

Double dividend? Transnational initiatives and governance innovation for climate change and biodiversity

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Abstract

Growing recognition of the need to tackle climate change and biodiversity loss together is leading to shifts in the global environmental governance landscape such that these two traditionally separate domains are increasingly interlinked. This process is taking place not at the level of the international policy regimes but rather through the work of transnational governance initiatives (TGIs) that connect state and non-state actors and which form an increasingly formalized part of the hybrid regime complexes through which global environmental governance is conducted. Central to these dynamics are ‘nature-based solutions’, interventions designed to work with nature to achieve multiple sustainability goals. In this paper, we demonstrate the ways in which TGIs frame and implement nature-based solutions. We show how this is leading to an evolution in market and asset-based responses to addressing these twin challenges and consider the wider consequences for how we understand what effective responses to the interlinked problems of climate and biodiversity entail.

Keywords: climate change, global environmental policy, transnational governance, nature-based solutions, net zero, policy innovation

JEL classification: F5 (F53, F55), F64, O13, O16, O19, Q54

I. Introduction

In their first ever joint report, the Intergovernmental Panel on Climate Change (IPCC) and the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES) concluded that neither climate change nor biodiversity, ‘will be successfully resolved unless both are tackled together’ (Pörtner *et al.*, 2021). The Sixth Assessment Report of the IPCC adds significant weight to this message. Working Group II sets out the evidence of the critical role of climate change in exacerbating rapid biodiversity loss and the ways in which ecosystems currently contribute to reducing the impacts of climate change, both by reducing the extent of climate change by providing sinks for greenhouse gas (GHG) emissions and by enhancing capacities for resilience and adaptation (Pörtner *et al.*, 2022). The report also identifies the potential of conservation, restoration, agricultural, forestry, and other land-use practices (AFOLU), ecosystem-based adaptation, and nature-based solutions (NBS) to support climate resilience and crucially as a critical means through which the challenges of adaptation and mitigation can be jointly addressed (Pörtner *et al.*, 2022). Likewise, Working Group III points to the critical need to reduce emissions in the AFOLU sector through the use of NBS and to their role in terrestrial, marine, and urban environments as a form of carbon capture and storage as well as their potential to mitigate climate change through, for example, providing cooling services or forms of adaptation that are less GHG emissions-intensive than their ‘grey’ counterparts (Pathak *et al.*, 2022). Not only are the problems of climate change and the loss of biodiversity now recognized as inherently interlinked, but there is growing realization of the need to address both challenges simultaneously—of the importance of developing governance innovations that can create a double dividend for climate and nature.

In response, national governments are increasingly focusing on governing nature as a means through which both climate change and biodiversity can be addressed—the governments of both France and the UK being among those who have dedicated significant proportions of their climate finance to NBS (Carbon Brief, 2021). Yet, critically, the mobilization of NBS as a response to these dual crises is taking place largely through transnational governance initiatives (TGI) which span state/non-state actors and multiple jurisdictions. These organizations are therefore central to the ways in which governance innovation to tackle climate and biodiversity is unfolding, in turn shaping how the goals set in both policy domains will/will not be met and with which wider political, economic, and social consequences. While NBS have a much longer history in the guise of the REDD+ mechanism of the United Nations Framework Convention on Climate Change (UNFCCC), ecosystem-based adaptation spear-headed by the World Bank in the late 2000s, reforestation and urban green space schemes throughout the twentieth century, to name but a few (e.g. Corbera and Schroeder, 2011), it has been through the linking of the climate and biodiversity policy agendas that the concept itself has gained significant and recent momentum. In an increasingly common definition, advanced by the International Union for Conservation of Nature (IUCN), NBS are identified as ‘actions to protect, sustainably manage and restore natural and modified ecosystems in ways that address societal challenges effectively and adaptively, to provide both human well-being and biodiversity benefits’ (IUCN, 2022). Example of NBS include the conservation of existing tranches of nature in order to, for example, protect watersheds or store carbon, the restoration of nature through schemes such as wetting peat bogs or daylighting urban rivers, and the creation of new natural areas such as sea grass beds, green roofs, wildlife corridors, and so forth.

Initially coined in 2008 by the World Bank in relation to interventions that sought to work with nature to address climate adaptation, it has only been over the past 5 years that NBS have been extended to also include climate mitigation and a host of other sustainability challenges. Their increasing popularity is partly because the term acts as an umbrella for diverse forms of intervention, operating at multiple scales and across diverse ecosystems, which has served to construct a singular object that is both more legible and more meaningful to a wider range of actors than was previously the case. Tozer *et al.* (2022) suggest that this shift in the framing of NBS is related to the greater emphasis given within the IPBES, and subsequently the process of negotiating the Global Biodiversity Framework, to ‘nature’s contribution to people’, the reignition of interest in carbon offsetting and removal with the rise of ‘net zero’ targets for climate mitigation in the wake of the Paris Agreement, a growing response across the private sector to the loss of biodiversity and efforts by the European Union specifically to bring NBS into a wider sustainability frame (e.g. European Commission, 2015). Of these drivers, it has been through the specific potential of NBS as means to mitigate climate change that NBS have gained most traction, driven by a significant increase in the voluntary carbon offset market since the Paris Agreement was reached (Blaufelder *et al.*, 2021) and the specific growth of ‘natural climate solutions’ to represent ‘about 40 percent of all the voluntary carbon credits that were retired [in 2020]—considerably more than the 5 percent of carbon credits... that NCS yielded in 2010’.

