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To Bruno Latour, in memoriam

Ecologization, part 2: Practices, strategies and devices for managing assets-actifs

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Abstract

In two instalments, this paper analyses ecologization as an emergent mode of economization. The first instalment proposed a new definition of economic activities that addresses today's ecological challenges. This second instalment identifies the activities involved in ecologization processes and how human actors from a variety of practices contribute to their design, revision and management. It discusses new accounting devices, developed to consolidate and extend this movement, which provide insights into the results obtained, actions taken to achieve them and monetary and non-monetary costs involved. After highlighting the uncertainties and resistances surrounding the future of this new mode of economization, we ask whether this emerging approach is worth pursuing and supporting, despite its challenges and ambiguities, and end by arguing that the answer is unequivocally affirmative.

Keywords: ecologization; economization; care; assetization; assets-actifs.

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Introduction

In the first instalment of this paper (Callon *et al*., 2025), we proposed a new way to both make and make sense of economic activities that address today's ecological challenges. We built upon an approach, first developed by Caliskan and Callon (2009, 2010), which takes as its object not the economy itself, but the processes of economization by which things and activities become economic. There are radically different modes of economization, involving very different types of economic arrangements, marketization is only one of them.

The present moment offers a rare and powerful opportunity for the emergence and strengthening of new modes of economization. Human ingenuity, shaped and amplified by advances in techno-sciences, has been channelled into profit-driven economies that profoundly shape the planet. In turn, the planet responds, reshaping the very conditions of human existence. This dynamic interplay defines the Anthropocene – a time when the rhythms of human and Earth systems are tightly interwoven, accelerating and influencing one another in unprecedented ways. Challenges such as climate change, biodiversity loss, resource depletion and soil degradation are daunting, but also signal the urgent need for transformation. The call is clear. The time has come to craft a new economic vision and practice – one that we call *ecologization*.

Our first instalment argued that assetization – now a ubiquitous feature of economic activities – introduces a fundamental concern for existing entities, whether human or other-than-human, which necessitates constant attention to maintaining their agency: their ability to act by causing action in others. Without this capacity, the transmission of value, whatever the form it takes, is destined to fail. To emphasize the emergence of this agential concern, and to help disentangle assetization from marketization (Bourgeron, 2024), we suggested replacing the traditional notion of 'asset' with the concept of *asset-actif*, and proposed the idea of *taking care* to encompass all the practices aimed at ensuring the long-term viability of these entities across time and space.

The term 'asset-actif' helps make visible any entity that carries value – of any kind – across time and space, emphasizing that value is not only preserved but also generated and transformed during this transfer, thanks to the entity's capacity to act, or its agency. Assetization, in this light, cultivates a climate conducive to recognizing the critical importance of taking care – ensuring the sustainability and flourishing of the entities that underpin our economic and ecological systems.

That observation is encouraging, but it would be incomplete if we left it at that. Assetization, without being supported by a broader transformative movement, risks becoming merely another extension of the marketization process. That may indeed happen, but it is far from inevitable. What can help prevent this outcome is the profound novelty embedded within assetization – a novelty that resonates with a powerful, emerging current centred on the practice of care. A diverse array of forces – from care studies and design for care to

disability anthropology and feminist studies – are helping drive this transformative shift. Assetization can mingle with the growing focus on care, be influenced by it, reinforce it and thus become one of the driving forces of the ecologization process.

The adoption of *taking care* as a strategic orientation is beginning to be shaped by appropriate measuring instruments, *valuemeters*. These tools are designed and tested specifically to evaluate progress made, if any. Such evaluations are not straightforward, nor do they seamlessly translate into concrete actions. The process of ongoing ecologization never reaches a definitive conclusion or stable equilibrium (Georgescu-Roegen, 1971). Instead, it requires continuous effort, with no ultimate endpoint or 'great attractor'. Managing *assets-actifs*, therefore, becomes an art of approximation – taking one step at a time.

Readers may be sceptical about our emphasis on valuemeters and calculation devices. Aren't these tools often shaped and manipulated for self-serving purposes, for example, to greenwash harmful activities of large corporations or to profit from poor quality or even fraudulent? We fully recognize this reality. However, this acknowledgment underscores the critical importance of focusing on the most significant valuemeters and actively exposing and resisting ever-present abuses. To leave this vital terrain unexamined and uncontested would be, in effect, to abandon efforts that are essential to ecologization. These tools should not be dismissed, but reclaimed and reshaped into instruments for genuine, transformative change.

In this second instalment of our two-part paper, we first explore 'care', care practices, and their relations to the management of assets-actifs. Second, because what concretely constitutes care is intrinsically heterogeneous, we then examine four key questions/challenges that any comprehensive view of care must address. Third, we turn to socio-technical devices – 'valuemeters' – crucial to addressing those challenges. Fourth, we examine relevant accounting instruments (with accounting understood in a broad sense). The fifth section, our conclusion, emphazises the provisional nature of our analysis, which we expect to be contested in, for example, its emphasis of the ambivalent nature of the notion of asset, which we liken to Derrida's (and Plato's) notion of the *pharmakon*, both poison and potential cure. We nevertheless defend the analysis we present in this two-part paper, arguing that the emerging mode of economization that we call ecologization involves devices and practices that are at least partway to being concretely realized. Ecologization, therefore, is both a compelling object for social-science research and a crucial sphere for intervention.

Asset management meets care practices

The process of asset activation inherently involves attentiveness to existing things. It is part of a broader, long-standing, increasingly influential movement: care. Taking care is deeply rooted in long-established practices – a rich humus

formed by a blend of tried-and-tested behaviour shaped by collective learning. These practices have been progressively incorporated to ensure a liveable communal life within a sustainable world. Since the 1980s, care has emerged as a clearly identifiable concept and practice, with its associated requirements influencing an ever-growing number of sectors and experiences. As it expands, its meanings have become more and more nuanced and complex, allowing for diverse – and sometimes conflicting – interpretations and practices.

To understand the full polysemy and richness of *care*, one only needs to consult a dictionary. One French dictionary lists around 60 synonyms of the noun, including: attention, application, delicacy, conscience, scrupulousness, precaution, respect, service, duty, solicitude, thoughtfulness, concern, worry and regard (CNRTL, n.d.). Merriam-Webster (n.d.) offers multiple synonyms of the verb, such as: nurse, see to, minister (to), wait on, administer (to), look after, look out for, treat, mother, wait upon, heal, support, provide (for), aid, remedy, cure, preserve, conserve.[1]

The polysemy of 'care' is a strength. It defines an open, dynamic space that welcomes and fosters initiatives. Within this space, the process of ecologization, as a new form of economization, can emerge and thrive. In the following subsections, we aim to describe this care movement and its potential to foster the emergence and consolidation of ecologies focused on valuing and sustaining existing or emerging things and their agency. This strategic reorientation becomes even more effective when complemented with a growing body of reflections and experiments on the conditions for integrating care into economic activities.

