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Fixing the ecological crisis: The promises and pitfalls of green accounting infrastructures

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Abstract

Accounting was designed to facilitate economic growth and, as such, tends to reinforce dynamics that are harmful to the environment. Promoted today as a corrective, green accounting is often portrayed as a pioneering intervention. Yet, green accounting is not new. This paper situates it within a genealogy of initiatives developed since the 1980s and assesses their potential to establish an infrastructure capable of supporting a post-growth transition or redirecting capital toward nature conservation. It argues that, across its various iterations, green accounting has consistently struggled to materialize as a genuine infrastructure for either purpose. Nevertheless, the promises it carries help pre-empt capitalism's crisis of legitimacy in the face of mounting socio-ecological crises.

Keywords: accounting; biodiversity; global environmental politics; post-growth; socio-ecological fix.

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Introduction

> Last June, I raised a few eyebrows when I told attendees at the United Nations Conference on Sustainable Development in Rio (aka Rio+20) that 'accountants would save the world'. But I meant it. To get all businesses involved in solving the world's toughest problems, we must change the accounting rules.
>
> Peter Bakker, President of the WBCSD, 2013.

Reconciling the world's environmental and economic concerns through greening accounting: this was the enthusiastic and confident promise made by the President of the World Business Council for Sustainable Development (WBCSD) – a coalition of over 200 multinational companies – more than a decade ago. The simple phrase, 'accountants will save the world', quickly gained traction across diverse venues of environmental and economic policymaking. It soon evolved into a rallying motto, adopted as a mantra on the stages of numerous sustainability events. 'It was the favourite formula of my boss', noted a former European Commission environment staff member (Interview, former European Commission staff member, November 2023).

At a time when financial actors tend to express the limitations of their forecasts and scenarios for tackling ecological crises in terms of a 'data gap', the need for green accounting systems to provide reliable information has rarely been so strongly argued. Christine Lagarde, President of the European Central Bank (ECB), highlighted this need in a letter to the Chair of the International Sustainability Standards Board (ISSB) – established in 2021 by the International Financial Reporting Standards (IFRS) Foundation, the world's leading financial accounting standard-setter. She noted that new green standards 'could help address these data gaps, supporting collective efforts to mitigate climate change, improving the resilience of the financial sector to climate risks, and ensuring an orderly transition' (Lagarde, 2022). Accountants, described as possessing 'solid skills for controlling information', must therefore be mobilized to address the ecological crisis, as highlighted by the former director of the WBCSD's 'Redefining Value' programme (Notes from observation: International Standards of Accounting and Reporting Congress, 2019, Geneva).

This ongoing effervescence suggests that accounting may be on the verge of significant transformation. Recent scholarship has largely framed this shift in relation to the rise of climate-related risk in financial policymaking (Christophers, 2017), often taking its promises at face value – as if they were likely to be realized and represented genuine innovation (e.g. Folkers, 2024). Yet, green accounting dates back at least to the early days of environmental governance in the 1970s – well before climate change came to dominate environmental policy and scholarly debates (Aykut & Maertens, 2021), or before the idea that climate risk equates to financial risk became mainstream (Kaplan & Levy, 2025). In this paper, we situate recent developments within a longer genealogy

of green accounting – one that is distinct from climate finance and more firmly oriented toward nature conservation, which has recently become the central terrain for a new wave of green accounting initiatives and their turn toward the 'riskification of nature' (Irvine-Broque & Dempsey, 2023; van 't Klooster & Prodani, 2025).

Over time, the various actors engaged in green accounting projects have all emphasized the pioneering character of their interventions, often presenting them as heralding a new era in environmental governance. In the 1990s, for instance, proponents of the 'ecological footprint' (Rees, 1992; Wackernagel, 1994) promised nothing less than the 'GDP of the 21st century' (Boisvert, 2005, p. 176). In global biodiversity governance – particularly within arenas dominated by economic and financial concerns – this future-oriented, solutionist impulse tends to obscure historical continuities, exaggerate novelty, and overstate the imminence of breakthroughs (Dempsey & Suarez, 2016; Maechler & Boisvert, 2023). Beyond the rhetoric, to what extent have green accounting projects reshaped the main indicators of the global economy and, by extension, the relationship between capitalism and nature? We provide a comprehensive analysis of the diverse actors, practices, objectives and outcomes, that have emerged in the field of green accounting over the past four decades, organizing initiatives into three main categories: (1) biophysical accounting developed since the 1980s; (2) natural capital accounting from the 1990s onward; and (3) the latest wave of nature-related risk accounting projects, emerging since the mid-2010s.

We move beyond viewing accounting merely as a set of policies, standards or institutions, and instead approach it as a foundational infrastructure of capitalism – one that connects institutions and actors through the recording, monitoring and forecasting of economic life (Lee, 1987), thereby emphasizing its relational features. As Bernards and Campbell-Verduyn (2019, p. 777) observe, infrastructures 'don't do anything, per se' but function as enablers of other forms of activity. Accounting has historically played a pivotal role in enabling and sustaining economic growth (Norgaard, 1989, p. 311). Yet in ecological contexts, it may also act as an 'un-facilitator'– obscuring environmental degradation or enabling its continued reproduction (Ahmad *et al.*, 1989). In line with the aims of this special issue, we therefore conceptualize conventional accounting as a growth infrastructure (Campbell-Verduyn & Kranke, 2025; Furlong, 2025), and examine whether emerging green accounting initiatives might similarly function as infrastructures that support a transition to post-growth – or alternatively, as mechanisms for redirecting capital flows toward nature conservation. Put differently, if conventional accounting is a growth infrastructure, then what are the various types of green accounting?