Yet, as the history of previous schemes suggests, governing with nature to address societal challenges is far from straightforward. NBS are controversial. For some, this concern lies in the dominance of climate change as the driving force behind the growth of NBS and a concern that ‘natural climate solutions’ will be used to achieve net-zero emissions targets without taking into account effects on biodiversity or society and potentially used to sustain the generation of GHG emissions (Brandi, 2017; Reside *et al.*, 2017; Seddon *et al.*, 2020). Allied to this is the issue of the veracity of the claims made by carbon offset providers and the extent to which such efforts are really contributing to reducing GHG emissions in the atmosphere (Greenfield, 2023). For others, NBS seem to draw attention to the ‘useful’ parts of nature without ensuring that its intrinsic value remains central and the term serves as a distraction from the need to allocate space for true conservation efforts if biodiversity loss is to be halted (Osaka *et al.*, 2021). Cutting across both of these narratives are issues of the north–south politics involved in designating nature as either a solution or as ‘off limits’, with particular concern directed to how Indigenous People and Local Communities (IPLC) and their lands are designated in relation to interventions that are often directed by actors in the global North and the ways in which global South nature is repurposed to ‘solve’ the problems created by the global North (Woronecki *et al.*, 2020; Pettorelli *et al.*, 2021). The result is, as the UK House of Lords Science and Technology Select Committee (2021) recently argued, that ‘bold promises on restoring or conserving nature are not fulfilled. Pledges and financing risk being misdirected towards scientifically uncertain, poorly planned initiatives which have few lasting impacts other than to greenwash the activities of polluters.’

The increasing interconnection between climate/biodiversity and the growth of NBS that this is giving rise to is taking place within a changing landscape of global governance that has, over the past two decades, shifted from discrete international regimes connected to particular issue areas to the sprawling ‘hybrid’ complexes of state and non-state actors through which the governing of global affairs now takes place. In this paper, we examine the forms of governance innovation emerging as TGI seek to govern climate change *with* biodiversity, exploring the emerging

governance architecture, discourses, and practices this is generating. In section II, we examine the growing role of TGI in global environmental governance and its implications. We then turn, in section III, to chart the emergence of TGI at the climate/biodiversity frontier and identify the dominant frames that are shaping the development of NBS as a governance innovation. In section IV, we consider how the financialization of nature through NBS is leading to a particular focus on new techniques for monitoring, reporting, and verification (MRV) and the ways in which what counts as ‘effective’ NBS governance is being determined as a result. We argue that despite the evidence that climate and biodiversity are now increasingly interwoven areas of global environmental governance and that TGI are playing a significant role in innovating with NBS at this frontier, our understanding of what constitutes effective governance remains limited, with significant implications for how we analyse progress in both of these policy arenas.

II. The confluence of climate and biodiversity governance: an emerging frontier for governance innovation

Since Nye and Keohane (1971) first identified the significance of transnational governance, its dynamics and consequences have come to be a central concern within the discipline of international relations and beyond. While the literature distinguishes between different forms of transnational governance, here we use the term TGI to refer to all partnerships and networks which cross national boundaries and include a mixture of state and non-state actors (Bulkeley *et al.*, 2014). TGI are not only seen as influencing the nature and shape of international regimes, but rather as a direct form of governance on account of their capacities to bring together ‘a sufficient marriage of power and legitimacy to establish, operationalize, apply, enforce, interpret, or vitiolate... behavioural rules’ (Conca, 2005, p. 190; see also Andonova *et al.*, 2009). Governing here is understood as a matter of authority rather than a matter of control. TGI are now considered to be central to global governance, part of the ‘hybrid institutional complexes’ and ‘polycentric governance’ found across all areas of global politics (Furumo and Lambin, 2020; Abbott and Faude, 2021). TGI are particularly prevalent in relation to global environmental governance where they have historically been associated with the domains of private sustainability standards (e.g. Forest Stewardship Council) and climate governance (e.g. C40 Climate Leadership Group), with a more recent wave of TGI developing in the biodiversity domain (e.g. Nature4Climate). Importantly, this work shows that the growth of TGI does not replace the role of states and global institutions; rather public and private authority in the arena of global governance is being reworked through transnational governance (Bulkeley *et al.*, 2014; Jordan *et al.*, 2018). State actors across all levels of government are central to many forms of TGI, while global regimes and key international actors (from development banks to private foundations) play a significant role in establishing the conditions within which transnational governance takes place (Andonova *et al.*, 2019; Hale, 2020). At the same time, it is often the absence of international commitments and national action that generates the development of TGI.

Looking at the climate domain, we can see this pattern of both state-based enabling and engagement alongside attempts to fill governance vacuums as critical to the evolution of transnational governance. A first wave of TGI can be traced back to the adoption of the Kyoto Protocol—creating new demands and opportunities for governing climate change through carbon markets and the Clean Development Mechanism (CDM)—and the subsequent failure of the US to sign—which generated a set of TGI designed to give US-based subnational and private-sector actors a means through which to demonstrate their continued engagement with the issue. Similarly, in the run-up to the Copenhagen Conference of the Parties (COP) in 2009, widely anticipated to be a ‘crunch point’ in advancing climate action, a number of TGI were formed by state and non-state actors in order to generate momentum for international cooperation. Yet when the COP failed to reach the much-heralded outcomes, a further tranche of TGI were set up to fill the governance gap this created. A similar pattern can be observed in relation to COP21, held in Paris in 2015, where a third wave of TGI can be observed in the run-up to the event as non-state and state actors sought to generate sufficient levels of commitment and action to build international consensus. Unlike previous waves of increased TGI formation, international institutions and nation-states played a significant role in orchestrating the development of transnational governance during this phase (Andonova *et al.*, 2017; Hale, 2020; Allan *et al.*, 2023). At the Paris Conference itself, for the first time, parties ‘officially called on transnational actors to adopt the global goals negotiated in the Paris Agreement and created a voluntary process inside the UNFCCC to orchestrate and track their efforts to advance them’ (Hale, 2020). In this way, the 2015 Paris Climate Agreement marked a turning point in recognizing TGI as central to the business of global environmental governance and officially integrating TGI into the working of the UNFCCC as a means through which global climate goals can and should be realized (Hale, 2016; Bäckstrand *et al.*, 2017; Chan *et al.*, 2019).