Asset(-actif) management

First, we illustrate the extent of the diffusion of asset management practices, which form a beneficial foundation for the development of economies attentive to care. Asset(-actif) management was not born at the end of the twentieth century. Among all assets-actifs, human beings occupy a privileged position. Maintaining a human being in a state of activity, ensuring that they will have offspring capable of taking over from them, designing training systems to preserve and enrich knowledge and skills, etc. are all activities that come under this heading. A history of these practices and of the struggles to which they gave birth would have to follow the gradual constitution of institutions devoted to keeping human beings healthy, educating them and protecting them.

As that history would show, taking care is a result, always being reworked, always under construction, always controversial – a result that, alas, does not prevent exclusion or exploitative relationships. Deadly conflicts, bloody atrocities and brutalities are intertwined with the evolution of caregiving practices. Equally undeniable is the Machiavellian nature of the relationships of domination that have shaped this evolution. Institutions of care, intended to provide assistance and support, have also been marked by relations of power, domination and subjectification.[2]

From a certain perspective, social policies can be viewed as early precursors to the policies that eventually evolve into ecological policies. The concept of 'taking care' now extends beyond human beings to technical objects. This is evidenced, for example, by the evolution of asset management. The 'primary function' of financial activities, writes Braun (n.d., p. 1), 'has shifted from financing to asset management, that is, the preservation of wealth over time'. Asset management firms pay close attention to the life span of their investments – they know they must return money within that time frame (Christophers, 2024) – and so must be attentive to the transportation of value over time and space. But asset management's fields of application are becoming much broader. Asset management involves balancing costs, opportunities and risks against the desired performance of assets to achieve organizational objectives. In the case of infrastructure, a domain in which asset management is prominent, there is pressure to take into account the entire life cycle of an infrastructure, including its design, construction, maintenance and even demolition (Mattern, 2018).

Asset management in this broad sense is beginning to be implemented in the renewable energy sector. Other fast-growing specialties include engineering asset management; software asset management; enterprise asset management (information); intellectual and intangible asset management; and more. Professional associations are multiplying to prescribe and evaluate best practices. The International Organization for Standardization (ISO) has produced standards to define and guide the implementation of these different asset management methods. Regardless of the type of assets involved, the guiding principles of their management revolve around common concepts such as repair, adaptation, transformation, maintenance and recycling.

The objects, systems and infrastructures with which everyday human lives are entwined 'need to be kept in good repair', as Denis & Pontille (2025, p. 4) put it. They have not hesitated to take the plunge and speak of 'the care of things', thus designating a huge range of practices, knowledge and affects involved in upkeep and maintenance.[3] Criticism of planned obsolescence and the widespread use of so-called reparability indexes bear witness to the spread of these concerns.

Invocations of 'care' are increasingly prominent in sectors such as design, architecture and urban planning. Design, for example, is increasingly prioritizing maintenance, facilitating repair and supporting sustainability: the Parsons School of Design, for instance, now has a Care Lab and a curriculum, led by Michele Kahane, developed around the notion of 'care design'.[4] Notions of restoration, regeneration, reproduction, upkeep, attention, concern, repair and compensation are among the terms used in these fields to frame care practices (Robison & Engster, 2015). These collaborative practices have the potential to create provisional, evolving habitats that enable iteration and transformation, rejecting fixity and sedentarism as foundational principles, calling for 'relationality and pursuing interventions to care not just for humans but also for non-humans, ecosystems and broader universes' (Escobar *et al.*, 2024).

Promises and pitfalls: Care as a new orientation for economic activities

With the spread of asset management practices – including into the sphere of design (Aguiar, 2023) – the idea is increasingly gaining traction that ensuring the viability of (commercial) economic activities requires attention to the sustainability of existing assets and their maintenance. In essence, these assets must be viewed as 'assets-actifs' that require care. This movement, which originated at the core of market arrangements, paves the way for a radical redefinition of the strategic orientations that shape what will be considered the economy. Furthermore, as we now propose, this is reinforced by a body of work and reflections grounded in care, raising questions about its potential (and desirable) role in redefining economies. What is now considered as care *work*, predominantly carried out by women, often unpaid, has only recently been recognized as a vital component of economic activities. Only gradually have researchers, including economists, developed instruments to measure its impact and monetary value. These efforts aim to stop it being devalued through what can be thought of as forced barter economization, and sometimes advocate its inclusion in market economization, assigning monetary value to it.

We had to wait for feminist studies to show that attention to care should bring with it a redefinition of economic activities and a reorganization of social relations. Care is not reducible to utilitarianism, but also seen as an emotional, ethical and political force. For Tronto (1993), care is

> a species activity that includes everything we do to maintain, continue and repair our world so that we can live in it as well as possible. This world includes our bodies, ourselves and our environment, all of which we seek to weave together in a complex, life-sustaining web. (p. 103)

Caring requires special attention to the vulnerability of beings and their capacity to act. Feminists rightly emphasize that caring is not merely an emotion; it is reflexive, productive and action-oriented within an ethical framework (de la Bellacasa, 2017).

For several decades, capitalist economies have faced the increasing importance of activities undeniably related to care – be it healthcare, elderly and disability care, education, domestic tasks and more. Care is thus becoming a key concept to revisit traditional questions such as public policy (Chopra *et al.*, 2013), migration and international political economy (Williams, 2014), global domestic labour and postcapitalist politics (Safri & Graham, 2010), online platforms (Rodríguez-Modroño *et al.*, 2024) and ecology (Bauhardt & Harcourt, 2018). This comprehensive body of work, along with its associated practices, makes a significant contribution to recognizing the centrality of care. Indeed, some observers now speak of societies of care.