We argue that, across its various iterations, green accounting can scarcely be considered a genuine infrastructure for enabling a transition to post-growth or redirecting capital toward nature conservation. Nevertheless, the promises it carries help pre-empt capitalism's crisis of legitimacy, forming part of what

Carton (2019) describes as a political economy of delay and shaping the terrain on which environmental futures are imagined and contested.

Our analysis draws on a diverse range of sources, including grey literature such as standards, protocols, case studies, best practices and consultation documents. Additionally, it builds on data from participant observation at 38 meetings focused on a diversity of green accounting projects, conducted between June 2019 and May 2025. These sessions varied in duration, from one-hour webinars to multi-day in-person events. The meetings primarily centred on developing new methodologies and standards, discussing the implementation of green accounting and presenting case studies. Furthermore, we conducted 15 semi-structured interviews with individuals actively involved in the development and implementation of green accounting, particularly in standard-setting processes. Interviewees included personnel from the United Nations, the European Commission, nature conservation organizations and private sector consultants engaged with the topic. These diverse data sources provided comprehensive insights into the breadth of practices and experiences within this field, forming the foundation for the analysis presented below.

The paper is structured as follows. First, we provide a brief overview of existing scholarship on green accounting and develop our conceptual framework, elaborating on the concepts of (accounting) infrastructure and socio-ecological fix. Second, we analyse three green accounting efforts, assessing their progress and potential to support a post-growth agenda or act as socio-ecological fixes aimed at sustaining capital accumulation. We conclude by emphasizing the importance of examining environmental issues beyond climate change and the improbability that green accounting efforts will drive infrastructural change in capitalism's response to the ecological crisis. Finally, we open a discussion on emerging conservation finance initiatives that position nature itself as a potential infrastructure for sustaining growth and capital accumulation.

Thinking accounting as an infrastructure and a socio-ecological fix

Green accounting can be understood as an attempt to 'put accounting where accounting was not', in Hopwood's words (1987, p. 214) – in this case, onto nature – and as an indicator of the deployment of ecologization as an emerging mode of economization (Callon *et al.*, 2025, p. 13) Critical accounting studies engaged early with this agenda, focusing mainly on the micro-dynamics of societal change that a greening of accounting practices might enable (for comprehensive overviews of the field, see Bebbington *et al.*, 2021; Villiers & Maroun, 2018). In parallel, scholars across the social sciences have interpreted the integration of nature into accounting as a step toward its commodification (Dehm, 2023; Levidow, 2020; Sullivan & Hannis, 2017). Yet, political ecologists and economic geographers have highlighted the ways in which nature resists commodification (Dempsey & Suarez, 2016; Robertson, 2006). As we

shall see, this constitutes one of the key limitations faced by green accounting projects.

More political economy-oriented accounts have framed green accounting as part of a broader attempt to reconfigure capitalism in response to escalating ecological crises. These analyses have examined a range of initiatives central to this paper, from the United Nations System of Environmental-Economic Accounting (SEEA) (Bérard, 2019; Holmes & Yarrow, 2023) to more recent efforts by task forces and standard-setters to account for climate-related risks (Christophers, 2017; Folkers, 2024; Kaplan & Levy, 2025; Maechler, 2023), and, to a lesser extent, biodiversity and nature-related risks (Irvine-Broque & Dempsey, 2023; van 't Klooster & Prodani, 2025). While many of these studies underscore the disjuncture between discourse and practice, they often treat such initiatives as relatively novel and seldom engage with the longer historical lineage of green accounting projects.

Many studies emphasize that accounting – encompassing knowledge, standards, calculation practices, information, resulting decisions and relationships among involved actors – functions as an infrastructure. Lee (1987, p. 75) highlights that 'a precondition for capital market efficiency is the existence of a sophisticated accounting infrastructure', a point echoed by Bernards and Campbell-Verduyn (2019, p. 777) for whom accounting enables 'key functions in global finance'. According to Lee (1987, p. 79), accounting as an infrastructure consists of four highly interconnected elements: '(1) the information producer and final user; (2) the information intermediaries; (3) the laws and regulations that govern the production, transmission and usage of information and (4) the legal entity that monitors and implements the laws and regulations'. In financial accounting, the producers of information are companies, while users include governments, central banks, shareholders and creditors. The intermediaries are the auditors, primarily the 'Big Four' (Deloitte, EY, KPMG and PwC), and financial analysts who prioritize this information, such as rating agencies, particularly the 'Big Three' (S&P, Moody's and Fitch Group). Finally, standard-setting bodies, such as the IFRS Foundation in most countries or the Securities and Exchange Commission (SEC) in the United States, establish the legal and regulatory framework. Although this financial accounting infrastructure has been largely privatized and globalized since the early twenty-first century (Nölke, 2005), governments remain formally responsible for overseeing its application. In this capacity, their representatives exchange 'good practices' under the United Nations International Standards of Accounting and Reporting (ISAR).

The same applies to national accounts: governments and their statistical offices produce information, in particular gross domestic product (GDP). A number of users benefit from such information that allows 'computation, comparison, historical analysis, and future forecasting' (Mügge & Linsi, 2020, p. 404), which is based on the standards set by the United Nations Statistical Commission (UNSC), in collaboration with the International Monetary Fund (IMF), the World Bank, the Organisation for Economic Co-operation

and Development (OECD) and Eurostat. UNSC has been pursuing harmonization since the 1950s and has developed the System of National Accounts (SNA) (DeRock & Mügge, 2023). These stakeholders meet regularly to share best practice and revise methodology. Finally, financial accounting and public accounting are interconnected in a number of ways. In particular, the former informs the latter (Statistical Office of the European Communities & European Commission, 2013, Ch. 21).