In the domain of biodiversity governance, the TGI picture is somewhat different. While there have historically been a number of private certification standards designed to advance the sustainable use of natural resources (e.g.

timber, fish) or promote environmental standards in the production of key commodities including through the role of such sectors in supporting biodiversity (e.g. coffee, chocolate) (Grabs *et al.*, 2021; van der Ven *et al.*, 2021), the wider development of TGI has been a more recent phenomenon, often following major UN conferences. An analysis of 331 TGI in the biodiversity domain finds that they mainly operate in the arenas of agriculture, oceans, and forests, with most focus on sustainable use (73 per cent), followed by conservation (66 per cent), perhaps also reflecting these early roots in the certification of commodities (Negacz *et al.*, 2020). Here too there have been recent efforts to more closely align international institutions with the evolving landscape of transnational governance. The 'Action Agenda for Nature and People', launched at the Convention on Biological Diversity (CBD) COP14 in Egypt in 2018, was seen as a means to provide opportunities to include a broader coalition of non-state and sub-national actors in biodiversity governance (Kok *et al.*, 2019; Pattberg *et al.*, 2019). While momentum has been slow to build, not least due to the delays in the process of negotiating the Biodiversity Governance Framework encountered as a result of Covid-19, attempts were made at COP15 held in Montreal in December 2022 to formalize the Action Agenda through the creation of specific platforms recognized by the Secretariat of the CBD through which non-state actors can pledge their commitment and report actions towards global goals.

Across both the climate and biodiversity domains by the late 2010s TGI had become established as a critical part of global governance and increasingly recognized and integrated within formal intergovernmental processes. This has led to a fundamental shift in the landscape of global governance, generating 'hybrid regime complexes' composed of multilevel, polycentric governance arrangements and a mesh-like set of interactions between them which has shifted the terrain of what 'counts' as governance. Under the initial international regime developed in the 1990s, climate change was a relatively discrete, end-of-pipe issue which was to be addressed as collective action problem through pooling resources to reduce the concentration of GHG emissions in the atmosphere. As the deeply systemic nature of the climate problem has increasingly been acknowledged, the terrain of governing the issue has shifted from the atmospheric commons to a whole host of sites and processes through which decarbonization and resilience need to be enacted. The emergence of TGI has both been driven by and served to cement this agenda. As Bulkeley *et al.* (2014) noted in their early analysis of climate TGI, specific clusters concentrated around key issue areas—carbon markets, energy, infrastructure—could be identified with different characteristics, mechanisms, and capacities. As climate change has become increasingly connected to a diverse set of issues—from travel to food, steel to concrete—more actors, sites, and domains come to be enrolled in the governing of climate change (Bulkeley, 2016; 2021). At the same time, it is notable that not all TGI who see themselves as acting on climate change frame this directly in terms of mitigation and adaptation as expressed in Sustainable Development Goal (SDG) 13 (Coenen *et al.*, 2022) and may instead link to climate-related issues such as renewable energy or carbon markets. As Aykut and Maertens (2021, p. 502) argue, 'global climate governance has become the focal point for a wide array of debates and conflicts around issues from development and global equity to energy policy, urban planning, security and migration.' While this argument is advanced to suggest that climate governance actors and mechanisms are extending 'their sphere of influence by "climatizing" other domains of global politics' (Aykut and Maertens, 2021, p. 502), the loose coupling found between climate TGIs and the climate SDG suggests that this may also be a matter of actors, and accompanying discourses and techniques, from other domains seeking to enter and integrate into the climate arena to extend their influence and reach. This is not a process that arises from the requirements of climate treaties or formalized links between international organizations, but is often the result of the work of TGIs either entering into the climate arena to lobby for recognition and resources or 'driven to include climate concerns in their traditional mandate by political and normative convictions, or on pragmatic or strategic grounds' (Aykut and Maertens, 2021, p. 502).

The recent development of biodiversity TGI emerges in this landscape, not only generating TGI focused on biodiversity specifically, but contributing to new forms of transnational governance at the climate/biodiversity frontier through which actors seek to address both challenges simultaneously. We identify three related trends in the forms of governance innovation now shaping this landscape (Table 1). First, TGI which have a history of governing climate change are adding nature to their portfolio, primarily as a means of implementing 'net zero' but also in recognition of the significance of the biodiversity challenge—here biodiversity becomes the next 'level' for actors wishing to show their environmental credentials. Second, non-state actors, and particularly NGOs in the conservation sector, have sought to establish TGI with the express purpose of developing innovative forms of NBS that ensure that biodiversity goals are met through climate action. Third, new forms of TGI are being set up which predominantly seek to advance action in relation to the loss of biodiversity, but do so mobilizing NBS as a means of attracting support and resources from the climate domain. In this sense it is possible to make the case that not only are we witnessing the 'climatization' of biodiversity, but also the 'biodiversification' of the climate domain as acting on nature becomes not only a means to a climate change end, but also a marker of the ambition and integrity of climate governance, and biodiversity-led TGI cast climate outcomes as 'co-benefits' of responding to the loss

Table 1: Examples of the growth of TGI at the climate/biodiversity frontier

Emerging trends at the climate/biodiversity frontier	Examples
TGI traditionally focused on climate change adding ‘nature’ either (a) as a means for achieving net zero climate goals; or (b) as a ‘next step’ towards sustainability ambitions	Carbon Disclosure Project Science Based Targets Network We Mean Business Natural Climate Solutions Alliance
Non-state actors in the conservation sector have begun to establish TGI that aim to address climate change, especially through use of nature-based solutions.	IUCN Urban Alliance Act4Nature Tropical Forest Alliance Nature4Climate
Novel biodiversity-focused TGI are being established by new actor coalitions combining previously discrete climate and biodiversity interests.	Business4Nature Ocean Risk & Resilience Alliance One Planet Business for Biodiversity Science Based Targets Network

of nature globally. Governance innovation in the *architecture* of governing the climate/biodiversity frontier is both generating and being generated through novel discourses and practices that identify NBS as a means through which both issues can be addressed, playing a potentially critical role in how both the climate and biodiversity problems are framed and the ways in which political and financial resources are being directed towards their resolution.

