doi.org/10.1017/S0260210505006534>.
- Caney, S. 2010. Markets, morality and climate change: What, if anything, is wrong with emissions trading? *New Political Economy* 15 (2): 197–224. <https://doi.org/10.1080/13563460903586202>.
- Caney, S. 2011. Climate change, energy rights and equality. In *The ethics of global climate change*, ed. Denis G. Arnold, 77–103. Cambridge: Cambridge University Press.
- Caney, S. 2012. Just emissions. *Philosophy & Public Affairs* 40 (4): 255–300. <https://doi.org/10.1111/papa.12005>.
- Caney, S. 2016. Climate change and non-ideal theory: Six ways of responding to non-compliance. In *Climate justice in a non-ideal world*, ed. Clare Heyward and Dominic Roser, 21–42. Oxford: Oxford University Press.
- Caney, Simon, 'Climate Justice', *The Stanford encyclopedia of philosophy* (Summer 2020 Edition), Edward N. Zalta (ed.), <https://plato.stanford.edu/archives/sum2020/entries/justice-climate>.
- Cripps, E. 2017. Population and Environment. in: *The Oxford handbook of environmental ethics*, S. Gardiner & A. Thompson (Eds.), Oxford: Oxford University Press.
- Dirix, J., W. Peeters, and S. Sterckx. 2016. Emissions trading ethics. *Ethics, Policy & Environment* 19 (1): 60–75. <https://doi.org/10.1080/21550085.2016.1173282>.
- Eggleston, H. S., Buendia, L., Miwa, K., Ngara, T., and Tanabe, K. (2006). *2006 IPCC Guidelines for national greenhouse gas inventories*. Japan.
- FAO. 2020. Global forest resources assessment 2020: Main report. Rome. <https://doi.org/10.4060/ca9825en>.
- Farmer, G. T., and J. Cook. 2013. Carbon dioxide, other greenhouse gases, and the carbon cycle. In *Climate change science: A modern synthesis*. Dordrecht: Springer. https://doi.org/10.1007/978-94-007-5757-8_9.
- Gosseries, A. 2005. Cosmopolitan luck egalitarianism and the greenhouse effect. *Canadian Journal of Philosophy* 35 (sup1): 279–309. <https://doi.org/10.1080/00455091.2005.10716857>.
- Grubb, M. 1990. The greenhouse effect: Negotiating targets. *International Affairs* 66 (1): 67–89. <https://doi.org/10.2307/2622190>.
- IPCC. 2021. Summary for policymakers. In: *Climate change 2021: The physical science basis. Contribution of Working Group I to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change* [Masson-Delmotte, V., P. Zhai, A. Pirani, S. L. Connors, C. Péan, S. Berger, N. Caud, Y. Chen, L. Goldfarb, M. I. Gomis, M. Huang, K. Leitzell, E. Lonnoy, J. B. R. Matthews, T. K. Maycock, T. Waterfield, O. Yelekçi, R. Yu and B. Zhou (eds.)]. Cambridge University Press. In Press.
- Jamieson, D. 2001. Climate change and global environmental justice. In *Changing the atmosphere: Expert knowledge and environmental governance*, ed. Clark A. Miller and Paul N. Edwards, 287–307. Cambridge, MA: The MIT Press.
- Kolers, A. 2009. *Land, conflict and justice: A political theory of territory*. Cambridge: Cambridge University Press.
- Kolers, A. 2012. Justice, territory and natural resources. *Political Studies* 60 (2): 269–286. <https://doi.org/10.1111/j.1467-9248.2011.00933.x>.
- Lawford-Smith, H. 2013. Understanding political feasibility. *Journal of Political Philosophy* 21 (3): 243–259.
- Margalioth, Y., and Y. Rudich. 2013. Close examination of the principle of global per-capita allocation of the earth's ability to absorb greenhouse gas. *Theoretical Inquiries in Law* 14 (1): 191–206. <https://doi.org/10.1515/til-2013-011>.
- Meyer, L. and Sanklecha, P. 2017. How legitimate expectations matter in climate justice. *Politics, Philosophy and Economics*, 13(4), 369–393.
- Moss, J. 2015. Exporting harm. In *Climate change and justice*, ed. Jeremy Moss, 73–88. Cambridge: Cambridge University Press.
- Nine, C. 2008. The moral arbitrariness of state borders: Against Beitz. *Contemp Polit Theory* 7: 259–279. <https://doi.org/10.1057/cpt.2008.18>.
- Nine, C. 2012. *Global justice and territory*. Oxford: Oxford University Press.
- Ostrom, E. 1990. *Governing the commons: The evolution of institutions for collective action (Political economy of institutions and decisions)*. Cambridge: Cambridge University Press. <https://doi.org/10.1017/CBO9780511807763>.
- Ostrom, E., R. Gardner, and J. Walker. 1994. *Rules, games, and common-pool resources*. Ann Arbor, MI: The University of Michigan Press.

