Technology Review for Carbon Neutrality

Perspective

Nature's Minsky Moment, NatureFinTech and the world's next asset class

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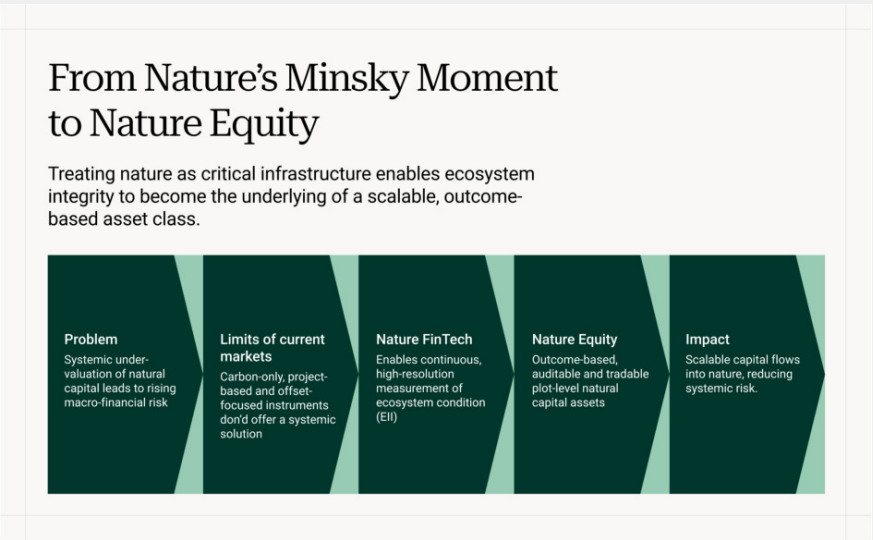
ABSTRACT

Systematic under-valuation of natural capital is creating growing macro-financial risks and raises the prospect of a "Nature's Minsky Moment," in which ecosystem degradation triggers abrupt asset repricing, a dynamic now increasingly recognised by central banks and supervisors as relevant to financial stability and capital adequacy. This article reviews existing nature-finance instruments and shows why carbon-centric and project-based approaches remain insufficient to close the global nature funding gap. It advances a framework that treats nature as critical infrastructure and examines how recent advances in NatureFinTech enable continuous, high-resolution measurement of ecosystem condition. Building on these capabilities, the paper introduces Nature Equity as an outcome-based asset class linked to verified ecosystem integrity. While early applications demonstrate promise, challenges remain in regulation, valuation, and market maturity.



KEYWORDS

Natural capital accounting; Nature Equity; NatureFinTech; nature finance; ecosystem asset valuation; nature markets

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1. Introduction

Biophysical limits and ecosystem integrity are increasingly likely to determine how economic value creation and financial stability evolve over the long term. Recent work has referred to a potential "Nature's Minsky moment," in which accumulated, systematically undervalued environmental risks trigger a sudden repricing of assets[1]. By analogy with the 2008 financial crisis, in which the risks embedded in subprime assets became visible, today's economies are exposed on the systematic under-valuation of natural capital (fertile soils, clean water, a stable climate) that has long been treated as an inexhaustible externality[2].

Increasing ecosystem degradation is already affecting supply chains, food security and the stability of financial systems. Estimates suggest that more than half of global economic output (around USD 58 trillion) is moderately or highly dependent on ecosystem services[3]. A substantial loss of these services would lead to an abrupt repricing of assets and significant macro-financial risks with far-reaching economic and social consequences.

The aim of this article is to (i) highlight current instruments for nature finance and their limitations, (ii) argue for a view of nature as critical infrastructure, (iii) discuss the enabling role of technical and economic innovation through "NatureFinTech", (iv) introduce "Nature Equity" as a new asset class, and (v) highlight the current state of implementation and discuss identified barriers.

2. Current nature finance approaches and their limitations

In recent years, several instruments explicitly targeting nature and biodiversity have emerged. These include thematic funds and facilities such as the recently announced Tropical Forest Forever Facility (TFFF), rhino bonds, green and sustainability-linked bonds, and debt-for-nature swaps. While upcoming initiatives such as the TFFF are promising, these instruments remain limited in scale, duration, and are often tied to specific grant, development or policy contexts[4].