Accounting infrastructures have been instrumental in the emergence and evolution of capitalist modes of production (Carruthers & Espeland, 1991; Chiapello, 2007), both constraining and enabling particular socio-economic configurations (Furlong, 2025). For example, the shift in the early 2000s from historical cost to fair value accounting supported the expansion of financial capitalism, serving the interests of a narrow subset of users of financial information – namely, passive investors and creditors (Young, 2006). Accounting also operates as a vehicle for internalizing and incorporating critiques of capitalism (Boltanski & Chiapello, 1999), while simultaneously functioning as a disciplinary mechanism – a form of biopower in the Foucauldian tradition. It enables actors not merely to count or manage, but to govern capitalist societies. As Miller and Rose (1990, p. 12) put it:

> national accounting is not a simple matter of mirroring the dispersed activities of individual enterprises and producers … It entails the formation of a novel relationship between government and society which makes possible distinctive forms of calculation and management of economic and social life.

Accounting thus exemplifies how infrastructures materially sediment hegemonic power relations (De Goede & Westermeier, 2022, p. 4), temporally 'fixing' not only the boundaries of the economy (Mitchell, 1998), but also the terms through which capitalism's crises are rendered visible and governable.

By facilitating growth, accounting inherently reinforces economic dynamics that harm the environment. Both public (i.e. national) and private (i.e. financial) accounting were, in fact, criticized early on for rendering environmental damages invisible – or even enabling their reproduction (Ahmad *et al.*, 1989; Gray, 1990). As ecological economist Norgaard (1989, p. 303) noted in the very first issue of *Ecological Economics*, GDP – one of the central tools of national accounting – 'increases when stock [of environmental] resources are depleted […] and when the quality of the environment is reduced by pollution'. In other words, national accounts frame economic activity driven by environmental harm as economic success. Accounting infrastructures thus not only contribute to the processes through which 'capitalism degrades and underproduces its own socioecological conditions and relations of production' (McCarthy, 2015, p. 2487), but also play a constitutive role in shaping those very conditions. In this context, greening accounting is seen as a promising fix for the environmental deficiencies of conventional accounting. Amidst the global ecological crisis, accounting infrastructures are thus closely intertwined with the possibilities –

and limits – of advancing (post-)growth agendas and shifting investments towards environmental protection (special issue introduction).

Recent scholarship has interpreted these developments through an infrastructural lens, framing the latest initiatives as efforts to establish a green accounting and reporting infrastructure capable of governing environmental breakdown (Folkers, 2024; Seabrooke & Stenström, 2025). Yet in this paper, we argue that despite decades of experimentation, green accounting has consistently failed to materialize as a durable infrastructure – and that there is little reason to expect the current wave of initiatives to yield a different outcome. For green accounting to qualify as a fully-fledged infrastructure, it would need to be applied at scale, widely recognized and sufficiently institutionalized to influence the steering of economic and financial activity. Or, in Power's (2015, pp. 49, 51) terms, it would need to become a 'routinized fact'– a stable, consolidated practice rather than a sporadic or experimental one. In this sense, green accounting would need to attain the taken-for-granted mundanity of the 'boring things' described by Star (1999). We show that this has not occurred.

If, as Power (2015, p. 49) suggests, '[a]ccounting often begins with a combination of disappointment and the promise of improvement', then green accounting has followed a cyclical rather than a linear trajectory. The successive waves of standard-setting supporting this dynamic – mostly outside traditional arenas until recently – have primarily served to prepare, support and guide future implementation. Crucially, green accounting has never fully reached the point of 'wrestl[ing] with the inertia of the installed base' (Star, 1999, p. 382), whether in relation to national accounting (GDP) or financial accounting. We propose to analyse the diversity of accounting projects examined in this paper through the concept of 'infrastructuring', which foregrounds the relational and incomplete processes involved in building infrastructures. As Karasti (2014, p. 142) notes, this perspective draws 'attention to the extended periods during which infrastructuring unfolds'. The persistent uncompletedness of green accounting undoubtedly stems both from the formidable challenge of translating nature into numbers and metrics, and from the difficulty of reforming a foundational infrastructure of contemporary capitalism.

However, not all green accounting initiatives are equally radical in this regard. The definition and framing of the ecological crisis vary widely across schemes, ranging from those advocating growth limitations to protect the planet, to those seeking to neutralize the impacts of natural capital depletion to sustain growth, or even to safeguard financial investors from the risks of socio-ecological breakdown. It is therefore crucial to recognize the diversity of possible accounting responses to the challenges the ecological crisis poses to capitalism. To explore this diversity, we draw on the concept of 'socio-ecological fixes' developed in geography (Castree & Christophers, 2015) as an extension of the famous concept of 'spatial fix' proposed by David Harvey (1978, 1981) to account for the capacity of capital to evolve and restructure in order to regenerate in the face of crisis.

Harvey (1978, 1981) describes 'spatial fixes' as investments – typically in the built environment – that enable capital to overcome crises of overaccumulation. They are 'fixes' in a double sense: on the one hand, the investments are directed towards fixed capital, and on the other, they temporarily fix the crisis resulting from the internal contradictions of capital accumulation. By extension, socio-ecological fixes entail shifts in social regulations and resulting material investments aimed at enabling capital to transcend the major obstacle to further accumulation posed by the ecological crisis (Castree & Christophers, 2015; Ekers & Prudham, 2015). The concept has been used to analyse the various ways capital seeks to 'solve' environmental crises, for instance, through promoting negative emissions technologies (Carton, 2019). In the context of the climate crisis, it highlights how one of the dominant responses has been to shift from a fossil-fuel-based energy regime to a post-carbon regime that remains compatible with ongoing capital accumulation and economic growth (McCarthy, 2015; Spivey, 2020). Socio-ecological fixes are thus intended to lead to what Harvey (1978) calls a 'capital switch' and that Castree and Christophers (2015, p. 380) define as 'large-scale, temporally concentrated diversions of investment that serve to alter systematically the historically contingent forms that capitalism assumes'.

