



 **UNIVERSITY OF
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02. Climate Change and Nature:

What Business
Needs to Know

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WHAT IS THE TOPIC?

Climate change and the destruction of nature are regarded as urgent, but often distinct, environmental crises. However, they are inextricably linked.

By sequestering and storing carbon, nature mitigates climate change – for free. The carbon equivalent of a decade’s worth of human emissions is held within the Amazon rainforest, yet nearly 20% of its area has been destroyed by economic activity. This not only reduces the Amazon’s capacity to sequester carbon emissions, but also alters rainfall patterns, habitats, and biodiversity, making the rainforest less resilient to wildfire and other climate-induced changes.

The connections between climate change and nature¹ – and the value to business and society from all that nature provides – clean water, clean air, food, fibre, pollination, healthy living environments, and natural defences against flood, forest fire and drought – are increasingly recognized by business, investors, and policy makers. The UN Convention on Biological Diversity (CBD) will soon adopt a Post-2020 Global Biodiversity [Framework](#) that sets targets, as the Paris Agreement does on climate change, for nations to protect and restore nature. Businesses will need to understand and increasingly disclose their impacts on nature, and align their reporting and actions with a nature-positive agenda.

These developments, alongside recognition that the long-term sustainability of business and our economy are inseparable from healthy natural systems which have been in serious decline since the 1970s (see Figure 4.7, next page, from [Dasgupta, 2021](#)), signals that it is short-sighted and even counterproductive to prioritize climate actions and investments that do not also restore and maintain nature.

¹We use ‘nature’ to refer to the biosphere, the part of the Earth occupied by living systems, which in turn rely on non-living aspects of the biosphere (e.g., water, carbon, and nitrogen cycles). ‘Biodiversity’ refers to the variety of life, and is a key contributor to nature’s productivity and resilience. Biodiversity is not so much an end in itself, but can be regarded as an enabler of what we ultimately seek, which is healthy natural systems ([Dasgupta, 2021](#)).



GLOBAL TRENDS IN THE CAPACITY OF NATURE TO SUSTAIN CONTRIBUTIONS TO GOOD QUALITY OF LIFE FROM 1970 TO THE PRESENT



Source: Intergovernmental Science- Policy Platform on Biodiversity and Ecosystem Services, IPBES (2019s) Dasgupta, P. (2021), The Economics of Biodiversity: The Dasgupta Review. (London: HM Treasury)

https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/962785/The_Economics_of_Biodiversity_The_Dasgupta_Review_Full_Report.pdf

WHY IS IT IMPORTANT TO BUSINESS?

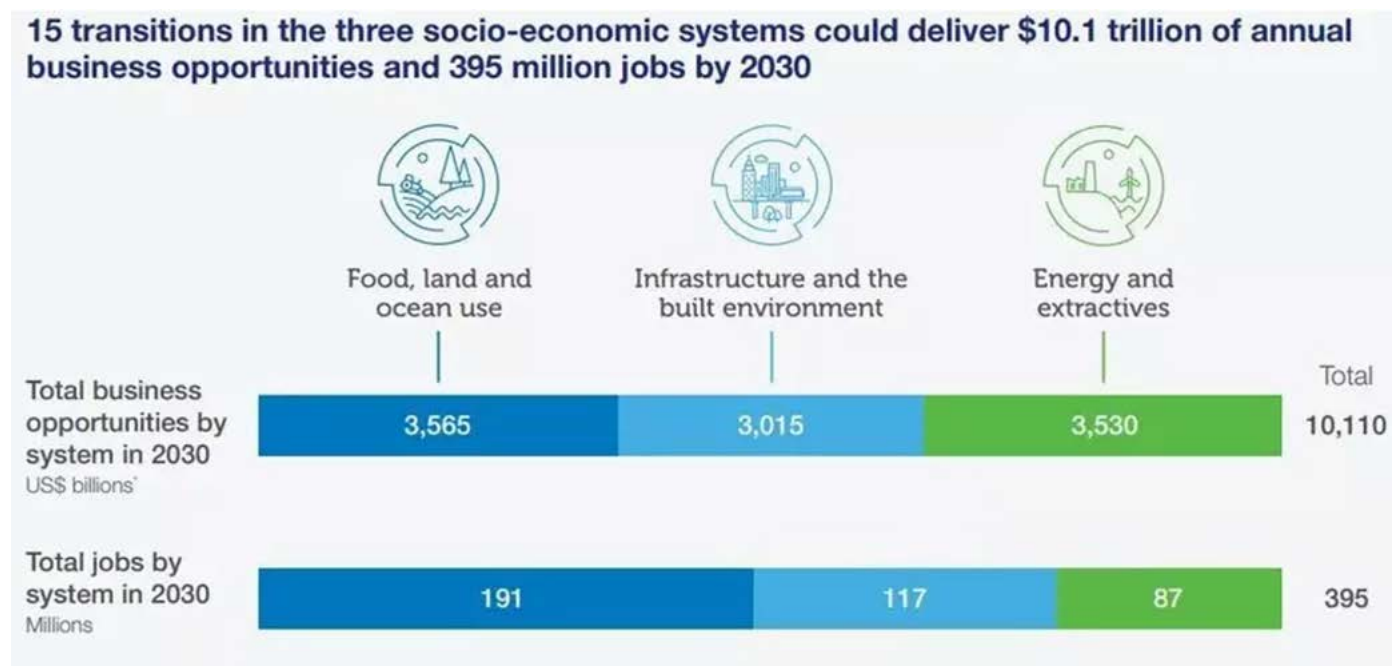
All businesses have both impacts and dependencies on nature and these might be direct or indirect (see Box/Infographic). These will increasingly pose operational, financial, regulatory or reputational risks for business. Coupled with climate change, these risks are likely to be exacerbated. For example, continued negative impacts of business activity on nature will make nature-based solutions to climate change, like reforestation, harder and more costly to effectively implement. Furthermore, business dependencies on nature, for agricultural production or for provision of clean water, for example, will be disrupted due to local and regional shifts in rainfall and temperatures as a result of climate change.