Beyond them, the only environmental market that currently operates at global scale is the voluntary carbon market. While carbon markets have mobilized USD 30.3 billion toward nature-based activities such as restoration and REDD+ (Reducing Emissions from Deforestation and Forest Degradation plus additional forest-related activities) between 2021 and 2024, they are proving an increasingly limited tool[5]. The voluntary carbon market faces concerns about integrity and impact[6]. There remain too few financial instruments designed to protect and regenerate natural capital at scale, and the offset focussed voluntary carbon market alone cannot shoulder this burden.

Key challenges for the effectiveness of carbon markets include:

Permanence and additionality. Many carbon offsets do not represent permanent emissions reductions or genuinely "additional" climate action[7]. Forest-based credits, for example, can be invalidated if the forest later burns or is cut down, releasing stored carbon. This creates a fundamental time asymmetry: fossil emissions are effectively permanent, while nature-based storage is temporary and reversible. Guaranteeing perpetual preservation is nearly impossible, and some offset projects have been shown to credit actions (such as preventing deforestation) in areas that were never at real risk[8].

Shift from avoided emissions to removals. Traditional carbon credits often finance avoided emissions (e.g. protecting a forest to prevent CO_2 release). Avoidance can be problematic: preventing emissions in one place may lead to "leakage" elsewhere[9]. Climate science increasingly emphasises the need for actual carbon removals (such as reforestation or direct air capture) to achieve net-zero[10]. Credits for removals are in demand, while pure avoidance credits face growing scepticism. This shift raises the bar for project quality and reduces the pool of credits considered acceptable.

From compensation to contribution. Leading climate governance bodies now recommend a shift from "compensation" models, in which companies purchase offsets to neutralise unabated emissions, toward "contribution" claims, in which companies finance climate- and nature-positive projects without asserting strict equivalence to their own emissions[11]. This evolution is reflected in the Science Based Targets initiative (SBTi), which states that carbon credits "cannot be counted toward a company's near-term science-based targets," but may be used to finance beyond-value-chain mitigation[12]. Similarly, the Voluntary Carbon Markets Integrity Initiative (VCMI) framework emphasises the primacy of internal emissions reductions and limits the role of offsets to clearly framed, non-neutrality claims.

Carbon as a commodity. To date, most carbon credits have been treated as a homogeneous commodity: one tonne of CO_2 reduced is assumed to be equivalent to any other tonne. In such a commodity framing, the market primarily optimises for price and volume, and differences in underlying integrity (permanence, leakage risk, biodiversity outcomes) are only imperfectly reflected, if at all[13]. This creates incentives to supply the cheapest credits rather than those that deliver the most robust and durable ecological outcomes.

From ex-ante to ex-post valuation. In the early carbon markets, credits were often sold ex-ante, financing projects with the promise of future emissions savings. This practice contributed to over-issuance and uncertainty over whether projected reductions would materialise. The trend is now toward ex-post credits, issued only after sequestration or avoidance is verified[14]. Ex-post valuation ensures that payments are made for realised climate benefits, strengthening market integrity but limiting immediate capital for projects.

To close the USD 700–800 billion Nature finance gap[15], a systemic approach is needed that builds on existing carbon and green market infrastructure, but shifts the object of finance from individual offset transactions to the condition and stewardship of underlying natural capital. The next section argues that such a solution becomes conceivable only if nature is treated explicitly as critical infrastructure, with corresponding governance, measurement and investment frameworks.

3. A new narrative: nature as critical infrastructure

If a stable climate and functioning ecosystems are foundational to the economy, nature must be managed and financed as infrastructure. This implies moving nature from the periphery of finance, where it is treated as a "nice-to-have" corporate social responsibility topic, to the core of economic decision-making. The recent positioning of the Bank of England (Supervisory Statement 4/25) and the European Central Bank (Climate Factor) add to this by embeding climate risk into core prudential frameworks. Meeting these expectations requires understanding climate risk and the economics of mitigation and resilience, how ecosystem integrity lowers physical risk, stabilises cash flows and collateral values, and improves credit quality. This creates demand for structures that allow capital to be allocated directly into high-integrity ecosystems as resilience-enhancing assets.

Nature thus becomes the essential capital stock that underpins prosperity and requires the same level of investment, maintenance, and risk management as any other transport or energy infrastructure. Just as infrastructure is funded to prevent bridge collapses or power outages, natural infrastructure requires investment to avoid ecosystem collapse.