The general, and in some sense universalist, orientations of the care movement have led to an interest in the redefinition, organization and performation of 'the economy'. One approach, the less radical and ambitious one, involves

highlighting and making explicit the growing integration of care practices into existing economies. A simple way to move this integration forward is to require that unpaid domestic and care labour be included in economic measures such as GDP (Waring, 1988); for ways to operationalize and measure the impact of care, see Folbre (2006). But for many observers, this movement does not challenge existing (so-called capitalist) economies, which adeptly absorb and transform it to their advantage. Žižek (2009), among others, speaks of 'philanthropic capitalism', wherein charity is no longer an idiosyncrasy of a few benevolent individuals but a foundational aspect of our economy. He argues that this merger of philanthropy and profit is unlikely to be undone.

The subordination of caring practices to profit, or their pacified coexistence with it, are not, however, irreversible. They elicit powerful opposition. Nadasen (2023) confirms that today's care economies draw on institutionalized, hierarchical systems where some people's pain translates into others' profit. Yet within this universe, there are also many stories of resistance. Low-wage workers, immigrants and movements ranging from Wages for Housework and Welfare Rights to the Movement for Black Lives have continued to fight for and practise collective care. These groups help envision how, given the challenges before us, we can create a caring world as part of a radical future. As Eisler (2017) argues, the idea of subverting economies based on market *agencements* in the name of justice through a systemic restructuring of care practices is not only plausible but also draws on existing relations of solidarity. For him, a 'care economics' approach is the way forward.

Yet, these approaches often assume that there are two hostile competing worlds. Such a binarism – care practices versus marketization – was denounced by Viviana Zelizer (2005) because it leaves no alternative but either submission or revolt. By introducing the concept of multiple 'economies of worth', Zelizer (2005) incites us not to view care and market activities as opposing or mutually exclusive, but to consider that there are many economic spaces where they coexist and interact.

We agree with Zelizer (2005). Caring is present in both market and non-market organizations in various forms: in the impersonal form of maintenance, in the form of personal services and the resistance provoked by their commodification, and in the form of alternative economizations that researchers are invited to support and promote. Furthermore, researchers who have studied care emphasize its complexity and ambivalence. To put it simply, it is a slippery concept (Mol, 2008). Care may also involve violence, exclusion, manipulation and dishonesty in claiming it. Geiger and Loza (2024), who are part of the care ethics movement and among the few social scientists who have raised the question of the present and possible place of care in market relations, point out: 'Care might foreground and subvert existing power relations, but it might also perpetuate or further ingrain them: not all "caring" is good, and whether it is depends very much on the position of the person making the judgment' (p. 507).

These two seemingly opposing movements, the one driven by the asset-activation process, which makes economic agents sensitive to taking care, and the one inspired by care, which questions its role in economies, can and (must) work together. The hypothesis we formulate is that the conjunction of these two movements, assetization and care, creates an infrastructure of practices that promotes a redefinition of economic activities, their orientation and organization – what we call a new mode of economization, ecologization.

The vibrant and growing body of literature that highlights the central role of care practices serves as a cornerstone for reimagining *agencements* through the lens of ecologization. This foundation is deeply rooted in age-old care traditions and propelled by transformative shifts, moving from stacked economizations on platforms to innovative designs of care infrastructures and architectures. But care is generally practised and yet locally articulated. How to approach care?

General and specific considerations of care

The objectives and manifestations of caring are deeply influenced by local circumstances, but there are underlying commonalities that become evident when hybrid collectives collaborate to design and implement specific care practices. Four sets of questions/challenges arise. Examining them helps us think through what might be involved in a comprehensive view of caring as concern for all that exists, and what instruments might help realize it.

The first practical challenge is to compile a comprehensive list of the entities mobilized by each hybrid collective. Consider, for example, a company (though NGOs, public authorities and other organizations could also be examined) that directly or indirectly mobilizes a variety of entities. Is it possible to provide an exhaustive, constantly updated list of these entities and to evaluate their mobilization at any given moment? Certainly not, but attempting it requires developing and accounting for the design, manufacture and installation of the necessary inventory instruments – and that effort, even if it can never be definitive, can be productive.

Second, let us imagine that the first stage has been completed satisfactorily, even if partially, resulting in lists upon which agreement has been reached, albeit in a provisional manner. The next question concerns the operations that must be designed and implemented to care for the identified entities. This involves assigning operational meaning to one or more of the numerous verbs that signify concrete forms of care. Plainly, there is room for differing interpretations and controversy. What may seem desirable and justified to some will seem frighteningly conservative to others. Different assessments will, for example, depend on how hybrid collectives explore the entities (assets-actifs) that are parties to the actions undertaken, and which entities they decide to take into consideration.

For instance, in the case of the automobile should we maintain and restore, at all costs, infrastructures while ignoring the melting of glaciers and predicted

disappearance of polar bears? What some people strive to preserve, others dream of destroying. These actions can be further broken down into various modalities. Preserving a human being, non-human living organisms, or minerals involves different approaches. What exactly does it mean to restore? Are there multiple strategies for successful restoration? Is it even possible to discuss restoration in the context of minerals, gold veins, or lithium deposits? Perhaps we should limit ourselves to conservation, but if so, how? Again, possible answers are multiple and sometimes contradictory.

Third, even if we set aside the first two challenges, we are left with the task of assessing costs. Typically, the concept of cost encompasses not only the investment required to activate an asset but also, and perhaps more crucially, the consequences (or as economists call them, negative externalities) resulting from such activations (or mobilizations of assets-actifs). Restoration, as part of these processes, aims to mitigate these adverse effects. Importantly, it need not always involve monetary exchange. For instance, the maintenance of assets-actifs can often be undertaken by volunteers who dedicate themselves to monitoring and, where necessary, repairing them – much like families who provide care for elderly or disabled members without monetary compensation within barter or gift economizations.

Fourth, there remains the complex and contentious issue of determining who will bear the costs, whether monetary or non-monetary. Answering the seemingly straightforward question – such as which agent, or which company, is accountable for mobilizing which entities (assets-actifs) and for what portion of their activity – proves impossible without the presence of established conventions and measuring instruments. The process of attribution inherently involves an element of arbitrariness. Typically, this arbitrariness is mediated, to some extent, by property rights, which can take various forms, whether explicit or tacit. For instance, the wide property-rights spectrum as conceptualized by Ostrom (1990) differs significantly from the traditional European notion of property that has dominated for centuries, leading to divergent frameworks of responsibility. It is important to note, however, that the attribution of responsibility (a concept heavily influenced by European legal systems) does not necessarily require the existence of property rights, whether explicitly codified or implicitly reconstructed by observers. Alternative conventions are conceivable. Nevertheless, there is no indication, either in current practices or theoretical developments, that we can realistically dispense with such frameworks altogether.