Many of the benefits nature provides that contribute to healthy, functioning economies have – at least until recently – remained invisible and unpriced in the market (Dasgupta, 2021). This will no longer be the case, although

efforts to report on, price, and regulate business impacts and dependencies on nature lag those underway on climate. However, frameworks are rapidly developing.

As noted, the forthcoming UN CBD Biodiversity Framework, while non-binding for business, nonetheless lays out targets that business strategies and operations should align to. In addition, the G-7 has endorsed the launch of the Task Force on Nature-related Financial Disclosures (TFND). The TFND will develop a framework, to be launched in 2023, for businesses to report and act on nature-related risks, and to support financial flows toward nature positive outcomes.

Finally, there are significant opportunities for businesses that make nature positive transitions. The World Economic Forum anticipates that, by 2030, up to \$10 trillion US in annual business value could be created, alongside 395 million jobs, through nature-focused shifts in food, land and ocean use, extractives and energy, and the built environment. While business leaders are waking up to the potential, much more action is needed (Hoffmann & Le Goulven, 2021).



Source: WEF 2020 New Nature Economy Report II: The Future Of Nature And Business In collaboration with AlphaBet
[WEF_The_Future_Of_Nature_And_Business_2020.pdf \(weforum.org\)](#)

IMPACTS AND DEPENDENCIES



IMPACTS: Business activities impact nature by, for example, using fossil-fuel derived energy which contributes not only to climate change but to air and water pollution. Whether such energy is used in a business' own operations or indirectly within a supply chain or during consumption of a product or service, nature is adversely impacted. Increasingly, business, investors, and policy makers will be called on to take actions and develop instruments to limit ongoing impacts and reverse the effects of those already felt.



DEPENDENCIES: In addition to their impacts, many businesses – such as those that rely on agricultural production for food or fibre – directly depend on nature's provisioning² services. As nature is in decline, these companies will find it more difficult or more expensive to source raw materials. For example, the decline in wild pollinators, including bees, already affects 70% of the world's crop production.



INDIRECTLY, all businesses and sectors depend on nature's regulating services, which include the ability for soils and plants to absorb carbon, habitats to purify water, winds and ocean current to regulate local climates, healthy ecosystems to keep pathogens in check, and many others. Without urgent actions to protect and restore nature's capacity to provide and regulate, businesses will face increasing costs and disruptions to their operations, and within their value chains.



FINALLY, business and society depend on nature for health and wellbeing, as well as cultural value.

²The Common International Classification of Ecosystem Services (CICES) categorizes three ways in which nature contributes to human well-being: through provisioning services including food, fuel, fibre and genetic material; through regulating services including maintaining the composition of the atmosphere, purifying water, recycling nutrients, and many more; and through cultural services that offer nonmaterial (e.g., aesthetic or spiritual) benefits.

WHAT WE KNOW TODAY AND HOW BUSINESS CAN ACT

While climate impacts are readily measurable, their cause-effect relationships well established, and companies are increasingly being held to account through credible, transparent reporting, the interactions between business activity and nature are extraordinarily more complex (Howard-Grenville, 2021).

Nonetheless, there are some key ways in which business interactions with nature are influenced by i) actions taken to address climate change and ii) climate change directly.

Below we consider each of these and pose questions business managers, investors, and board members can ask in order to assess the extent to which their climate change commitments and actions support nature.

FOREGROUNDING NATURE IN ACTIONS TAKEN TO ADDRESS CLIMATE CHANGE.