The initiatives examined in this paper represent different ways of mediating the threat that socio-ecological crises pose to capital. We therefore propose to analyse the infrastructuring processes at play in various forms of green accounting, evaluating their degree of advancement, their disruptive potential, and the extent to which they might support a post-growth agenda – or, conversely, function as socio-ecological fixes aimed at sustaining capital accumulation. While we show that none of these projects has succeeded in institutionalizing a fully-fledged infrastructure capable of redirecting investment toward conservation or enabling a transition to post-growth, we argue that they nonetheless produce significant effects. Specifically, they operate, as Carton (2019, p. 764) puts it, 'through the mobilisation of a specific vision of the future as a way to legitimise and reproduce the present'. This dynamic resonates with what many scholars have observed in relation to market-based conservation: although it remains 'negligible to and largely outside of global capital flows' (Dempsey & Suarez, 2016, p. 653), and thus peripheral to the core infrastructures of capitalism, it nonetheless carries important consequences by foreclosing alternative and progressive possibilities capable of resisting the *status quo* logics of accumulation (Maechler & Boisvert, 2024).

Three agendas for infrastructure transformation in green accounting

Since the emergence of environmental concerns in public policy in the 1970s, various ways of 'fixing' them through accounting have been considered. We examine below three main bodies of work or sets of initiatives which, in our

Table 1. Dimensions of green accounting infrastructure agendas.

	Biophysical accounts	Natural capital accounts	Nature-related risks accounts
Producers	Statisticians, national accountants, researchers	Environmental economists, conservationists, and business representatives	Accountants, financial market operators, accounting standard setters
Target audience	National administrations, international organizations	Businesses (their management)	Financial markets
Problem to be fixed	Blindness to environmental limits (finiteness of resources, environmental capacity)	Natural capital depletion Under-investment in nature	Unpredictability and complexity of financial risks associated with the ecological crisis
Focus	Biophysical dimensions of economic activities, the environment as an economic sector	Consumption of natural capital by economic activity Impacts on nature	Impact of the climate/ecological crisis on the financial system Impacts of nature
Objective	Fair and efficient economic and environmental planning	Visibility of natural assets/ environmental externalities through monetary valuation. Investments in conservation	Financial risk management leading to switching investments to sectors less vulnerable to ecological crisis risks
Metric	Biophysical (material, energy), monetary	Monetary	Monetary (or monetizable financial risk)

view, structure the field of green accounting: (1) biophysical accounting; (2) natural capital accounting; and (3) nature-related risk accounting (see Table 1).

These various initiatives are distinct and do not represent sequential stages in the evolution of a single, unified project. While they share the overarching goal of enhancing the visibility of the environment in economic calculations and indicators, they differ in the social and political spaces in which they are deployed and the audiences they target. Differences in their levels of radicalism or disruptiveness relative to the conventional accounting infrastructure may explain the varying nature and intensity of the obstacles and resistance they face in their attempts to 'mainstream' or 'infrastructure' green accounting. Each struggles to materialize in practice, albeit for different reasons.

Biophysical accounts: Steering public action towards sustainable resource management

The question of what metric should be used to account for economic activity, its dynamics and its reliance on natural resources first emerged in the nineteenth century (Martinez-Alier, 1987). It gained particular prominence when concerns about the underproduction of nature were first discussed on the international stage. A key moment was the 1968 Intergovernmental Conference of Experts on the Scientific Basis for Rational Use and Conservation of the Resources of the Biosphere, organized under the auspices of the United Nations Educational, Scientific and Cultural Organization (UNESCO, 1968). Today, ecological economists at the Vienna School of Social Ecology continue this line of inquiry, advancing an accounting framework designed to establish objective metrics that capture nations' metabolic interactions with the natural environment (Fischer-Kowalski *et al.*, 2011; Haberl *et al.*, 2016).

These methods enable GDP to be evaluated in relation to the quantities of material consumed in its production. They thus provide an alternative perspective to traditional representations of national wealth, focusing instead on the material imprints left on the biosphere – the 'weight of nations' (World Resources Institute, 2000). In this approach, economic flows are quantified and compared in terms of their mass, measured in tons. Similar assessments are conducted for energy flows, using various scales and metrics commonly employed in thermodynamics. Beyond highlighting the relationship to nature, these analyses aim to capture the pressures exerted on the biosphere, understood as a system generating flows of matter and energy utilized by different countries or economic sectors. Material and energy flow accounts primarily serve as tools to evaluate resource allocation and growth limitations, contributing to fairer and more rational economic and long-term environmental planning. They aim to assess the effectiveness of environmental policies. These proposals, therefore, build on a more or less radical critique of mainstream indicators and the conventional accounting infrastructure – chiefly GDP – which is seen as failing to reflect an economy operating within its limits and not encouraging a rethinking of growth (Boisvert, 2005).