Readers will understand that our goal is not to propose universal rules like those commonly found in economics or political science textbooks: make the polluter pay, tax the externality, govern inclusively! If there is a general rule, it is that there is no general rule. Solutions are always local, uniquely crafted, based on the balance of power, possible compromises, interpretations of care, the forms of property rights, the identification and valuation of costs, and other situational factors. A clear illustration of the contextual nature of care-related actions is offered by the fine study by Chance, Goulet and Le Velly

(2023) of organic farming. It highlights the complexity of systems that must be designed on a case-by-case basis. In this context, caring – such as restoring fields to their original state – and distributing the associated costs result in specific arrangements that depend significantly on the variability of the living, non-human entities involved.

The practices analysed showcase a wide range of assumptions and modes of action. What unites them, however, is their shared engagement with common challenges: the inventorying of assets-actifs, the execution of restoration or regeneration and even destruction operations, and the evaluation and allocation of costs. Taking care – this phrase encompasses the diverse array of socio-technical activities and instruments devised and implemented to address these issues. Ecologization is an ongoing process, shaped by learning, debates and power dynamics. It is constantly evolving and will become what it is through these transformative processes. One thing is certain: there must be no turning back from this new mode of economization and like all modes of economization, this one depends on a variety of devices – some groundbreaking and essential, others as ancient as humanity itself.

Socio-technical devices: Valuemeters

Economization processes are materialized and enacted through socio-technical devices that persistently shape behaviour, expectations, representations, relationships and attachments. For example, as Miller and Power (2013, p. 556) argue, 'accounting representations and metrics are simultaneously powerful interventions that shape people, practices, and organizations … accounting is a mechanism by which the economization of organizational life is elaborated and institutionalized' (see also Tamar, 2023).

Those tools form a qualculative (i.e. simultaneously qualifying/characterizing and calculating) infrastructure that delineates what is considered relevant or irrelevant, enabling the tracking of variations and changes (Cochoy, 2002; Callon & Law, 2005). The term *valuemeter* has been introduced to describe the diverse instruments designed to structure the valuation process – that is, the establishment of value (counting, as Callon [2021] notes, is never merely counting).[5] No economization occurs without valuemeters. Importantly, valuemeters vary according to the mode of economization. For instance, the tools used to monitor activities like caregiving – such as the inventory of active entities involved, or the outcomes of restoration and maintenance – differ significantly from those employed in processes of commodification and the organization of market *agencements*.

One way to identify and characterize an emerging mode of economization, and to assess its degree of development and diffusion, is to take an interest in the emergence of new accounting tools and the controversies and debates they generate. It is to this investigation, necessarily superficial in the context of a paper, that we will devote the following lines. There is no doubt, as we

are going to show, that in the last few decades a computational infrastructure has been created to accompany and support the process of assetization and activation as defined previously. This infrastructure, designed and developed by specialists and economic agents, assembles devices that are increasingly attentive to assets, but assets considered as vectors of value transport and active entities, i.e. assets-actifs. Their diffusion is a powerful means to consolidate and to reinforce the process of greening economic activities.

As demonstrated by studies examining the evolution and application of accounting tools, there are at least three distinct approaches to measuring and accounting for value, each corresponding to a particular vision and mode of economic practice. Consider, for instance, the case of machines. Their value may be assessed based on the historical cost of expenditures incurred to acquire and maintain them. In this perspective, the past takes precedence, and what matters is the productive activity that these machines enable.

In a second approach, the focus shifts to the global and present value of what is owned, assessed through its potential negotiability in markets. Here, what counts is the resale value, often described as 'fair value' to emphasize its alignment with prevailing market conditions.

In the third case, it is future profitability that takes precedence. Here, the value of machines is not tied to past expenditure on them or their present market value but rather to the anticipated revenue they are expected to generate. This forward-looking approach emphasizes the potential for future gains, aligning valuation with projections, expectations and strategies aimed at maximizing profitability.

Each of these three modes – past cost, present market value and future profitability – reflects a distinct temporal orientation and embeds a specific vision of economic practice. Of course, though, if markets are efficient, which they never are, if expectations are rational, which they never are, if all economic agents choose Irving Fisher's (1912) formula (which many do) developed in *The nature of capital and income*, then the three modes converge to a single result: the value of any entity (for example, capital) is the sum of discounted estimated future profits.[6]

In the second and third cases, unlike the first, where wealth is generated through acquisition and productive activity, wealth can be accumulated in numerous other ways, provided the balance sheet value increases. For instance, if one purchases an asset, such as a piece of land in the centre of a major city, and its value rises over time without requiring any action, wealth is created. This phenomenon is often referred to as a speculative gain – a form of value appreciation that can be readily converted into cash, highlighting a shift from productive to speculative forms of enrichment.

It took 100 years, battalions of economists preaching the good word and working to convert accountants, the intervention of specialized consulting firms, and the commitment of legislators for companies to put into practice the recommendations of an economist, Irving Fisher (1912), who had published his work at the dawn of the twentieth century. The linear time of clocks and

mechanical movements imposed itself on economic life. The past now exists only in the present, and the future is reduced to the same present by the grace of a simple formula. Ergo, Fisher won (Muniesa & Doganova, 2020; Doganova, 2024).

The process of assetization is intricately tied to the widespread adoption of accounting standards, themselves heavily influenced by Fisher's (1912) formulas. By placing the concept of assets at the centre and defining them in exclusively financial terms, these accounting tools erase the past and reduce the future to its present monetary value. Content with estimating cash flows or recording resale prices, they disregard the lived histories of assets – how they come into being, their ability to persist, adapt, transform and co-evolve with their surroundings. In essence, these tools overlook the agency of assets, failing to recognize that every asset is, in fact, an *asset-actif*: an active entity endowed with agency, unfolding within the broader space–time of the planet. This agency transcends the narrow confines of fair value calculations as they have been conceived in recent decades, challenging the reductionist logic that dominates contemporary valuation practices. Ergo, Fisher's (1912) followers are wrong.

Accounting standards have had the significant merit of elevating the concept of assets to a central position, thereby acknowledging the critical role of value transport in organizing economic activities. However, these standards must continue to evolve to reflect the expanding and enriched understanding of assets. Only then can they serve as tools for an economy defined not merely as the financial management of assets, but as the stewardship of *assets-actifs* – active entities with agency and capacities that extend beyond monetary valuation. What some might consider the greatest flaw – the reduction of things to their market value through accounting – could, paradoxically, become its greatest strength.[7] From this very limitation may emerge a framework for measuring the caring attention we devote to things, enabling a reorientation of accounting toward practices of care and responsibility.