III. The transnational governance of nature-based solutions: governing climate with nature?

Any rubbish can be branded as nature-based nowadays. The term can be used to apply to tree plantations, industrial agriculture, land grabs, carbon offsets, biodiversity offsets. The term is so vague I could probably cut down a tree, whittle it down to a stick, wave it at the moon and call it a nature-based solution.

Teresa Anderson, ActionAid International, quoted in *Carbon Brief*, December 2021.

This shifting landscape of global environmental governance and its architecture is both enabling and being driven by the growing interest in NBS. As set out above, the notion of governing environmental challenges through and with nature is not new, but this approach has been given momentum through their reframing and positioning as nature-based *solutions*. Accompanying this growing interest in NBS has been significant work across the conservation community, particularly through the IUCN, to define and standardize NBS as specifically involving the protection and restoration of biodiversity. Yet despite the significant momentum and traction the discourse of NBS appears to now hold, the nature of the problem(s) that these solutions are intended to solve, the terms of what counts as climate and/or biodiversity governance, the objects to be enrolled, the actors who are required, and the consequences which are/are not seen to be legitimate are far from settled—as the quotation from ActionAid International in the *Carbon Brief* following the 2021 Glasgow COP26 makes all too clear. As such, struggles over how, and by whom, NBS governance innovations are framed is a crucial site of their politics. Framing is a critical process not only delimiting the problem to be addressed and its legitimate solutions, but also in reinforcing the ‘power relations that structure people’s interactions’ with NBS and their consequences (Woroniecki *et al.*, 2020).

Take first the matter of defining what NBS actually *are*. Here it has been the IUCN definition of NBS as ‘actions to protect, sustainably manage, and restore natural or modified ecosystems, that address societal challenges effectively and adaptively, simultaneously providing human well-being and biodiversity benefits’ which has become most widespread in its adoption across TGIs. The European Commission has also recently revised its definition of NBS to add that they must ‘benefit biodiversity and support the delivery of a range of ecosystem services’. The centrality of biodiversity to these definitions reflects the concerns of scientists, NGOs, and policy-makers that NBS could become a new form of (corporate) greenwash on the one hand, and a means through which to reinforce exploitative forms of carbon offsetting globally where countries in the global North use NBS in the global South as a means of continuing business as usual, on the other (Woroniecki *et al.*, 2020; Pettorelli *et al.*, 2021). The level of these concerns has meant that successive meetings of the UNFCCC and CBD failed to agree on a common definition or on the inclusion of the term NBS within official documents. It was only at the 5th UN Environment Assembly (UNEA-5), held in February 2022, that the UN adopted a definition of NBS as one of ‘14 resolutions to strengthen actions

for nature to achieve the Sustainable Development Goals'. Interestingly, despite clearly framing NBS in relation to efforts to conserve and restore nature, the definition included in the UNEA-5 resolution focuses on the role of NBS in supporting sustainable development, framing NBS as

actions to protect, conserve, restore, sustainably use and manage natural or modified terrestrial, freshwater, coastal and marine ecosystems, which address social, economic and environmental challenges effectively and adaptively, while simultaneously providing human well-being, ecosystem services and resilience and biodiversity benefits

and add that such innovations must also ensure the rights of indigenous people and local communities (UNEP, 2022). Here the dynamics of framing are not so much focused on the role of nature in such solutions, but rather relate to who it is who should benefit from any such intervention. Concerns that NBS represent a new form of green colonial rule have been expressed by NGOs representing indigenous peoples, such as Survival International, as well as by indigenous groups, such as those involved in the Global Forest Coalition, who launched a campaign in 2020 to highlight that 'our nature is not your solution' (Global Forest Coalition, 2020). Subsequently, NBS were recognized by the UNFCCC with the final cover text encouraging parties 'to consider, as appropriate, nature-based solutions or ecosystem-based approaches' in their mitigation and adaptation action, albeit that this was confined to the section related to forests (UNFCCC, 2022). Likewise, NBS were included in the text of the final Kunming–Montreal Global Biodiversity Framework agreed at CBD COP15 in December 2022 but confined to two targets—Target 8 on climate action and Target 11 on ensuring and enabling nature's contribution to people—alongside the language of ecosystem-based approaches which retains significant support across the parties to the CBD (UN CBD, 2022).

As with previous waves of TGI activity, it seems that the mobilization of NBS by TGI at the climate/nature frontier is arising both in response to state-based drivers for action and governance vacuums that are emerging as the connections between these agendas come into focus, but the institutional means through which to respond to them remain largely absent. In this context, TGI have come to fill the void in framing and implementing NBS. In their analysis of the ways in which NBS are being framed among TGI that focus on urban issues, Tozer *et al.* (2022) find four overlapping frames: nature for resilience; nature for mitigation; integrated benefits of nature; and nature first. Further,

diverse actors draw on these frames in various combinations, adopting new governance arrangements and focusing on novel governance objects such that what it means to govern climate in the city is being reconfigured, while cities increasingly occupy a prominent position on the agendas of those seeking to govern nature. (Tozer *et al.*, 2022)

There is somewhat less evidence that TGI focused on biodiversity are also now engaging with climate through NBS, though the data available pre-dates the recent momentum that NBS has attracted. Analysis of a dataset of 331 biodiversity TGI (Negacz *et al.*, 2020) found 39 with an explicit focus on SDG 13 (climate change) and in-depth analysis of 20 of these TGI suggests that NBS are explicitly framed either as a means through which to achieve climate outcomes or to combat the loss of biodiversity, sometimes attributed to climate change, which is seen as an existential threat to continued economic or social life (Fransen, 2021).