In the 1980s, several initiatives were launched to consider how best to reflect environmental change in international indicators in preparation of the 1992 Rio Earth Summit. Of particular importance was a series of workshops convened between 1983 and 1988 by the United Nations Environment Programme (UNEP) and the World Bank. Statisticians and environmental economists made several propositions to 'ensure that future calculations of national income more accurately represent true, "sustainable" income' (Ahmad *et al.*, 1989, p. v). They emphasized that 'the current system of national accounting has some limitations', particularly in the way it 'ignore[s] the degradation of the natural resource base and view[s] the sale of nonrenewable resources entirely as income', or as 'free lunch' (Ahmad *et al.*, 1989, p. v) – a logic that can be interpreted as the tendency of capitalism to consume its own ecological foundations in the name of growth.

The 1992 Rio Earth Summit marked a significant milestone in the institutionalization of green accounting, embedding it within one of the conference's key texts, *Agenda 21* (United Nations Conference on Environment and Development, 1992, p. 73). In its aftermath the United Nations established the SEEA, to complement the SNA. First published in 1993, it was designed as a satellite system to complement the central system of national accounts (United Nations Statistics Division, 1993). Statisticians and economists from national and international statistical institutions debated methodologies and potential improvements for years before reaching a consensus. Proposals to integrate the environment directly into national accounts – as monetary aggregates, and thus to seriously grapple with national accounting infrastructures – had been advanced (El Serafy, 1997; Kokkelenberg & Nordhaus, 1999; Lutz, 1993). However, this approach was ultimately rejected due to its reductionist nature, which oversimplified the complexity of the environment into a single dimension and metric. In 2012, the Commission finally recognized the SEEA as an international – satellite and biophysical – accounting standard (United Nations, 2014).

While the SEEA theoretically allows for shifting the boundaries of 'the economy', its practical ability to influence public action and drive related investments has remained limited – notably due to inconsistencies with traditional accounting practices and standards (Holmes & Yarrow, 2023). Producing biophysical accounts requires substantial, regularly updated datasets and distinct capabilities beyond those needed for traditional national accounts. These prerequisites remain out of reach for many countries, resulting in the establishment of environmental accounts following the SEEA standard being repeatedly framed as a gradual objective rather than an immediate requirement. Furthermore, the SEEA remains largely unknown outside specialized circles of experts, including national accountants, international statisticians and researchers. Biophysical accounts are highly technical and not easily interpretable. They are not only challenging to produce but also difficult to use effectively. Unlike GDP, they do not deliver straightforward messages. For example, interpreting energy metrics is neither intuitive nor immediate; it requires a distinct skill set compared to analysing national accounts expressed solely in monetary terms.

This highlights a persistent divide between the statisticians responsible for developing the accounts and the practical needs of end users. Many international organizations involved in 'mainstreaming' the SEEA, particularly in developing countries, advocate for monetary metrics, citing their perceived 'policy relevance'. As they argue, 'it is much easier to communicate with decision-makers using monetary data' (Notes from observation: 26th Meeting of the London Group on Environmental Accounting, 2020, online). In contrast, national experts – particularly statisticians involved in the development of the SEEA – often resist the systematic adoption of monetary metrics. From their perspective, monetary valuation is viewed as 'unscientific', driven by 'strange economists' who claim to be able to assign a value to everything (Notes from observation: 26th Meeting of the London Group on

Environmental Accounting, 2020, online). More fundamentally, they argue that phenomena must be rigorously measured before moving toward monetary valuation – an approach that contrasts sharply with natural capital accounting, discussed below.

Biophysical accounts have succeeded in bringing ecological issues into the core of macroeconomic statistical discussions; however, their influence remains largely confined to these arenas. Despite their ambition to concretize the limits to growth and to inspire a transformative economic agenda, they have fallen short of achieving the institutionalization and 'infrastructuring' required to complement, let alone challenge, the dominant growth-focused national accounting infrastructure. Experts convene annually to refine these standards, but separately from conventional national accounting bodies. This sustained engagement yields technical reports and expert knowledge that uphold the proposition that national accounting could – or indeed should – be fundamentally reformed, despite the persistent lack of necessary resources and political will. The SEEA is referenced in international biodiversity conference outcomes, where states are repeatedly praised – and urged – to comply, fostering a sense of momentum that is not matched by substantive institutional uptake.

Natural capital accounts: Raising awareness of biodiversity loss

Following the 1992 Rio Earth Summit, a new pathway emerged, addressing the need to translate the concept of sustainable development into tangible actions. The British environmental economist David Pearce was tasked with developing recommendations for the United Kingdom. Working independently or in collaboration with colleagues Anil Markandya and Ed Barbier, Pearce authored a series of influential reports in the late 1980s and 1990s, beginning with *Blueprint for a green economy* (1989). Pearce is credited with disseminating the concept of 'natural capital' (Åkerman, 2003). He proposed that sustainability could be conceptualized by viewing nature as a form of capital that produces flows of goods and services and, like other types of capital, is subject to depreciation and requires investment for maintenance. Within this framework, defining nature as capital makes conservation a more tangible objective. However, this conceptual shift also implies that money becomes the sole metric capable of rendering the different categories of capital commensurable, thereby positioning monetary accounting for natural capital as the only viable method for greening accounting.

This proposal amounts to encoding the challenges of global environmental protection in terms of the logic of monetary accounting (Costanza *et al.*, 1997). It was favoured by the international assessments conducted not only on ecosystems, but also on the costs of climate change, biodiversity loss and 'ecosystems services' in the early 2000s.[1] These forms of valuation have also been widely taken up in international environmental arenas, lending credence

to the hypothesis that the monetary expression of environmental values ensures their intelligibility. This shift aligned with the late-2000s institutionalization of a 'private sector' agenda in global biodiversity governance (Bled, 2009), aimed primarily at developing 'tools for assessing the value of biodiversity and ecosystem services, for their integration into decision-making' (United Nations Convention on Biological Diversity, 2006, p. 3). A significant milestone in this effort was *The Economics of Ecosystems and Biodiversity* (TEEB) initiative, hosted by the UNEP, with its series of reports publicly presented at the 10th Conferences of the Parties to the Convention on Biological Diversity (CBD) in 2010. Notably, the business-focused report urged companies to integrate natural capital into 'corporate planning, accounting and reporting' (TEEB, 2010, p. 9).