The notion of nature as infrastructure is gaining traction in policy and business circles[16,17]. The World Economic Forum's Global Risks Report 2025 highlights biodiversity loss and ecosystem collapse among the top threats to global stability[18]. Leading insurers and banks likewise acknowledge that environmental degradation is translating into uninsurable assets and credit risks with in turn can lead to an "unmortgageability" of entire regions[19]. These circumstances suggest that natural capital acts as vital infrastructure: it provides services such as flood protection, water filtration, pollination and climate regulation, without which built infrastructure and economies cannot function.

Importantly, the scale of investment needs to reflect the value nature provides. At present, global finance allocates only a very small fraction of capital to nature-positive assets. One analysis finds that while 50%–55% of global GDP is dependent on ecosystem services, natural capital represents only around 0.2% of institutional investor portfolios[20]. This misalignment constitutes a significant market

failure. Trillions of dollars flow into conventional infrastructure, while the annual funding gap for nature conservation and restoration is estimated at around USD 700–800 billion[15]. Bridging this gap requires treating nature with a level of urgency and financial innovation comparable to large-scale infrastructure programmes or the energy transition.

Policymakers and experts therefore call for "rewiring" finance to embed nature: incorporating natural capital into national accounts, mandating disclosure of nature-related risks (e.g. Taskforce for Nature-Related Financial Disclosure), and creating investment vehicles analogous to infrastructure funds or bonds for nature assets[21]. Nature-based solutions can offer competitive returns: for instance, each dollar invested in wetland or peatland restoration can avoid several dollars in future flood damages while generating co-benefits. Recognising this, some governments and institutions have explicitly labelled ecosystems as critical infrastructure and begun to allocate budgets accordingly[22]. One analysis suggests that even a 2% pension fund allocation to nature as an asset class could unlock on the order of GBP 100 billion for projects, with substantial resilience and economic benefits[23].

4. NatureFinTech: measuring and monetising ecosystems

Until recently, it was not feasible to integrate nature into financial and policy frameworks in the same way as conventional infrastructure, because ecosystem condition and performance could not be measured with sufficient precision. Roads or energy infrastructure can be monitored in terms of inputs, outputs and depreciation; ecosystems, lacked operational metrics that could support long-term contracts, valuation and risk management. Only recent advances in Earth observation, ecosystem modelling and artificial intelligence (AI) are closing this measurement gap and making it technically feasible to treat ecosystem integrity as an underlying infrastructure.

An emerging NatureFinTech (nature financial technology) sector leverages these innovations to create digital natural capital accounts and smart contracts for ecosystem services[24]. These rely on ground-truthed satellite imagery and optional in-situ data to monitor soil carbon, water levels, biodiversity indicators, creating digital twins of ecosystems on a polygon level. Machine-learning models can automate the monitoring, reporting and verification (MRV) of environmental performance. These systems use AI-trained models to estimate ecosystem improvements (e.g. carbon sequestered, species habitat restored) and continuously update accounts for each parcel of land. Real-time, high-resolution tracking means ecosystem performance can be assessed with "financial grade" confidence. In effect, it becomes possible to define, value and verify "natural capital stocks" anchored in measured state variables.

Just as Industry 4.0 digitised manufacturing, Nature 4.0 is digitising natural capital management. Companies and investors can increasingly manage ecosystems with operational and financial precision analogous to other infrastructure assets. These technologies unlock novel financing models: for example, outcome payments that automatically trigger when water quality in a catchment improves or when a land parcel meets a biodiversity index target. They also increase transparency: investors can track performance of nature-based investments, reducing the "black box" character that has hindered parts of the offset market. Continuous MRV creates the level of trust required to reward land stewards for improvements or maintenance of their natural capital.

The Ecosystem Integrity Index (EII) as a lead indicator

A central element of such an infrastructure is the availability of scientifically robust, scalable metrics for ecosystem condition. Ecosystem integrity understood as the extent to which the composition, structure and function of an ecosystem remain within their natural range of variation, has emerged as a key concept in this context[25].

The Ecosystem Integrity Index (EII) operationalises this concept as a single composite metric that synthesises three pillars of ecosystem health: functional, structural and compositional integrity[26]. Functional integrity captures whether ecosystems perform core functions such as energy capture and nutrient cycling close to their natural potential. Structural integrity describes the spatial configuration and degree of human modification of habitats. Compositional integrity refers to species richness, community composition and the distribution of species.