While this analysis shows some differences in how NBS are being framed in response to climate change and biodiversity loss, they find in common a primarily instrumental view of nature and the ecosystem services it provides. For example, the CCAFS (2019) argues that:

nature-based solutions harness nature's capacity to reduce emissions and enhance resilience, offering a crucial response to climate change at the scale and pace that is needed to keep global temperatures within a 1.5 degrees rise. In addition, nature-based solutions also support efforts to achieve sustainable development in areas such as food security, poverty reduction and rural livelihoods.

While Plan Bleu also stress that 'Nbs could involve preserving these ecosystems so that they can continue to deliver services' and 'where valuable ecosystems have suffered degradation that prevents them from providing services, it may well be worth restoring them to recover their original functionalities for climate change or other purposes' (Plan Bleu, 2020, p. 3). These 'other purposes' are spelled out by the Gold Standard, which suggests that forestry, as a 'nature-based climate solution not only absorbs CO₂ from the atmosphere, it creates local jobs in forest management and conserves vital ecosystems—protecting local biodiversity at a time when a million species are in threat of extinction' (Gold Standard, 2021). Such approaches are instrumental in so far as they view NBS as valuable because they are capable of realizing specific social and economic development needs alongside their functions which can protect and enhance the resilience of natural and social systems. At the same time, both analyses show that alternative frames are also present. Tozer *et al.* (2022) find that even in an urban context NBS are framed as having

intrinsic value, while [Fransen \(2021\)](#) identifies a focus on ‘putting nature first’, though this frequently reflected a concern that the existential threat that climate change poses to biodiversity would have a knock-on impact on society. For example, [Cool Earth \(2019\)](#) states that ‘Nature is not “nice to have”—it’s our life support system’. Within this overarching frame of the risk that climate change poses to biodiversity, the focus remains predominantly instrumental with [Fransen \(2021\)](#) finding that TGI such as UNEP-FI stress the ‘material risks and opportunities for banks, asset owners and asset managers, as they invest in and lend to companies facing increasing physical, market, regulatory and reputational threats associated with biodiversity loss’ on the one hand, and the opportunities businesses can realize by abating these risks on the other, as ‘replenishing and rebuilding biodiversity is an urgent global priority and those financial institutions which show market leadership by being early movers may have a considerable competitive advantage’ (Eric Usher, Head of the UNEP-FI, 2021, quoted in [Fransen \(2021\)](#)). Perhaps due to the lack of such corporate actors in the urban TGI analysed by [Tozer *et al.*](#), this focus on the economic losses and opportunities that NBS could generate was not identified, with the focus instead being on how NBS could support resilience and disaster risk reduction/recovery as part of the value of NBS for climate adaptation.

In these ways, the use of NBS by TGI is serving to rework the landscape of global governance, both creating new understanding of what the climate and biodiversity problems are and how they should be solved as well as generating new actor coalitions which are reordering the dynamics of TGI at the climate/biodiversity frontier. Initial analysis of the definition and framing of NBS reveals that this is a dynamic landscape, with high levels of contestation especially over the standing that biodiversity and IPLC should have and in terms of for what and for whom NBS are fundamentally a solution. Nonetheless, there appears to be evidence that NBS are serving as a means through which the utility of nature for addressing (diverse facets of) the climate problem is gaining momentum—in line with the wider climatization of global politics discussed above—and that this is primarily being undertaken within TGI through a framing that views NBS as having direct instrumental benefits for climate (carbon storage, resilience) with the added value of being able to simultaneously respond to other key global challenges, most often related to the SDGs. While biodiversity as an outcome in and of its own is increasingly fortified within definitions of NBS that are widely adopted, there is less evidence to date that this is being universally translated through the framing of NBS across diverse kinds of TGI.

IV. Nature-based solutions: governing the carbon economy?

The reworking of governance at the climate/biodiversity frontier is not only taking place through the framing of NBS but also through sets of practices established to design these as interventions capable of addressing the climate and biodiversity problem. Crucially, this has involved TGI actors drawing on an existing repertoire of practices that have been developed over the past two decades to both *account for* and *invest in* nature as a means of responding to climate change and biodiversity, which are in turn being further developed to enable the benefits of NBS to be more fully captured. These techniques have been identified as leading to the *financialization* and *technologization* of nature, through both market-based mechanisms and more recently the creation of new classes of assets that can be constituted as ‘green’ because of their natural, low-carbon, or resilience qualities ([Carse, 2012](#); [Nelson and Bigger, 2022](#)).

Particularly significant have been the mechanisms and techniques that have been deployed to measure and account for carbon. It is no exaggeration to claim that for over a decade ‘contemporary climate governance hinges on the ability to account for stocks and flows of carbon’ ([Lövbrand and Stripple, 2011](#), pp. 187–8; see also [Langley *et al.*, 2021](#)). As [Langley *et al.* \(2021\)](#) argue, ‘monitoring, standardizing and verifying carbon’ has become a pervasive feature of climate governance driven by the reporting requirements of national and international policy and scientific endeavours to understand carbon flows in order to more accurately predict future climate change, but also as a result of the demands created by the need to generate and account for climate finance. With the development of carbon markets, the CDM and REDD+ schemes during the 2000s, significant work was required not only to establish market-based institutions but also to determine the commodity value of carbon ([Lovell, 2013, 2014](#)). As ‘a new and unusual commodity... credible systems of measurement and calculation’ became particularly important to the creation of carbon markets, especially in relation to the forest carbon market where carbon commodification ‘almost entirely centred on debates about the measurement, reporting and verification of the carbon stored in forests’ ([Lovell, 2013](#), p. 127). The parallel development of the notion of ecosystem services and means through which payments for such services—particularly in terms of water quality and quantity—could be realized also generated significant efforts to monitor and account for natural capital in monetary terms. To a significant degree, especially in the realm of TGI, ways in which interventions to address both climate and biodiversity came to be known were through techniques that enabled the translation of the qualities of ecosystem services into monetary terms ([Birch, 2017](#); [Kay, 2018](#); [Ouma *et al.*, 2018](#)). Both because of the institutional development of market-based mechanisms for carbon (and water services) and as a result of the relative ease of measuring carbon in comparison

to other ecosystem services (such as biodiversity, air quality, health, and well-being), the predominant means of knowing and intervening in nature for climate change came to be figured around its mitigation potential.