Many businesses are making commitments to transition away from fossil-fuel derived energy, and an increasing number are making Net Zero commitments. The energy transition relies on increased use of renewable energy sources, while many Net Zero commitments will include nature-based offsets in their portfolio of approaches. Here are questions to ask in relation to each:

1. ARE OUR ENERGY TRANSITION ACTIONS AND INVESTMENTS SENSITIVE TO IMPACTS ON NATURE?

Rapidly deploying renewable energy at scale is critical to tackling climate change. However, not all renewable energy sources are equal, nor benign, in their [impacts on nature](#). Hydropower is an established and cost-effective source of energy, but poses considerable risks to ecosystems and biodiversity. Wind power, if turbines are poorly sited and operated, can be damaging to migratory birds and bats. Bioenergy, especially if developed through the planting of monocultures, can cause significant losses in biodiversity. Solar energy when deployed carefully appears to pose minimal risks to nature but further research is needed.

Any renewable energy assets or investments should be evaluated using tools and frameworks, like the Integrated BioDiversity Assessment Tool ([IBAT](#)), to assess their impact on nature and biodiversity. Monitoring of impacts should continue throughout the lifecycle of renewable energy projects, not simply in the design phase.

2. DO OUR CLIMATE COMMITMENTS USE NATURE-BASED OFFSETTING IN AN APPROPRIATE MANNER? ARE ANY OFFSETS FROM NATURAL SOURCES CREDIBLE AND WELL MANAGED?

Using nature-based carbon storage for offsetting hard to abate emissions is part of the suite of actions needed to achieve Net Zero. Forests already remove 25% of human-sourced carbon dioxide emissions. The potential exists for one-quarter of the cost-effective climate mitigation needed to limit warming to 2 degrees C to come from protecting and restoring forests globally (Coomes et al., 2021). Schemes exist to purchase carbon offsets when direct reductions in emissions are hard to achieve.

It is generally agreed that carbon offsetting can be a complementary part of a comprehensive strategy that relies first and foremost on reducing emissions. This is in part because directly reducing harmful emissions is typically regarded as more credible by stakeholders. As well, carbon offsetting is itself risky in that it relies on the integrity and longevity of the underlying natural asset.

Offsets via natural forests are favourable to those using commercial plantations, because they can store up to 40 times more carbon and are less susceptible to disease and climate extremes (Seddon et al., 2020). Currently, 45% of land pledged for reforestation is targeted for commercial plantations, often monocultures (ibid), meaning the source of offsets should be carefully scrutinized to deliver high quality offsetting and support biodiversity.

Even offsetting that involves protecting or restoring natural forests can be risky. Wildfires in the American West in the summer of 2021 impacted forests that generated carbon offsets purchased by [Microsoft and BP](#). While credible offsetting schemes include buffers to guard against such losses, the increasing frequency and intensity of wildfires may render these buffers inadequate. The future of disturbances in ecosystems thus represents a core research hurdle to accurately develop carbon credit schemes.

Put simply, the interactions between climate change and nature-based carbon storage are complex, making the use of offsets inherently risky and to be pursued with attention to the underlying quality of the offset, its provider, and its stewardship.

Research led by **Dr. Adam Pellegrini**, from the University of Cambridge's Department of Plant Sciences finds that intense wildfires lead to reductions in subsequent tree growth, making forests less able to recover their carbon storage capacity over the long run. Fire effects are especially large in wet regions where tree growth can be deceptively high, but ultimately lost if a fire occurs. Intense fires also release carbon from the soil, which has historically been a very stable sink for carbon, holding three times more organic carbon than the atmosphere and trees. However, prescribed fires can sometimes stabilise soil carbon, protecting it from decomposition

over the long-term, opening up an exciting opportunity to both reduce wildfire risk and promote soil carbon storage.

Professor David Coomes, also from the University of Cambridge's Department of Plant Sciences, conducts research on forest conservation and ecology and led a chapter setting out the potential for UK woodlands to contribute to climate mitigation and preserve biodiversity in a landmark report by the British Ecological Society.

Professor Jennifer Howard-Grenville has interviewed **Dr Adam Pelligrini** and **Professor David Coomes**.

You can watch the video link below.



Prescribed burn in mixed conifer forest – including white fir, giant sequoia and red fir – at Sequoia National Park, California. This was the first fire after several decades of suppression.

Credit: **Tony Caprio**

<https://creativecommons.org/licenses/by/3.0/>



Second prescribed burn in ponderosa pine and black oak forest, Cedar Grove, California, a decade after the first.

Credit: **Tony Caprio**

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“Managers in coniferous forests are trying to adapt to the severe wildfire conditions. they can’t exclude fire because a lot of biodiversity is lost that way. prescribed burns try to mitigate carbon losses, and limit these intense fires.”