Building on the framework developed at UN Environment Programme World Conservation Monitoring Centre (UNEP-WCMC), recent work has implemented a global, high-resolution version of the EII at 300-metre scale that combines pressure- and response-based indicators in a hybrid design. An additional local modulation layer allows global integrity scores for individual parcels to be adjusted using local management and monitoring data[27].

Through this combination of global comparability and local sensitivity, the EII provides a robust reference value for natural capital that is suitable for both risk analyses and the structuring of nature-related financial contracts. In practice, the EII can serve as a lead index to which outcome-based nature contracts can be linked. In this way, the index connects ecological integrity concepts with the requirements of financial market participants for comparability, auditability and scalability.

5. A new asset class: Nature Equity

With enabling technology in place, innovators are now structuring Nature Equity as a formal asset class. "Nature Equity" refers to investment instruments that represent a share in the improvement and maintenance of natural capital, analogous to equity shares in built capital. Rather than a one-off credit for a tonne of carbon, a Nature Equity asset is a digital contract tied to continuously measured natural capital, for example, a claim on documented improvements in soil carbon, biodiversity, water retention and additional indicators on a defined area of land. These instruments effectively transform regenerative land management into an investable security. Buyers of such assets can be companies seeking to secure sustainable supply chains or meet nature-related targets, while sellers are land stewards who implement regenerative practices.

Importantly, Nature Equity is designed to be compatible with existing financial markets and corporate accounting. Contract values reflect the estimated economic value of the underlying ecosystem services to the buyer (e.g. water security, carbon removals, biodiversity outcomes) and can be reflected on the balance sheet as intangible assets. This means a company investing in Nature Equity can record expenditure not only as a corporate social responsibility cost, but as an asset that yields future benefits (risk reduction, resource stability, contribution to meeting climate and nature commitments). Nature assets can also be pooled into funds or special purpose vehicles (SPVs), drawing in institutional investors. For example, a climate finance lab analysis describes a structure in which Nature Equity projects are aggregated in a fund, with returns generated by selling the resulting nature assets to corporate offtakers[28]. Such structured approaches can scale capital deployment by blending different investor types (impact investors, development banks, philanthropies taking junior tranches) in order to distribute risk. By securitising portfolios of nature projects, it becomes possible to move from individual, "boutique" conservation projects toward scalable investment products.

Crucially, Nature Equity focuses on outcomes rather than activities. This aligns incentives as investors and land stewards are remunerated for measurable ecological gains. Unlike generic carbon credits, Nature Equity units are multidimensional (covering multiple ecosystem services), traceable to the plot level and specific time periods. This traceability and scope help avoid double-counting and reduce the risk of trading improvements in one dimension (e.g. carbon) against losses in another (e.g. biodiversity).

This approach is consistent with the Nature Credit Roadmap proposed by European Commission, which calls for high-quality, transparent and outcome-based instruments. Nature Equity assets offer a practical implementation of Nature Credits that can be more systematically recognised within existing accounting frameworks, e.g. International Financial Reporting Standards (IFRS) as nature-related intangible assets.

Table 1 summarises how Nature Equity is designed to address the structural limitations of the voluntary carbon market identified in the previous section.

6. Emerging markets and practical barriers

Early traction of Nature Equity is promising but remains at an early stage. At present, two broad market segments can be distinguished:

In the *Nature Resilience and risk markets*, nature outcomes are primarily treated as risk-management and resilience services. The realities of a rapidly changing environment influence a company's operational success through its dependence on nature, for example via insurance premiums, cost of capital or supply chain disruptions. Agrifood companies, for instance, finance measures to regenerate soils to increase yield stability and reduce drought risk; infrastructure and energy companies invest in ecological buffer zones to reduce flood or erosion risk. In such cases, payments for ecosystem services are increasingly converted into standardised, long-term Nature Equity contracts functionally similar to power purchase agreements in the energy sector.

The *Nature and contribution markets* build on established environmental markets. Investments in intangible asset or Nature Equity create new relationships between companies and landscapes: rather than purchasing single offsets, companies acquire longer-term claims on documented nature outcomes in specific landscapes, sometimes linked to supply-chain, brand or regulatory strategies (for example, to meet biodiversity and nature-disclosure requirements) or to secure strategic buy in and first mover advantage.