If a first wave of such techniques focused on the creation of ecosystem services as commodities bound up with market-based transactions, the past decade has witnessed a shift towards the generation of ‘green’ assets (Ouma *et al.*, 2018; Bridge *et al.*, 2020). Sullivan (2018, p. 56), for example, shows how thinking of nature in terms of ‘natural-capital’ has led to it being seen as ‘a bank of financial assets... [or] “countable capital”’ for both conservation and carbon returns while Ouma *et al.* (2018, p. 501) suggest that nature’s financialization is ‘linked to the more general assetization of almost everything’. Rather than being a matter of calculating the exchange or service value of carbon (or other ecosystem services), ‘becoming asset’ is primarily a matter of the potential to generate future returns on capital (Muniesa *et al.*, 2017, pp. 128–31) requiring the deployment of different practices and techniques than those associated with the making of markets. Following Muniesa *et al.* (2017), Bridge and colleagues (2020) argue that it is the process of ‘capitalization’, ‘used to refer to the processes of prospective valuation—both by and for investors—that are integral to assetization’, for it is this process which shapes ‘how a specific carbon sequestration initiative or low-carbon investment is deemed valuable and able to realize returns because it is capable of bearing debt’. Sullivan (2018, p. 61) finds that the means by which ‘standing forests and other ecosystems of the global south... [are transformed into] a store of projected natural-capital-based income streams that can be leveraged’ are far from stabilized or routine, such that the attributes or qualities that make a low-carbon asset have yet to be fully established (Langley *et al.*, 2021). At the same time, the shift from market-based to asset-based approaches has allowed for its extension beyond singular services—such as carbon storage or water provision—to a more multiple approach in which nature-as-asset comes to be seen as a form of infrastructure for both climate mitigation and resilience. This in turn relies on a host of ‘policy approaches, scientific practices, discourses, and investment strategies that make ecosystems legible, governable, and investable as systems of critical functions that sustain and secure (certain forms of) human life’ (Nelson and Bigger, 2022, p. 87).

The discourse and practice of NBS have emerged at this juncture, drawing from a repertoire of financial and technical practices designed to be able to monitor, report, and verify carbon both as a commodity and increasingly as an asset from which multiple services can leverage capital to generate (future) returns on investment. For example, the TGI Nature4Climate argues that nature is emerging as a set of assets from which multiple services arise and which ‘will have multiple payoffs not only for climate, but also for the plants, animals and people that call Earth home’ (Nature4Climate, 2021e). Here, nature is framed as a set of assets which can leverage capital to generate (future) returns of investment, and therefore investing and funding nature is argued to be the ‘opportunity of the century’ (Nature4Climate, 2021c). For Cool Earth, a TGI which aims to ‘work alongside rainforest communities to halt deforestation and its impact on climate change’ (Cool Earth, 2021a), nature is seen as an asset from which multiple services arise—‘alongside carbon storage, forests also provide many ecosystem services ranging from local livelihoods to food, water, health and the maintenance of biological diversity’ (Cool Earth, 2021b). Here, indigenous people and local communities (IPLC) are seen as ‘effective biodiversity and conservation managers’ and the ‘primary custodians of most of the world’s remaining tropical forests and biodiversity hotspots’ (Cool Earth, 2021b), effectively framing IPLC as important stewards and ‘asset managers’ in a new climate/biodiversity economy.

The rapid growth of interest in NBS demonstrates not only the strong appetite for assets that can be designated as low-carbon (and/or resilient), but also the ways in which NBS are able to be made into assets through techniques of financialization and technologization. Central to this has been the emergence of new technological practices that are both better able to account for carbon and to simultaneously identify and enumerate other forms of ecosystem service that are rendered valuable through the conjoining of the climate and biodiversity problems—those which relate to climate resilience, the multiple services that nature can provide to society (e.g. health, well-being), means through which future economic risks can be reduced, and those which allow the value of nature in and of itself to be recognized. As Bakker and Ritts (2018) document, ‘Smart Earth’ applications, encompassing

innovations in environmental monitoring technologies that combine Information and Communication Technologies (ICT) with conventional monitoring technologies (e.g. remote sensing), and Environmental Sensor Networks... have proliferated due to the rapid decrease in cost of cloud-based computing and innovations in Machine to Machine (M2M) infrastructure... enabling unprecedented environmental management applications.

Such techniques are increasingly prevalent across the landscape of transnational nature-based solutions governance, enabling the ‘time-space compression of data availability and decision-making’ and bringing new actors and forms of accountability into the transnational governance of NBS (Bakker and Ritts, 2018, p. 202).

Techniques of monitoring, verification, and reporting of NBS do more than shape the parameters by which individual projects are judged, but also serve to configure the framing and design of NBS and along with it the

legitimacy and authority of TGI within global environmental governance. Such techniques are clearly at work in Nature4Climate, as Kat Bruce (Founder and Technical Director NatureMetrics) sets out:

biodiversity is incredibly complex so data and measurement is critical to unlocking its value. If we want to integrate nature into financial models and systems then we have to be able to measure and monitor what we have, what we're losing and what we're gaining. (Nature4Climate, 2021a)

One example of how this approach is put to work within Nature4Climate is the 'Natural Climate Solutions World Atlas' tool (Figure 1) which 'shows how every nation can harness the power of nature to reduce its carbon emissions' (Nature4Climate, 2021d) and seeks to demonstrate 'opportunities for countries around the world to view how natural climate solutions (NCS) alongside emission reduction strategies, can help them reduce their net greenhouse gas emissions' as well as 'the maximum mitigation potential for each pathway as well as the cost-effective potential (at \$100 USD/ton CO₂e)' (Nature4Climate, 2021f). Another example is the 'Nature Tech' program by Nature4Climate, which states that 'nature and technology can work together to help solve the climate and biodiversity crisis, and achieve natural carbon capture goals' (Nature4Climate, 2021b).