ATTENDING TO NATURE AS IT RESPONDS TO CLIMATE CHANGE.

Beyond the actions businesses take to address climate change, their future operations, strategies, and investments will be shaped by how climate change directly affects nature. As a result, business impacts and dependencies on nature will become increasingly shaped by both acute, probabilistic events and slow-moving adaptations. Here is what to ask now:

3. ARE OUR DECISION-MAKING FRAMEWORKS INTEGRATING THE RISK OF DISRUPTIONS TO NATURE AND THEIR IMPACT IN THE NEAR TERM AND LONGER TERM?

It only takes a glance at newspaper headlines to recognize risks to operations, employees, and facilities are arising with increasing frequency due to large storms, flooding, extreme heat, and wildfires. These physical risks are one type of risk the forthcoming TNFD considers as posing potential financial risks (and opportunities) to businesses as they cope with disruptions to their assets, employee wellbeing, and/or supply chains. Integrating consideration of these acute disruptions and preparing for them should become part of the risk management process. Anticipating how customers, clients, or suppliers may be affected by such acute events may also open new opportunities.

More systemic risks³ also arise as a result of climate change and its direct impact on nature. These include significant disruption of ecosystem functioning that result in loss or a significant decline in nature's provisioning services. For example, land degradation may make regions unsuitable for crop cultivation. As well, nature may lose its capacity to provide regulatory services, like flood protection, in key regions. These will have direct economic consequences. Losses of \$52 billion US could be saved for the insurance industry if coastal wetlands are preserved to provide protection against future storm and flood damage (Dasgupta, 2021). Beginning to assess the potential vulnerabilities of a business and its assets, investments, and people to these systemic changes is essential to managing for the nature-related physical risks that will arise due to climate change.

³TNFD defines systemic risks more broadly to include "(i) the risk that a critical natural system no longer functions properly; (ii) risks that arise at portfolio-level (rather than at organisation or transaction-level) of a financial institution; and (iii) a risk to system-wide financial stability." (TNFD Nature in Scope. 2021. p 11).

WHAT LEADERS NEED TO PAY ATTENTION TO FOR FUTURE ACTION

In the relatively near term, given the speed with which nature and biodiversity are attracting increased attention from policy makers, investors, and business, leaders should:

- Carefully track how metrics and reporting frameworks for nature are developing and understand how these integrate into existing frameworks for climate action. Simultaneously, leaders need to recognize that impacts and dependencies related to nature are highly sensitive to local or regional conditions. Hence, the ways in which climate impact is measured and acted on may not translate readily.
- Be aware that greater levels of scrutiny and greater competition will likely arise over nature-based carbon offsetting as more businesses and nations make net zero commitments. The market for carbon offsets is predicted to be \$50 billion US by 2030, but using offsets, especially without making significant cuts in emissions, is subject to [criticism](#). Leaders will need to ensure they have accurate, science-based insight guiding their offsetting strategy and a high level of transparency.

In the longer term, grasping how the complex, nonlinear dynamics that underpin natural systems – which include not just ecosystems but ocean currents, atmospheric chemistry, and much more – shape business activity in the era of climate change will require different ways of thinking and new forms of adaptation. To act effectively, businesses must incorporate inputs from diverse stakeholders to see trends across different scales and expect probabilistic and increasingly volatile operating conditions (**Howard-Grenville & Lahneman, 2021**).

Despite uncertainty, on what will happen, where, and when, we do know that nature and its benefits are not evenly distributed geographically. Just over 17% of the Earth's land surface supports 77% of plant species and 43% of vertebrates, while 0.012% of the oceans contain about 50% of range-restricted species (Dasgupta, 2021). This means that conserving a prioritised 30% of biodiverse land area would get us almost two-thirds of the way to meeting goals for conserving species, water regulation, and carbon stock (**Jung et al., 2021**).

This has key implications for how future actions should be undertaken:

- Leaders can and must prioritize their nature positive actions to address the most valuable biodiverse areas, which simultaneously may yield outsize climate benefits.
- Decisions should adhere to a mitigation and conservation hierarchy, prioritising preserving nature and reducing impacts over restoring it, and (as a final resort) compensating for losses (Milner-Gulland, 2021). Some changes to nature, such as species loss, are irreversible; others, such as eutrophication in lakes due to excessive phosphorous, are essentially irreversible for the time to recovery is so long.
- Decisions related to the conservation or restoration of nature should be made on a local or regional scale with input from local stakeholders, including those with indigenous knowledge and who may rely on nature for their livelihoods. Business leaders will need to work across these domains and interests to develop approaches that offer mutual benefit.

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FURTHER READING/ ADDITIONAL RESOURCES

[The Dasgupta Review. The Economics of Biodiversity. \(2021\).
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