Across both segments, emerging transaction structures increasingly resemble infrastructure-like assets with expected cash flows derived from (i) cost savings (e.g. operating efficiency and cost stability, compliance and community alignment, reduced insurance premiums and lower cost of capital), (ii) revenue protection and increase (e.g. product premiums, access to new markets), or (iii) capital market recognition (improved equity risk perception, strategic optionality intrinsic value recognition). Pilot projects indicate that companies are willing to pay for nature outcomes that reduce material business risks. In these deals, payments for ecosystem services are increasingly embedded in contracts that can, in principle, be treated as tradable assets.

However, barriers to broader diffusion remain:

Market maturity and regulation: In many jurisdictions, Nature Equity markets are only weakly regulated at best, and key terms for instance the distinction between nature credits, contribution titles and Nature Equity claims are not yet consistently defined. This hampers standardisation, recognition in supervisory practice and the development of liquid secondary markets.

Valuation and Net Present Value (NPV): Determining the net present value of investments in Nature Equity investments is complex. Cash flows often depend on long-term risk reductions, regulatory developments and the performance of ecological indices. This can create uncertainty around discount rates and cash-flow projections. Institutional investors require clear valuation and risk metrics, which currently exist only in preliminary form.

Methodological capacity: On both investor and supervisory sides, there are gaps in knowledge regarding ecological foundations, MRV methods and the interpretation of integrity indices such as the EII. This can lead to scepticism towards new products even where environmental integrity is high.

It is therefore plausible that Nature Equity will initially grow in niche and bilateral structures, for example, in supply-chain partnerships or with specialised impact investors, before standardised products and liquid markets emerge. Climate finance experts argue that Nature Equity mechanisms could materially contribute to closing the nature funding gap by channelling capital from capital markets into structured nature portfolios. Over time, as performance data accumulate, pension funds and insurers may allocate portions of their portfolios to Nature Equity for diversification and inflation-hedging benefits, as healthy ecosystems tend to buffer commodity price swings and physical climate risks. Natural capital investments often show low correlation with broader market cycles and can generate relatively predictable income streams (e.g. via conservation leases, nature-related product premiums or resilience credits), characteristics that are attractive to infrastructure-oriented investors.

At the same time, scaling Nature Equity markets is not only about financial returns, but also about reducing systemic risk. Large-scale investment in nature can lower the probability of ecological tipping points, improve the insurability of physical assets, and increase the resilience of food and water systems. In the long run, the emergence of Nature Equity could therefore contribute to stabilising both climate and financial systems, provided that questions of integrity, governance and valuation are adequately addressed[29].

7. Conclusion

The persistent under-valuation of natural capital is increasingly being recognised as a macro-financial risk—a Minsky Moment for Nature, where hidden dependencies and physical risks mature until markets are forced into abrupt repricing. NatureFinTech and integrity metrics such as an Ecosystem Integrity Index begin to make an alternative pathway technically and institutionally feasible, one in which ecosystem

Table 1. Structural differences of the voluntary carbon market and corresponding Nature Equity design responses.

	Carbon credits	Nature Equity assets
Permanence & time horizon	Credits can imply permanent neutralisation of fossil emissions, even when based on Nature-based Solutions with high reversal risk. Permanence is treated as an absolute criterion that Nature-based Solutions cannot realistically meet.	Transparency over permanence. Focuses on the ongoing condition of a defined stock of natural capital and its long-term stewardship, rather than a one-off erasure of emissions.
Avoided emissions & counterfactuals	Large share of credits based on avoided emissions and hypothetical baselines ("what would have happened otherwise"), which are uncertain and contested.	Shifts emphasis from counterfactual avoidance to observed changes in ecosystem integrity against a measurable reference state, reducing dependence on speculative baselines.
Compensation vs. contribution	Built around offsetting: individual actors claim to "compensate" residual emissions, suggesting balance at the entity level despite a finite global carbon budget.	Framed as contribution to shared landscape and global outcomes. Finance flows to nature results without granting strong neutrality claims to any single buyer.
Commodity vs. asset class	One tonne of CO_2 is treated as interchangeable with any other; markets optimise for lowest price and only weakly reflect differences in integrity and co-benefits.	Positions ecosystem integrity as the underlying of an asset class. Claims are linked to specific nature assets with documented condition, risk profile and data history, managed more like infrastructure or real estate.
Ex-ante vs. ex-post	Credits historically sold ex-ante against expected future reductions, creating non-delivery and integrity risks.	Explicitly outcome-based and issued ex-post: recognised Nature Equity units are grounded in verified improvements or maintained integrity, even if financing can involve forward commitments.