The shifting frontiers of global environmental governance and the emergence of NBS at this juncture is then leading not only to new frames of the climate/biodiversity problem and its solution which are now widespread across TGI and increasingly permeating the wider governance landscape, but also to the emergence of new practices and techniques of financialization and technologization. Nature-as-asset is secured through these 'high-tech' techniques which enable the knowing of nature at a distance on the one hand, providing assurance for these monitoring, reporting, and verification (MRV) techniques (Fransen and Bulkeley, 2022). On the other hand, these techniques enable the financialization of nature as these techniques 'help de-risk projects and play an important role in both creating a marketplace and attracting finance' (Nature4Climate, 2022). While recognizing the importance of such remote forms of MRV, Cool Earth also points to the importance of proximate, intimate forms of knowing held by IPLC as critical

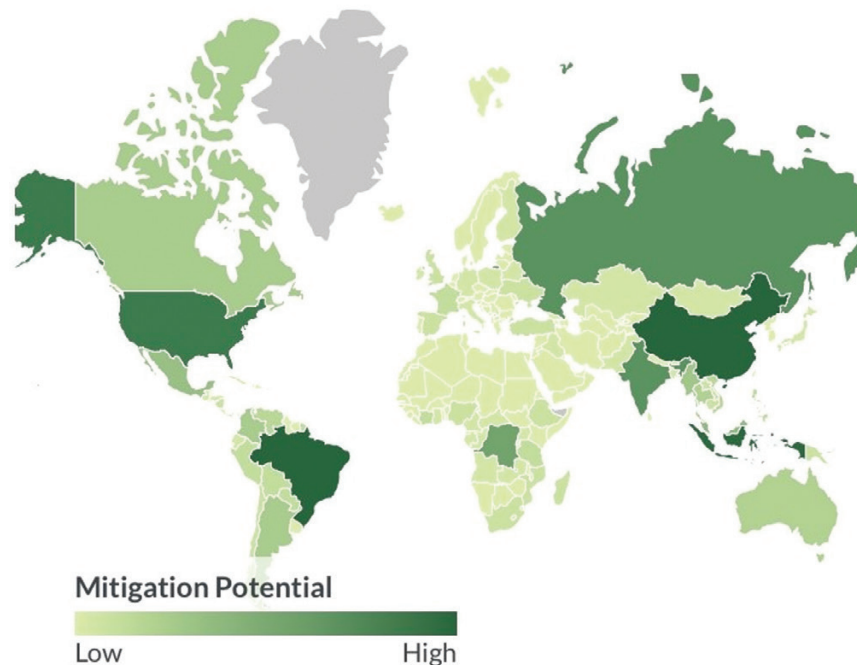


Figure 1: Natural Climate Solutions World Atlas.

Note: Reproduced with permission from NCS World Atlas (2018), Nature4Climate, accessed in June 2021 from <https://nature4climate.org/nature-in-action/ncs-world-atlas/>. Source: Nature4Climate, 2021d.

to the stewardship of such assets, arguing for example that investment in nature for climate and biodiversity will have ‘double the impact when put in the hands of rainforest communities’ (Cool Earth, 2021c). Which techniques are mobilized for MRV is then more than just a matter of which are most efficient—being able to manage the increasing demand for robust data on the impact of NBS—but is also serving to shape which and whose benefits get counted. They serve to identify what *effective* NBS entail, but are doing so in ways that are increasingly being shaped by what can be measured at a distance. This has led in particular to reinforcing the carbon potential of NBS and to direct finance to those forms of nature that can most readily be rendered into assets for carbon storage. While this can produce dividends through the conservation or restoration of high-carbon assets, other forms of biodiversity that may be protected through a wider frame of the potential connection between nature and climate (e.g. in terms of its potential to support resilience and adaptation) and of the array of nature’s contribution to people in turn become overlooked.

Moving beyond such narrow accounts of the effectiveness of NBS remains challenging. Those TGI, like Cool Earth and Nature4Climate, who have sought to explicitly include IPLC as critical to the stewardship of NBS do so in part to ensure that nature-as-asset is effectively managed for its carbon potential but at the same time seek to widen the definition of what counts as a ‘good’ NBS to those which do not only perform in climate/biodiversity terms but which are also inclusive and just. There is growing evidence that individual NBS projects can contribute to multiple climate, biodiversity, and social goals. In their analysis of ecosystem-based adaptation projects at 13 sites across 12 countries, Reid *et al.* (2019) found that all projects reported multiple benefits had been realized for climate adaptation, ecosystem services, and social well-being, but that at the same time trade-offs existed between these benefits and between the diverse groups who did/not benefit from such interventions. Such analysis suggests that even where projects are effective they may not be equitable. Remote techniques for MRV, even where coupled with efforts to include IPLC in the design and implementation of NBS projects, leave open significant questions about how such interventions manage these kinds of trade-offs and, especially in the case of projects implemented where IPLC are either absent or multiple, the inclusion of diverse stakeholders is married with concerns for the effectiveness of project implementation. The challenges of understanding what constitutes effective NBS multiply further when it comes to evaluating the role of TGI, whose networks are comprised of multiple actors with diverse NBS portfolios. Here the challenge is partly a practical one—of linking specific projects on the ground with key actors and their involvement in TGIs—and partly also because the synergistic effect of portfolios of projects on, for example, organizational behaviour, supply chains, the requirements within international institutions for MRV, or the design and use of new policy and financial instruments has yet to be explored. Further, the field of global environmental governance has yet to reach consensus in terms of how the effectiveness of TGI should be evaluated, with some preferring to focus on either or both of the direct/indirect impacts of specific initiatives and others arguing for the importance of also accounting for the catalytic dynamics that such initiatives can generate (Bernstein and Hoffman, 2018; Tozer, 2020). Taken together, this suggests that while the evidence points to a growing role for TGI in the shifting frontiers of global governance and to NBS as a key vehicle through which this influence is manifest, the effectiveness of these forms of governance and their wider consequences are still far from understood.