- Ott, H. E., and W. Sachs. 2002. The ethics of international emissions trading. In *Ethics, equity and international negotiations on climate change*, ed. Luiz Pinguelli-Rosa and Mohan Munasinghe, 159–178. Cheltenham: Edward Elgar.
- Rawls, J. 1999. *A theory of justice*. Revised. Oxford: Oxford University Press.
- Raymond, L. 2008. Allocating the global commons: Theory and practice. In *Political theory and global climate change*, ed. Steve Vanderheiden, 3–24. Cambridge: MIT Press.
- Richter, D. D., and D. Markewitz. 1995. How deep is soil? *BioScience* 45 (9): 600–609. <https://doi.org/10.2307/1312764>.
- Shue, H. 2014. Subsistence emissions and luxury emissions. In *Climate justice: Vulnerability and protection*, ed. Henry Shue, 47–67. Oxford: Oxford University Press.
- Singer, P. 2002. *One world: The ethics of globalization*. New Haven and London: Yale University Press.
- Singer, P. 2010. One atmosphere. In *Climate ethics: Essential readings*, Stephen Gardiner, Simon Caney, Dale Jamieson, Henry Shue, Rajendra Kumar Pachauri, eds. Oxford University, 181–199. Oxford: Press.
- Stilz, A. 2011. Nations, states, and territory. *Ethics* 121 (3): 572–601. <https://doi.org/10.1086/658937>.
- Swift, R. S. 2001. Sequestration of carbon by soil. *Soil Science* 166 (11): 858–871. <https://doi.org/10.1097/00010694-200111000-00010>.
- Torpman, O. 2019. The case for emissions egalitarianism. *Ethical Theory and Moral Practice* 22 (3): 749–762. <https://doi.org/10.1007/s10677-019-10016-8>.
- Torpman, O. 2021. Isolationism and the equal per capita view. *Environmental Politics* 30 (3): 357–375. <https://doi.org/10.1080/09644016.2020.1785809>.
- Vanderheiden, S. 2008. *Atmospheric justice: A political theory of climate change*. New York: Oxford University Press.
- Vanderheiden, S. 2017. Territorial rights and carbon sinks. *Science and Engineering Ethics* 23 (5): 1273–1287. <https://doi.org/10.1007/s11948-016-9840-8>.
- World Resources Institute. 2021. *Climate watch historical GHG emissions*. Washington, DC: World Resources Institute. <https://www.climatewatchdata.org/ghg-emissions>
- Wu, Y., Q. Zhu, and B. Zhu. 2018. Decoupling analysis of world economic growth and CO2 emissions: A study comparing developed and developing countries. *Journal of Cleaner Production* 190: 94–103. <https://doi.org/10.1016/j.jclepro.2018.04.139>.

Publisher's Note Springer Nature remains neutral with regard to jurisdictional claims in published maps and institutional affiliations.

Authors and Affiliations

Alex Mathie¹ 

✉ Alex Mathie
alex.mathie@lmu.de

¹ Munich Center for Mathematical Philosophy, Ludwigstraße 31, 80539 Munich, Germany