How might we, then, analyse and imagine new accounting instruments for care through asset-activation? This would require moving beyond frameworks that prioritize financial value and marketization-based metrics to develop ecologized devices that recognize the agency, interdependence and transformative capacity of assets-actifs.

Accounting instruments of ecologization

The development of accounting that truly reflects the contributions of non-humans resembles a long odyssey, one that has been remarkably traced by Holmes and Yarrow (2023). Environmental accounting was explicitly excluded from the early frameworks of national accounting. The United Nations' 1953 *System of National Accounts* explicitly stated that 'charges related to the depletion of natural resources are not included in provisions for the

consumption of fixed capital' (UN, 1953, p. 7). As Holmes and Yarrow (2023) illustrate, attempts have been progressively introduced to address this exclusion, but with limited success. These efforts have repeatedly faltered over the challenge of clearly distinguishing between so-called natural entities, which are to be preserved, and human entities, which act upon them, whether constructively or destructively (Stiglitz *et al.*, 2010, pp. 77–78).

A forest, for instance, continues to live its life as a forest even when exploited by humans, while few forests, even the so-called primary ones, remain untouched by human activity. Hybrid entities – where natural and human influences intertwine – are omnipresent. Active entities, human and other-than-human, are deeply entangled in ways that defy simplistic categorizations, underscoring the need for an accounting framework capable of grappling with such complexities.

An indication of the emergence of ecologization is the growing proliferation of instruments designed to trace and measure the entanglements and transformations generated by human activities that affect the planet (Bebbington *et al.*, 2021; Capital Coalition, 2020). The design and iterative implementation of these tools, now increasingly widespread, attests to the intensity and reach of concerns that can no longer be disregarded. An accounting infrastructure is taking shape, comprising tools, regulatory frameworks, public authority interventions, the work of specialists, academic contributions, experiments, feedback loops and socio-technical controversies. A defining characteristic of this emerging infrastructure is the likely absence of universal standardization. The tools being developed are context-specific, shaped by the particular realities they engage with and are created on a case-by-case basis. This diversity of tools enhances their adaptability, dissemination and the robustness of the movement driving their adoption. If there is any unity to be found, it lies in the shared commitment to identify and measure the efforts required to care for *assets-actifs* – through maintenance, compensation and other restorative actions. This shared commitment underscores the collective aspiration to include care as a fundamental principle in economic practices.

Indicators

The prevailing approach involves creating indicators that are primarily based on biophysical variables, which are then linked to economic variables. Compiled into dashboards, these indicators and their associated measurements enable the tracking of assets-actifs across their entire lifecycle, moving beyond one-time monetary evaluations confined to specific moments in their existence. They are designed to be both 'meaningful' and 'actionable' for decision-makers. Furthermore, these indicators can be calculated at varying scales and aggregated as necessary.

Among the most prominent are those that take the planet as their reference. A striking example is the annual calculation of the 'overshoot day', the date by

which humanity has consumed all the resources the Earth can regenerate within a year, accompanied by the sombre reminder that there is no Planet B that can sustain human life soon. At the planetary level, one might describe the existence of a measurable ecological debt whenever the hectares needed to meet global consumption exceed the Earth's surface area when scaled to the entire global population. Another notable example is the UN Sustainable Development Goals, which function as a globally recognized dashboard and serve as a reference framework for international coordination and accountability.

Biodiversity, for instance, is the object of around 20 indicators, divided between Goals 14 and 15 of the UN Sustainable Development Goals. These indicators aim to measure the conservation, preservation and restoration of ecosystems and biodiversity. At the global level, the UN's SEEA-EA programme (System of Environmental Economic Accounting – Ecosystem Accounting) facilitates discussions and proposals for standardizing these measures within international accounting frameworks. Examples of indicators include forest area, bird abundance, soil health and tonnes of CO2 sequestered by forests.

A similar case can be made for greenhouse gas emissions. While the calculations involved are extraordinarily complex, this is arguably one of the clearest areas for linking geophysical variables with economic measures: economic activities lead to an increase in greenhouse gas emissions, which in turn affect geophysical variables. This direct relationship makes it a particularly illustrative example of how biophysical and economic dimensions can be interconnected.[8]

Macro-calculations possess the distinctive advantage of aligning, to varying degrees, with the aggregation of meso-level (sectoral) and micro-economic behaviour. It is precisely at this juncture that generative economics asserts its relevance, introducing measurement tools designed to trace and evaluate the behaviour of agents, notably companies. Generative economics – often referred to as circular economics – endeavours to recalibrate production systems towards sustainability, emphasizing the creation of goods and services while deliberately constraining resource consumption, minimizing ecological degradation and reducing waste generation (Stahel, 2019). It is a model of production and consumption that involves sharing, reusing, repairing existing products and materials for as long as possible so that they retain their value, and product life cycles are extended to reduce use of raw materials and production of waste. This model is based on the creation of positive value loops with each use or reuse of the material or product before final destruction. In particular, it emphasizes new ways of designing, producing and consuming, extending product life, using rather than owning goods and reusing and recycling components.[9]

Howard *et al.* (2018, p. 7312) propose a framework of objectives for the generative economy, which include:

> the maintenance and rebuilding of stocks of natural capital and biological materials, the total use and depletion of stocks of technical materials (notably

> critical and "at risk" resources and materials), the quantities [and "quality" and longevity] of recirculated or cascaded technical and biological products and materials … the value of recirculated or cascaded … products and materials, and the use of renewable energy. Each of these objectives is accompanied by specific indicators that can be employed to assess a company's performance.

There are no systematic studies on the generalization of these practices. There are, however, some sectoral analyses. Muñoz *et al.* (2023) shows, for example, that in the construction industry, such circular economy indicators calculated by dedicated software are in common use; they counted 249 of them.[10] The emergence of these practices reflects an increasing interest in re-examining supply chains. Traditional linear design is gradually being replaced by more intricate models, characterized by intertwining loops and backtracking, which expand the network of participating entities.

While benefiting from its compatibility with certain existing macro-indicators, accounting, as currently defined by dominant standards, remains inadequate as a system for measuring and monitoring the principles of care. Instead, its logic is anchored in terms of costs – monetary or otherwise – to be minimized or avoided, rather than addressing the costs associated with regeneration or restoration. This discrepancy is particularly glaring in the case of digital production processes, such as digital advertising or AI systems like those developed by OpenAI. The huge energy and material consumption associated with the supply chains underpinning these processes demands innovative approaches to reimagine sustainability within such technologically intensive networks.