condition becomes measurable, auditable and attributable thus able to price and catalyse investments. If Nature Equity matures as an outcome-based asset class, it has the potential to rewire land-use incentives away from short-term extractive optimisation toward decisions that maximise long-term resilience and sustained productivity, thereby internalising what has historically been treated as an externality. This shift is financially material: by lowering physical risk, stabilising ecosystem-dependent cash flows and collaterals, and improving credit quality, Nature Equity can support more robust capital planning, stress testing, and risk pricing across the financial system. In this sense, nature outcomes become not only objects of investment, but instruments of systemic risk management. At scale, this logic opens the foundation for an entirely new industry built around the measurement, structuring, underwriting, trading and custody of nature-backed assets. Over time, the underlying measurement-and-contract primitives could enable more advanced financial architectures, including index-referenced claims in which an Ecosystem Integrity Index functions as a value anchor for nature-linked instruments, potentially extending to nature-based monetary designs. However, until ecosystem integrity is systematically reflected in how capital is allocated and risk is priced, the conditions for a nature-related Minsky moment remains.

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Martin Stuchtey: Conceptualization, Writing - Original Draft, Supervision. Benedict Witte: Investigation, Writing - Review & Editing, Visualization.

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Not applicable.

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The author(s) have no competing interests to declare that are relevant to the content of this article.

REFERENCES

1. Gardes-Landolfini, C., Oman, W., Fraser, J., de Oca Leon, M. M., Yao, B. (2024). Embedded in nature: nature-related economic and financial risks and policy considerations. *Staff Climate Notes*, 2024(2): 75.
2. Miller, H., Dikau, S. (2022). Preventing a 'climate Minsky moment': environmental financial risks and prudential exposure limits | Exploring the case of the Bank of England's prudential regime. https://www.lse.ac.uk/granthaminstitute/publication/preventing-a-climate-minsky-moment/.
3. Evison, W., Ping Low, L., O'Brien, D. (2023). Managing nature risks: from understanding to action. https://www.pwc.com/gx/en/strategy-and-business/content/sbpwc-2023-04-19-Managing-nature-risks-v2.pdf.
4. Olsen, L., de Mariz, F. (2025). Attracting more capital for biodiversity finance: the case of debt-for-nature instruments. *Commodities*, 4(2): 7.
5. Lambert, J., Turner, G. (2024). Investment trends and outcomes in the global Carbon-Credit Market-2024. https://www.msci.com/research-and-insights/paper/investment-trends-and-outcomes-in-the-global-carbon-credit-market-2024.
6. Probst, B. S., Toetzke, M., Kontoleon, A., Díaz Anadón, L., Minx, J. C., Haya, B. K., Schneider, L., Trotter, P. A., West, T. A. P., Gill-Wiehl, A., et al. (2024). Systematic assessment of the achieved emission reductions of carbon crediting projects. *Nature Communications*, 15(1): 9562.
7. Trencher, G., Nick, S., Carlson, J., Johnson, M. (2024). Demand for low-quality offsets by major companies undermines climate integrity of the voluntary carbon market. *Nature Communications*, 15(1): 6863.
8. Badgley, G., Chay, F., Chegwidden, O. S., Hamman, J. J., Freeman, J., Cullenward, D. (2022). California's forest carbon offsets buffer pool is severely undercapitalized. *Frontiers in Forests and Global Change*, 5: 930426.
9. Murray, B. C., McCarl, B. A., Lee, H. C. (2004). Estimating leakage from forest carbon sequestration programs. *Land Economics*, 80(1): 109–124.
10. Smith, S. M., Geden, O., Gidden, M. J., Lamb, W. F., Nemet, G. F., Minx, J. C., Buck, H., Burke, J., Cox, E., Edwards, M. R., et al. (2024). The state of carbon dioxide removal: a global, independent scientific assessment of carbon dioxide removal. 2nd edn. https://eprints.lse.ac.uk/129120/.
11. Kreibich, N., Fraling, J., Schulze-Steinen, M., Kühlert, M. (2024). A guide to implementing the contribution claim model. https://allianz-entwicklung-klima.de/wp-content/uploads/2024/09/2409_Guide_Contribution-Claim-Model.pdf.
12. Benson, S., Farrelly, A., Watson, E., Kazanecki, H., Massei, M., von Preussen, A., Steck, C., Trouwloon, D. (2024). Above and beyond: an SBTI report on the design and implementation of beyond value chain mitigation (BVCM). https://files.sciencebasedtargets.org/production/files/Above-and-Beyond-Report-on-BVCM.pdf.
13. Schneider, L., La Hoz Theuer, S. (2019). Environmental integrity of international carbon market mechanisms under the Paris Agreement. *Climate Policy*, 19(3): 386–400.
14. Cadman, T., Hales, R. (2022). COP26 and a framework for future global agreements on carbon market integrity. *International Journal of Social Quality*, 12(1): 76–99.
15. The Nature Conservancy. (2020). Closing the nature funding gap: a finance plan for the planet. https://www.nature.org/en-us/what-we-do/our-insights/perspectives/closing-nature-funding-gap-global-biodiversity-finance/.
16. Europäische Kommission. (2024). Von der Leyen auf der DLD in München: wiederherstellung der Natur in klarem wirtschaftlichen Interesse. https://germany.representation.ec.europa.eu/news/von-der-leyen-auf-der-dld-munchen-wiederherstellung-der-natur-klarem-wirtschaftlichen-interesse-2024-09-13_de. (In German)
17. Xie, C. P. (2024). Embracing nature as infrastructure: bridging concepts for a sustainable future. https://www.aiib.org/en/news-events/media-center/blog/2024/embracing-nature-as-infrastructure-bridging-concepts-for-a-sustainable-future.html.
18. World Economic Forum. (2025). The global risks report 2025, 20th edn. World Economic Forum, Cologny/Geneva, Switzerland.
19. Thallinger, G. (2025). Climate, risk, insurance: the future of capitalism. https://www.linkedin.com/pulse/climate-risk-insurance-future-capitalism-g%C3%BCnther-thallinger-smw5f/.
20. Shelton, D. (2024). The evolution of the Natural Capital asset class. https://newforests.com/insight/the-evolution-of-the-natural-capital-asset-class/.
21. Panwar, R. (2025). Why nature loss matters to companies — and what they can do. https://www.ft.com/content/c325ac02-9bc5-407b-9f0d-2f65b676f624.
22. Strzęciwilk, K., Grygoruk, M. (2025). Restoration is an investment. Comparing restoration costs and ecosystem services in selected European wetlands. *Journal of Water and Land Development*, (64): 221–229.
23. Gardner, R. (2024). This isn't philanthropy: nature is the most valuable asset on the planet, so why don't we value it, or pay for its services? https://www.paminsight.com/twn/article/isnt-philanthropy-nature-most-valuable-asset-planet-so-why-dont-we-value-it-or-pay-its-services.
24. Elias, O., Awotunde, O. J., Oladepo, O. I., Azuikpe, P. F., Samson, O. A., Oladele, O. R., Ogunruku, O. O. (2024). The evolution of green fintech: leveraging AI and IoT for sustainable financial services and smart