Since the mid-2010s, the standardization of natural capital accounting has been at the heart of efforts in this area under the leadership of different transnational, mostly private-led, initiatives. A key player in addressing this standardization challenge is the so-called 'natural capital community'– an informal designation used by its members – comprising consulting firms, companies, the financial sector and conservation organizations. This community primarily operates under the aegis of the Natural Capital Coalition[2] and EU Business and Biodiversity Platform, a European Commission initiative managed by private consultancies with the overarching aim of helping businesses to 'measure and integrate the value of biodiversity into business decision-making' (European Commission, 2024). Together, these two organizations have developed the *Natural Capital Protocol*, described as 'a framework designed to help generate trusted, credible, and actionable information … to inform decisions' (Natural Capital Coalition, 2016, p. 2), and numerous 'supplements' tailored to specific sectors.

However, these standards and protocols have rarely translated into lasting business practices, remaining largely confined to case studies conducted by specialized consulting firms. None of these standards has endured; they are frequently displaced by new proposals within a matter of months. Yet, the relentless cycle of standard-setting – alongside a steady stream of policy reports, conferences, and, more recently, webinars – perpetuates the impression of a dynamic and productive accounting field. This ongoing activity upholds the expectation of an imminent transformative shift in capitalism's valuation practices, sustaining the promise that natural capital accounting will supplant traditional metrics.

Conscious of the limited uptake of their methods, advocates of natural capital accounting often describe it as a 'journey'– a notion that has become central in market-oriented biodiversity arenas, where it signals that, despite the absence of concrete outcomes, progress is underway toward a vaguely defined, future-oriented goal (Maechler & Boisvert, 2023). At conferences, the narrative of a journey is often employed to guide and inspire action, sometimes portraying businesses engaging with this form of green accounting as adventurers. Since 2014, the EU Business and Biodiversity Platform's annual conferences

have played a key role in sustaining momentum around this approach. At one such event, a guest speaker – an actual adventurer – was invited to give a speech to sustainability consultants and companies representative, drawing parallels between his Greenland expeditions and corporate sustainability transitions. He emphasized the importance of 'passion' and the courage to 'jump into the unknown' (Notes from observation: European Business and Nature Summit 2023, Milan). This narrative shifts the emphasis from achieving definitive outcomes to valorizing the process itself, implying that engagement and effort matter more than precise indicators of success: 'what counts is not the measure; it is how we got the measure', someone pointed out at the conference two years earlier (Notes from observation, European Business and Nature Summit 2021, online). It echoes the recurring narrative of market-based conservation as always 'just around the corner' (Dempsey & Suarez, 2016, p. 664), once again sustaining the impression that a decisive breakthrough is imminent.

Natural capital accounting was developed to unite a broad community of interests around nature conservation. As such, it is deliberately growth-agnostic, enabling broad acceptance across varied interests and effectively deflecting criticism. However, as we have demonstrated, the initiative has been only partially implemented. In this context, the process of 'infrastructuring' remains largely incomplete. The multi-stakeholder initiatives supporting natural capital accounting operate independently from the *de jure* or *de facto* mandatory standards and regulations applicable to businesses, and do not emerge from statistical institutions (as in the case of biophysical accounts) or financial standard-setting arenas. In this sense, they exhibit no real ambition to wrestle with conventional accounting. Consequently, their practical scope remains limited, as expressed by a staff member from a Big Four accounting firm: 'You can theoretically monetize everything. But in the absence of a proper standard made by the proper standard-setter, it makes no sense to monetize' (Interview, Deloitte staff member, November 2019). Calls to assign a monetary value to nature in order to make it visible to capital have yet to produce a radical transformation of accounting systems or to achieve the internalization of environmental externalities they seek to capture. The transformation of nature into capital remains largely a discursive, if not symbolic, proposition. Yet, this proposition has nonetheless proven highly influential in shaping biodiversity conservation debates, where the calculation of monetary values is often framed as a decisive step forward (Maechler & Boisvert, 2024).

Nature-related risk accounts: Safeguarding financial capital amid ecological collapse

In recent years, the focus of green accounting has shifted, with the risks stemming from climate and other ecological crises emerging as critical concerns in financial governance, embarking green accounting within the broader project of

the 'riskification of nature' (van 't Klooster & Prodani, 2025). Following the launch at Wall Street of one of the leading financial initiatives in this area, the Taskforce on Nature-related Financial Disclosures (TNFD), media outlets symbolically remarked that 'the bastion of bulls and bears would seem to be embracing bees and biodiversity' (Fleming, 2023).

Nature-related risk accounting is neither designed to comprehensively account for natural assets and liabilities in order to reduce the ecological footprint of economic activity – as biophysical accounting seeks to do – nor does it centre on pricing nature itself, as in natural capital accounting. Instead, it focuses on assessing the risks that environmental degradation and reputational harm pose to economic activity. In particular, so-called 'transition risks'– those arising from policy shifts, regulatory changes, or evolving consumer expectations – are central to this approach. The objective is not to manage the ecological crisis *per se*, but to anticipate and mitigate the social and political responses it may provoke. As Carton (2019, pp. 754–755) puts it, the danger for capital lies not only in biodiversity loss or rising temperatures (framed as 'physical risks'), but also in the growing social movements and political pressures they generate – a 'looming crisis of legitimacy' that this latest avatar of green accounting seeks to defer and deflect in the interest of sustaining continuous capital accumulation.