From indicators to procedures

One of the key merits of the aforementioned indicators lies in their ability to highlight the cumulative upstream effects of dispersed actions without necessitating a detailed examination of each individual production chain back to its origin. However, their primary limitation is the lack of actionable accounting information tailored to individual agents. Instead, aggregates tend to focus on broad, undifferentiated measures, such as restrictive rules (for example, limiting individuals to four plane trips per year or standardizing households of no more than three rooms for families of four) or sweeping cultural appeals that celebrate values like sobriety. Such generalized propositions often clash with the diverse interests and calculation methods of different stakeholders, revealing the tension between universal aspirations and particularized realities.

A viable strategy for addressing these limitations lies in amplifying the voices within this diversity. This approach presupposes that valuemeters are not established *a priori*; rather, they emerge from a process of co-design and deliberation. Within this framework, agents and hybrid collectives – those who identify as stakeholders in the trajectory of assets-actifs involved in ongoing

or future projects – play a central role. Governance by indicators, traditionally imposed unilaterally by experts, is supplanted by a procedural method that embeds a democratic dimension into economic life. In this evolving paradigm, valuemeters are no longer conceived as predetermined starting points but as provisional outcomes, perpetually open to reinterpretation and transformation.

In France, the Ministry of Ecological Transition and Territorial Cohesion mandates that environmental considerations be incorporated as early as possible in the project design process. This includes decisions regarding the choice of the project, its location, and its overall appropriateness, ensuring that its environmental impact is minimized (Ministère de la Transition Écologique, 2023). The integration of environmental factors and checking for the neutrality of tools of valuation at the outset follows a clear hierarchy: first, the avoidance of impacts; second, the reduction of unavoidable impacts; and finally, as a last resort, compensation for residual impacts if the earlier stages fail to fully mitigate them.

Of course, it is not uncommon, if not the norm, for government assessments to be botched or simply ignored. Sometimes, however, when opposition becomes vigorous, recourse to the procedure may become the only conceivable response. This is what happened in France, when the Notre-Dame-des-Landes airport project threatened a wetland opponents considered essential to preserve. The experts commissioned by the government drew up a report covering the difficulties involved in such an assessment – difficulties of precisely the kind discuss the above, such as drawing up a complete inventory of the relevant assets-actifs (de Marsily *et al.*, 2013). The report's authors did not shy away from complex issues, such as how to take into account the non-stationarity of the changes they undergo.

The increasingly active presence of new tools in ecologization processes is of huge importance. Yet caution is imperative. As Kirkegaard (2023) suggests, tools created for ecologizing could have the effect of suppressing dissent or stifling ecological critique. This risk becomes particularly evident during the often expert-driven design phase, in which experts rely on tools such as energy scenarios, digital simulations and procurement schemes, which can prioritize techno-economic valuations and exclude other concerns. This underscores the necessity of embracing co-design as a fundamental principle – only through inclusive and collaborative design can genuine ecologization be achieved (Kirkegaard, 2023).

Monetary or non-monetary costs? Both indeed!

It is now clear that there can be no ecologization without the development and deployment of ecologizing tools. Evaluating and comparing costs is an essential step for anyone aiming to implement asset-actif management, yet this evaluation does not necessarily require monetary measures. For instance, in the case of the wetlands at Notre-Dame-des-Landes, nothing precluded the

report's authors from exploring alternatives such as mobilizing volunteers who, in exchange for land concessions, could have undertaken the regeneration and maintenance of new wetlands to replace those slated for destruction. However, such a proposal was conspicuously absent – likely because the authors either recognized, or were compelled to accept, that it was not aligned with the prevailing political agenda.

The costs associated with care – whether in the form of restoration, compensation, or other interventions – can be articulated in both monetary and non-monetary terms. Neither method, however, escapes inherent limitations. Non-monetary valuations, though seemingly more attuned to ethical and qualitative dimensions, are far from devoid of complications. They invariably invite contestation, opening a space for reasoned deliberation and the pursuit of potential compromises. Yet, simultaneously, they expose the terrain to confrontation between often irreconcilable ethical or political standpoints.

When a multiplicity of moral frameworks collides, and no single norm can claim authoritative primacy, agreement becomes a challenging endeavour in the absence of instruments – however rudimentary – that allow for the measurement of costs. For instance, how might one navigate the gulf between those who argue for the equality of non-human and human animals in terms of rights and those who advocate for a boundary to be drawn? What makes the enslavement of humans universally condemned, yet the domestication and slaughter of non-human animals largely permissible?

In such cases, the act of classification itself – assigning varying degrees of salience to different beings – enables the emergence of reasoned compromises. For example, the emotional toll of an ant's death is typically perceived as far less significant than the suffering of a horse injured and subsequently slaughtered by a farmer. However, one must concede that establishing such non-monetary metrics is no simple undertaking. Numerous criteria, shaped by cultural, emotional and ethical considerations, intersect to determine salience. The political deliberations surrounding these classifications, and the ill-conceived decisions that sometimes ensue, can give rise to untenable situations. Here, the interplay of moral plurality and institutional instruments of valuation reveals both the necessity and the fragility of constructing shared understandings amid profound disagreement.

So why avoid all recourse to even approximate monetary valuations? There's no reason to deny their potential. They make accounting easier, thanks to the generalized equivalences they establish; and they act as an incentive if they lead to well-targeted imputations of costs. However, monetary assessments of costs also encounter severe limitations. They fail to take into account the entire life cycle of assets-actifs, and privilege the market (financial) valuation of the latter as assets. For example, one of the most straightforward methods consist in closely coupling biophysical variables and monetary valuation, by deciding, for example, that a tax should be levied, or a financial penalty applied whenever a threshold is exceeded. This seemingly simple rule in fact conceals a host of complex issues to be resolved, as illustrated by the case of carbon emissions

and the markets that have been set up to assign a monetary value to each tonne of CO_2 emitted: fixing and allocating quotas, measuring greenhouse gas emissions, calculating offsets, assessing the resulting pecuniary inequalities and, in the absence of a constituted market, calculating the penalties imposed on agents who transgress quotas. All these issues can only be resolved through technical and political discussions. Monetary valuation does not magically make those debates disappear. In some cases, however, it can be enforced almost without discussion. This is the case, at least sometimes, for bio-economic models used for the control and management of fisheries (Parent *et al.*, 2024).