V. Conclusions

Growing scientific recognition of the ways in which the challenges of climate change and biodiversity loss are interconnected, coupled with the rise of a broader interest in sustainability concerns across the public and private sectors—as witnessed through the growth in commitments towards multiple Sustainable Development Goals—has led to a confluence of interests and action at the climate/biodiversity frontier. Against a backdrop of the rapidly shifting landscape of global environmental governance towards ‘hybrid institutional complexes’, this is leading to a wave of new forms of governance innovation within and between TGI, both in terms of the architecture of global governance and in terms of the design and implementation of interventions intended to address both of these challenges simultaneously in the form of NBS. When it comes to the architecture of global environmental governance, we have identified a growth of TGI which explicitly focus on the climate/biodiversity frontier. TGI which have traditionally operated in the domain of climate change are increasingly including biodiversity commitments and action within their remit, while biodiversity-orientated TGI seek to frame their work in climate-relevant terms and a host of new TGI are being formed with the specific intention of governing climate and biodiversity concurrently. In short, there is now clear evidence of innovation in the governance architecture through which both climate change and biodiversity are being addressed which has fundamental implications for the ways in which the international regimes and policy agreements which remain tied to a ‘separate spheres’ of environmental governance both operate and may achieve their intended

outcomes. For example, despite the failure to reach agreement on how climate change should be included in the Kunming–Montreal Global Biodiversity Framework, it is clear that the goals which it contains are unlikely to be met without climate action and/or climate finance, while equally action to support biodiversity and nature's contributions to people will be necessary to meet the climate mitigation and adaptation goals of the UNFCCC. Especially given the absence of greater institutional alignment across these Conventions, it is likely that actions by TGI will be needed to achieve at least the medium-term goals set for 2030. Yet while the UNFCCC has sought to further strengthen the integration of TGI into the regime complex for climate change, through its initiatives the Race to Zero and Race to Resilience, and to align action on climate change and nature through these platforms, the CBD has yet to fully engage with their potential to support the delivery of the Global Biodiversity Framework. Future research will be needed to understand this divergence and its implications for the landscape of global environmental governance as transformative action is sought to meet challenging goals for climate, nature, and society by 2030 and 2050.

Alongside the new architecture that the emergence of TGI is creating at the climate/biodiversity frontier, is the emergence of new interventions in the form of NBS that are intended to address both issues together. While previous attempts to govern with nature for climate change have emerged over the past two decades, we are currently witnessing an explosion of interventions under this umbrella term that seek to address a multiplicity of environmental, economic, and social challenges. NBS represent, then, a novel approach to governing climate and biodiversity which is seen to hold significant potential, particularly in terms of realizing ambitious goals across the private sector to realize net-zero emissions. Our initial findings suggest, however, that, driven primarily by the expansion in the voluntary offset market, these innovations are contributing to ongoing processes of financialization and technologization such that the making of nature-as-asset through NBS is serving to frame and demarcate the climate/biodiversity frontier in particular ways, especially in terms of capturing readily malleable carbon. Making nature-as-asset through NBS requires clear demarcations of ownership which have tended towards the accrual of natural assets by corporate actors and investment finance, alongside a clear stream of services and/or benefits that can be readily monetized, which in turn has led to a focus on the carbon value of particular forms of nature. Given the challenges of measuring and accounting for the value of nature, TGI which are seeking to bring nature into the climate-benefits frame are able to leverage these evolving approaches towards recognizing biodiversity as adding value to carbon offsetting both because it is associated with more effective carbon storage and for the value it holds in and of itself. To know nature in this way requires specific kinds of data and there is an increasing focus on the use of 'smart tech' and remote data gathering to enable the creation of such assets and to build legitimacy among investors and among those who rely on the carbon savings, and additional biodiversity and/or community benefits being accounted for. In turn this serves to shape the response to the twin challenges of climate and biodiversity through interventions which are low risk and high carbon.

This has obvious consequences in terms of how climate finance and investment from the corporate sector to address biodiversity loss are likely to flow, with concerns already raised that the more complex benefits of NBS for adaptation, resilience, biodiversity, and social well-being which are more challenging to measure and difficult to do with 'smart', remote modes of evaluation, may be neglected and hence the promise that NBS hold to address multiple challenges may be lost along the way. While multiple TGI are seeking to develop NBS that lie outside the immediate interests of the voluntary carbon market—for example, those involving cities and regions which tend to have a broader focus on the multiple benefits of NBS, or those focused on marine-based NBS that support resilience and risk insurance—there remain considerable challenges to realizing these projects on the ground in the absence of the finance being provided by the private sector. More broadly, this analysis raises the challenging issue of how the effectiveness of such interventions can and indeed should be evaluated. While work to date in this field has focused on singular TGI or particular projects and sought to evaluate their direct impact, we as yet know little about how all of this activity is adding up to substantive changes in terms of carbon savings, biodiversity protection, or societal benefits, nor of the specific role that TGI are playing. Further work is needed to extend and elaborate how the effectiveness of non-state governance is evaluated and how the success of NBS projects can be measured in ways that capture their complexity and diverse benefits, in order to provide an alternative means to carbon-based accounting and which can support those interventions that are seeking to fully realize the potential of NBS for climate, biodiversity, and society.

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