The creation of the aforementioned TNFD builds on the earlier establishment of its climate-focused counterpart, the Task Force on Climate-Related Financial Disclosures (TCFD), launched in 2016 by the Financial Stability Board (FSB). The TCFD capitalized on the global climate momentum generated by the 2015 Paris Agreement and garnered early support from prominent figures in financial governance, such as Mark Carney, a central banker and then President of the FSB, and Michael Bloomberg, the founder of one of the world's leading financial information companies, who subsequently chaired the TCFD. The TCFD frames climate change as a financial stability issue and advocates for the disclosure of so-called 'climate-related risk' (TCFD, 2017). Building on this model, the TNFD – initially emerging from conservation organizations and consultancies (Global Canopy & Vivid Economics, 2020) – was established in 2020, ahead of the 15th Conference of the Parties to the CBD, often referred to as 'The Paris Moment for Biodiversity' (Lacerda, 2022). The TNFD expands the financial – and consequently risk-oriented – framing of the ecological crisis beyond climate, encompassing biodiversity and ecosystems, and categorizing them as 'nature-related risks' (TNFD, 2023).

These task forces are supported by a diverse range of financial stakeholders. While they function as multi-stakeholder initiatives – somewhat akin to those in natural capital accounting – they have been more effective in engaging their target audience for the anticipated infrastructuring: financial accounting standard-setters. The frameworks developed by the TCFD and, more recently, the TNFD, build upon an 'installed base' (Star, 1999, p. 382): the existing infrastructure of financial accounting, including its standards, key concepts and established forms of expert knowledge (Seabrooke & Stenström, 2025). In

this respect, they have succeeded where earlier initiatives have struggled. Most notably, the IFRS Foundation – the world's leading financial accounting standard-setter – has endorsed this agenda through the creation of the ISSB, tasked with developing globally applicable sustainability-related disclosure standards.

Nature-related risk accounting encodes the environment in the language of financial accounting (Folkers, 2024; Maechler, 2023), particularly through the conceptual lens of materiality (Seabrooke & Stenström, 2025). From this perspective, the scope of risks – including those related to nature and biodiversity – is defined by their potential impact on the accuracy of companies' certified accounts. Proponents argue that this green accounting approach will enable stakeholders – primarily investors and corporations – to incorporate ecological crises into their decision-making. This vision of nature protection builds on what Kaplan and Levy (2025) describe as a 'rationalised myth': the belief that nature-related risks equate to financial risks, and that markets will not only price these risks accordingly but also reallocate capital toward environmental protection – presuming that doing so aligns with their rational self-interest. Many scholars have expressed scepticism about the feasibility of this market logic delivering meaningful ecological outcomes (Christophers, 2017; Irvine-Broque & Dempsey, 2023). While some jurisdictions, such as the European Union, promote a 'double materiality' approach – addressing both financial risks to companies and broader socio-ecological risks, in continuity with earlier natural capital accounting efforts – this approach is unlikely to prevail globally (European Commission, 2023). If these standards were widely implemented, the risk-based perspective would likely prevail within formal frameworks and shape how investors interpret and respond to information.

Yet it remains far from certain that nature-related risk – even in its financial materiality form – will become institutionalized, stabilized and routinized in the same way as financial accounting, i.e. fully established as a 'green accounting infrastructure'. The IFRS Foundation itself recently reported low uptake of its climate-related risk standards, with only 2–3 per cent of companies fully complying. Nevertheless, it emphasized that '30 jurisdictions are on the journey to introducing ISSB Standards in their legal or regulatory frameworks' (IFRS Foundation, 2024, p. 4). The journey metaphor is thus used once again to convey a sense of progress, as is the case in the field of natural capital accounting. 'The train has left the station', proclaimed the Executive Director of the TNFD during one of many promotional webinars, referring to the 500 companies committed to adopting the TNFD framework. 'Market momentum is already building', read the title of the accompanying slide, which featured an arrow suggesting limitless uptake (Notes from observation: The TNFD Adoption Journey, 22 May 2025, online).

Nature-related risk accounting marks a shift in how green accounting is envisioned – as a mechanism for redirecting capital. However, like previous initiatives, its primary goal is to initiate a transformation of existing accounting infrastructures, not necessarily to achieve it. Although it currently represents the most recent and institutionally attractive frontier within the evolving

landscape of green accounting, and although a number of former proponents of natural capital accounting have pivoted toward this new agenda (e.g. La Notte *et al.*, 2025), this shift does not signal the end of other initiatives. Those involved in natural capital accounting are unlikely to abandon this approach, as it remains the most robust and technically advanced method for representing the environment. It is therefore crucial for legitimizing green capitalism and neutralizing its critics. The conversion of statisticians engaged in the development of national biophysical accounts to nature-related risk frameworks is even less likely, given their longstanding resistance to the reductionism of monetary valuation. As a result, proponents of the various green accounting projects are unlikely to coalesce around a single model capable of constituting a durable infrastructure. Instead, a constellation of approaches and agendas continues to unfold in parallel across diverse political and socio-technical arenas. While a post-growth agenda grounded in green accounting appears increasingly unlikely, this fragmentation may also undermine green accounting's potential to become the central infrastructure of an 'ecologized' capitalism – or to function as a socio-ecological fix to the structural contradictions of capital accumulation.