Another compelling illustration can be found in the concept of ecoservice, which represents an attempt to bridge the divide between monetary and non-monetary valuation. The determination of the value of ecoservices often emerges as a qualitative compromise, negotiated between a plurality of viewpoints and preferences articulated by diverse stakeholders – ranging from associations and trade unions to scientists, political parties and beyond. The estimated worth of the services provided by a river, for example, varies significantly depending on the perspective of the stakeholder in question. For the trout fisher, the river embodies a natural habitat teeming with ecological value and recreational significance. For the grain farmer, it is primarily a source of irrigation, tied closely to agricultural productivity and sustenance. For the electricity producer, it becomes an energy reservoir, a means of generating economic and technological value. Such divergences in perspective underscore the challenge of constructing a unified measure of value, revealing the deeply contested and relational nature of ecoservice valuation. In this space of negotiation, the interplay of competing interests and ethical considerations produces outcomes that are rarely fixed or definitive, but rather provisional and context dependent.

However, once the value is determined by whatever means, and if it can be determined at all, it leads to the transformation of physical quantities into monetary values without any market transaction. Sticking too narrowly to the notion of ecosystem services reduces the Earth to the role of service providers, without concern for their sustainability. We can only agree with the courts that the losses associated with the disappearance of services should be assessed on the basis of the costs of restoration rather than the preferences of the beneficiaries.

To go further and take non-human agency into consideration, Brice Laurent (2023) proposes the introduction of the notion of territory, or more precisely of territorialization, to facilitate the transition from accounting organized around the notion of assets to an accounting that takes account of assets-actifs. To speak of territorialization, he points out, is to refuse to consider territory as a framework, a context, a background. Territories have a history, a past, and they have a future; their geometry is changing, caught up in an evolving process with its conflicts and catastrophes (Laurent, 2023, p. 161). The projects that Laurent (2023) has studied in French Guiana and New Caledonia highlight these two conceptions of territory, one static and the other evolving, one

deprived of history and the other inscribed in duration, one that detaches and the other that becomes an object of care. In the first case, the territory is nothing but a financial asset (measured by the market value of its mineral resources) that can be disposed of without any particular care. The process is one of deterritorialization, corresponding to the disappearance of national or regional territorial states, traversed by flows that ignore borders and the spatial constraints they impose.[11]

Deterritorialization leads to the creation of enclaves that can be governed from afar and guarded by private militias (as is the case in Niger, for example, for the exploitation of uranium deposits). In the second case, extractive activities are conceived in the long term: the monitoring of the construction and maintenance of a territory and the constant concern for a common destiny become permanent issues. As far as we know, the design of an accounting infrastructure dedicated to territorial management is still in its infancy. This is not for 'technical' reasons – the tools to be implemented are not fundamentally different from those used for the conservation of ecosystems – but because the interests at stake are strongly at odds. However, as the case of New Caledonia shows, the balance of power could well be reversed, putting the design and implementation of new accounting instruments on the agenda.[12]

Whatever the method used, valuation can only be meaningful from the point of view of the ecologization process if it takes into account the entire life cycle of the active entities concerned, and if it directly confronts the difficulties presented in the first section of this paper: What does it mean to take care of assets-actifs? What does it mean to restore, maintain, compensate, repair, regenerate, renew, etc.? The accounting systems used to monitor and manage the process of ecologization must combine calculating and debating.[13] Their design must also reflect the specific nature of the problems to be solved. There are no universal tools. These two principles – hybridization of tools and adaptability to the circumstances of their implementation – are clear from reading the remarkable Bebbington *et al.* (2021). Accounting should be as hybrid as convenient.

It is neither prohibited – nor discouraged – to attempt transpositions, to draw analogies, to seek out resonances. But one must never lose sight of the fact that ecologizations unfold within a world of approximation, a world where the priority is to avert the pessimum rather than to pursue an elusive optimum. This is why caution in the face of dogmatism is essential, and why even hesitant and incomplete initiatives deserve our attention and encouragement. From these reflections emerges a clear insight: this movement is already in motion. Valuemeters are being conceived, assembled and progressively earning legitimacy and recognition.

What matters most is to remain attentive to the overarching trajectory of ecologization, ensuring that the ongoing, iterative and collaborative process of designing valuemeters remains aligned with this vision. In essence, the sole transgression we must avoid is forgetting to consider the living and nonliving for what they truly are: active, structured, constitutive, dynamic entities

that are never static, always in flux, perpetually weaving the conditions of habitability both within and around us.

Conclusion

This paper focused on the processes of ecologization, rather than defining *a priori* what an ecologized economy should be. It is not an easy exercise, and there is no guarantee that it will produce a robust result. Given that we are in an emerging situation, there are undoubtedly several ways of describing the modes of economization that are in gestation. Only time will tell, as power relations evolve, which one will prevail. The only thing the social scientist can do is to propose a plausible analysis and show why it is plausible.

The difficulty is all the greater because a certain conception of social science practice is involved in this adventure. When we propose a definition of the process of economization, it is clear that we are expressing preferences. Taking care of the human and non-human entities that populate the Earth: the reader will have understood that we are committed to this conception, which is obviously not the only one possible, and may be in conflict with others. Every process of economization involves moral considerations and normative orientations: the search for efficiency, the fight against waste, the minimization of risks, the reduction of inequalities, the fight against injustices, the accomplishment of the divine will. Everyone chooses their gods and demons, and the social scientist no more no less than anyone else.

Let us be careful not to infer from this reasoning that we are entering a dangerous territory that takes us away from the scientific approach, from what Max Weber called *Wertfreiheit*, which might be interpreted as value-free understanding or axiological neutrality. We are not trying to impose our own empathies and antipathies without elaboration. Rather, as Passeron (1991) recommends, we transform them into cognitive resources that help us to better characterize and understand (‘*verstehen*’) the developments we observe from a distance, in the most detached way possible, and to give meaning to the practices that enact them (see also Costey & Fossier, 2003). *Verstehen* and *Wertfreiheit* should not be seen as mutually exclusive requirements. On the contrary, and especially in our exploration of assets-actifs, we have never neglected nor lost our belief in the ethos of scientific research. This quest, which has helped us propose the novel concept *asset-actif* to describe a reality that has remained largely invisible, would never have been possible if it had not been guided and nurtured by our interest in concepts such as habitability and sustainability.