contract implementation. *World Journal of Advanced Research and Reviews*, 23(1): 2710–2723.

25. Carter, S. K., Fleishman, E., Leinwand, I. I. F., Flather, C. H., Carr, N. B., Fogarty, F. A., Leu, M., Noon, B. R., Wohlfeil, M. E., Wood, D. J. A. (2019). Quantifying ecological integrity of terrestrial systems to inform management of multiple-use public lands in the United States. *Environmental Management*, 64(1): 1–19.
26. Hill, S. L. L., Fajardo, J., Maney, C., Harfoot, M., Harrison, M., Guaras, D., Jones, M., Oliva, M. J., Danks, F., Hughes, J., et al. (2022). The Ecosystem Integrity Index: a novel measure of terrestrial ecosystem integrity. bioRxiv preprint, https://doi.org/10.1007/s001090000086.10.1101/2022.08.21.504707.
27. Leutner, B. (2025). The Ecosystem Integrity Index: a comprehensive, globally applicable, and unified metric for ecosystem health. https://media.thelandbankinggroup.com/ecosystem-integrity-index-eii.pdf.
28. Stuchtey, S. (2024). The global innovation lab for climate finance. https://www.climatefinancelab.org/ideas/the-landbanking-group/.
29. Mehra, S., Daouda, A. (2025). Is natural capital the key to resilience and stability? https://www.weforum.org/stories/2025/06/natural-capital-economic-resilience-global-stability/.