Conclusion

In this paper, we have reviewed three main categories of green accounting: (1) biophysical accounting developed since the 1980s; (2) natural capital accounting emerging in the 1990s; and (3) nature-related risk accounting, which has gained prominence since the mid-2010s. We have examined their efforts to influence, shape, or green the conventional accounting infrastructure – captured through the notion of 'infrastructuring'. In line with the aims of this special issue, we have also explored the extent to which these initiatives might support a post-growth agenda or, alternatively, serve as 'socio-ecological fixes' aimed at sustaining growth and capital accumulation.

Despite their differences, we have shown that these initiatives share important commonalities – most notably, their failure to wrestle with the installed base of conventional accounting. None has demonstrated a serious ambition or capacity to confront or transform the foundational infrastructures they target: biophysical accounting and nature-related risk accounting engage with national and financial accounts respectively, but fall short of challenging them, while natural capital accounting lacks such ambition altogether. As a result, no project has succeeded in reversing the dynamics of resource exploitation and environmental degradation in a perceptible way, in bringing about a redeployment of investment in favour of the ecological transition, or in attracting the massive funding required for nature conservation. This is evidenced by the repeated calls at the Conferences of the Parties to the Convention on Biological Diversity to mobilize financial resources, so that its resolutions do not go unheeded.[3]

We have sought to show that, despite their limitations, these accounting initiatives are by no means without effect. On the contrary, not only do they

contribute to the internalization of critique, but more mundanely, they have also given rise to new institutions, attracted substantial funding, focused political debates and generated ambitious anticipatory visions of a green transition. These visions, in turn, have displaced alternative proposals – what Gibson-Graham (2006) refer to as the imagination of 'other worlds'. They exemplify what Carton (2019) describes as a political economy of delay: a constellation of practices that serve, in multiple ways, to postpone the inevitable clash between capitalism and the ecological crisis.

On the scholarly side, we step back from the current proliferation of green accounting debates – increasingly framed through the lens of the 'climate finance nexus' and risk materiality to highlight the longer history of efforts to use accounting to mediate the relationship between capitalism and nature. While extensive research has focused on the carbon economy – its markets, financial mechanisms, institutions and actors – biodiversity-related initiatives have remained comparatively underexplored. The specific dimensions of biodiversity conservation policies and tools are frequently overlooked, with biodiversity loss often conflated with or overshadowed by climate change in both public discourse and policy agendas. The recent emergence of the notion of 'nature-related risk' as an extension of 'climate-related risk' exemplifies the tendency to apply climate-centric categories and framings to broader environmental issues (Aykut & Maertens, 2021). This paper has sought to address this gap by shedding light on institutional processes, actor constellations, and instruments that are distinct from those of climate governance and markets, and which merit greater analytical and political attention. The current hegemony of the climate issue – which has only recently crystallized in its contemporary form – also tends to foster short-sighted analyses of global environmental governance. A longer-term perspective reveals recurring cycles in green accounting, closely tied to fluctuations in political interest in environmental issues. These cycles often align with major world summits, marked by peaks of engagement in the early 1970s, early 1990s and mid-2010s, serving as 'temporal focal points' (Manulak, 2022). Given the decidedly forward-looking narratives that characterize global environmental, and particularly biodiversity, arenas – which frequently exaggerate the novelty of recent developments (Maechler & Boisvert, 2023) – we have argued that a historical and genealogical perspective is essential to critically assess the trajectories and limitations of green accounting.

While green accounting can hardly be considered a socio-ecological fix, it raises a pressing question: what, if anything, might fulfil this role in contemporary capitalism as it confronts ecological crisis? One emerging candidate – operating outside conventional accounting arenas and aimed at redirecting investment toward nature – warrants closer attention: nature-based solutions (NbS). In this framework, it is not accounting but nature itself that is being reconfigured as infrastructure (Nelson & Bigger, 2022). 'Investing in nature' has become the guiding motto for a series of initiatives linking finance, development and the green transition (European Investment Bank, 2020; World Bank, 2021).

NbS are defined 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' (Cohen-Shacham *et al.*, 2016, p. 5). They aim to reconcile biodiversity protection with climate change mitigation, natural risk prevention, improved health, water supply and socio-economic development, notably by fostering innovation. NbS encompass various actions framed as investments in nature as an infrastructure to ensure the delivery of ecosystem services to human societies. Their proponents argue that nature itself can be seen and used as a palliative or remedy for the excesses of unbridled economic growth and the relentless pursuit of accumulation rather than as an inherent obstacle to human exploitation and extraction (Sowińska-Świerkosz & García, 2022, p. 2). NbS could thus emerge as the primary socio-ecological fix and central infrastructure of green capitalism. Ecological engineering – rather than accounting – would then operate as the key technology of power in the ecological modernization of capitalism, positioning nature itself – rather than green accounting – as the infrastructure through which growth is sustained and capitalism's contradictions are temporarily fixed.

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Ethical approval statement

This research involved interviews with professional stakeholders and observations. In accordance with the guidelines of the researchers' institutions, no formal ethical approval was required.

Notes

1 These consist, respectively, of the Millennium Ecosystem Assessment under the aegis of the United Nations, whose final report was published in 2005; the Stern Review on the Economics of Climate Change, prepared at the request of the government of the United Kingdom and published in 2006; and the TEEB Initiative on The Economics of Ecosystems and Biodiversity, whose reports were published in 2010.
2 The Natural Capital Coalition has then been renamed the 'Capitals Coalition'. See: https://capitalscoalition.org/.
3 See Target 19 of the 2022 Kunming-Montreal Global Biodiversity Framework (United Nations Convention on Biological Diversity, 2022, p. 12).

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