Perhaps the most disturbing result concerns the place given to the concept of asset. For some people assetization has become indeed synonymous with excessive financialization, undue rents, predation, the commodification of everything, the most advanced stage of capitalism and neo-liberalism … It’s hard to dismiss these arguments out of hand. But it’s also hard not to

see the ambivalence of assetization which is actually older than capitalism, neoliberalism, industrialization, and for some, even the emergence of history itself.

We do not propose that no matter what happens we need to assetize everything in nature and make it an object of marketization. What we propose is asset-activation. Assets-actifs are like the pharmakon in Derrida's (1981) analysis of Plato's Phaedrus (1981). Both remedy and poison, the pharmakon is the bearer of ambivalence. There is no remedy that doesn't have side effects, no medicine that isn't toxic. Because it acts and affects, it both soothes and hurts.

Derrida (1981) gives the example of scabies sufferers who 'feel a painful jouissance by rubbing their wounds'. The concept of *asset-actif* embodies this ambiguity. It draws attention to the pervasive presence of active entities while simultaneously encouraging care for them. Furthermore, it suggests that such care can benefit caregivers themselves, whether motivated by altruism or self-interest. By emphasizing the ambivalence and dual meanings of a concept that has become central, yet univocal, social scientists may facilitate the emergence of new forms of *agencement*. This approach also has the key advantage of bridging the gap between past, current and emerging practices. It combines two complementary elements. On the one hand, it reveals a new way of thinking about economies; on the other, it acknowledges existing practices while opening up new meanings. This movement, which we have tried to document, takes the form of new accounting practices that can help ensure its effectiveness and give it a certain continuity.

Ours is a difficult and uncertain proposal. Is it, then, worth pursuing? By the end of this long paper with two instalments, we believe the answer is affirmative, for at least two reasons. First, ecologization is not an abstract ideal or distant possibility. As we have (hopefully convincingly) showed, it is a current and empirically observable economized process, firmly grounded in actual practice. It is built upon theoretical elements, categories, everyday action, tangible devices, valuemeters that are already deployed and working. Whether one wants to see them as 'the ecological economy' inspired by Georgescu-Roegen (1971), or as ecologization via caring and *assets-activation,* these are all elements actively undergoing development. They remain malleable and open to reconfiguration. This grounding in reality not only ensures the viability of emerging *agencements* shaped through experimentation, but also facilitates the identification of potential sites for meaningful intervention.

Social scientists, along with those committed to collaborating with them in steering the process of ecologization, face a wide spectrum of potential interventions. This constitutes the second reason for supporting the approach we propose. These interventions include improving accounting tools, refining methods for cataloguing *assets-actifs*, exploring diverse forms of care, measuring both monetary and non-monetary costs using valuemeters, identifying the forces resisting these efforts, and deriving actionable insights for governments, such as shaping legal frameworks around property rights or recognizing non-human rights.

This approach does not seek an elusive optimum but rather aims to avoid the worst-case scenario, staying as far from the pessimum as possible. It acknowledges the power of forces seeking to manipulate measurement tools for their own narrow interests or to transform *assets-actifs* into mere sources of monetary income. Yet, it refuses to cede this critical terrain to such forces. The task is immense, and its outcome remains uncertain. However, without embracing uncertainty and the effort required to navigate it, economies would remain entrenched in their current forms, transforming into a rigid 'second nature' that imposes its immutable laws on all, human and non-human.

To complete the picture, we will need to address an issue that has not been addressed in this paper: the strategic question of how to finance an economy in the throes of ecologization. Platformization as stacked economization considerably increases the financing capacities of companies (Caliskan *et al.*, 2024). There are strong reasons to think that without regulation imposed by public authorities these companies will remain reluctant to take charge of the sustainability of the hybrid collectives they animate. As Golka (2023) advocate, this reallocation of financial resources would be more likely to occur if governments were to promote localized and decisive action required for managing hybrid collectives effectively in diverse ecological contexts. The work has only just begun.

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Notes

1 https://www.merriam-webster.com/thesaurus/take%20care%20of, last accessed on 23 November 2024.

2 Foucault's entire oeuvre might be seen as a documentation of this second point: one work especially relevant here is Foucault (1988).

3 See also Denis & Pontille (2015); Graziano & Trogal (2019) and Pomies (2023).
4 https://sds.parsons.edu/designmanagement/news/introducing-carelab/, last accessed on 23 November 2024.
5 Other terms, such as for example 'valuation tools', have been proposed (Asdal & Huse, 2023). Following Latour, we stick to the notion of valuemeter which implies the instauration of some sort of ordinal scale (Latour & Lépinay, 2009).
6 On the proto-history of the formula, see Deringer (2018).
7 Of course, there's no guarantee that this will happen. See for example Maechler (2023).
8 cf. Georgescu-Roegen's argument, as presented in the first instalment of this paper.
9 For the sake of completeness, we should distinguish between two concepts of circularity: weak circularity, which aims to adapt the economic model at the margins (recycling, maintenance, upkeep, waste prevention); and strong circularity, based on the principles of sobriety, extended product life and intensified use. For the circular economy and its accountability, see the pioneering work of Beulque *et al.* (2023) and Disse & Aggeri (2022).
10 Water, the ozone layer, energy, toxicity, land use, lifespan, and the necessary actions – such as eliminating product redundancy, extending usage, conserving resources, reusing products, and prioritizing repair and maintenance – are central considerations (Muñoz *et al.*, 2023). It would be valuable to compile an inventory of the main calculative tools currently in use or with potential for broader application. One such tool is E-liability (environmental liability), an accounting algorithm designed to measure the total carbon footprint of each product and service in the economy 'from cradle to [the customer's] gate', though not necessarily from cradle to grave. See https://e-liability.institute/wp-content/uploads/2023/11/v2-E-liability-FAQ.pdf.
11 The notion of deterritorialization is borrowed from Deleuze and Guattari: see for instance Wolny (2016) and for its adoption by geographers in the 1990s, Badie (1995).
12 The concept of bioregion, despite extensive research and exploration, appears less promising compared to the notions of territorialization and deterritorialization, which more effectively encompass the dynamics of the forces at play. For further discussion on bioregions, see Sale (2000). for a project that resonates with that of re-territorialization, see the innovative ways of reorganizing societies and caring for collective planetary resources explored by Dark Matter Labs (https://lee.darkmatterlabs.org/ last accessed 21 March 2025).
13 Economists are not unconditional supporters of monetary valuation. For example, Stiglitz, Sen and Fitoussi (2010) note that 'It is often difficult to assign a monetary value to the natural environment; distinct sets of physical indicators will therefore be needed to monitor its evolution'.

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