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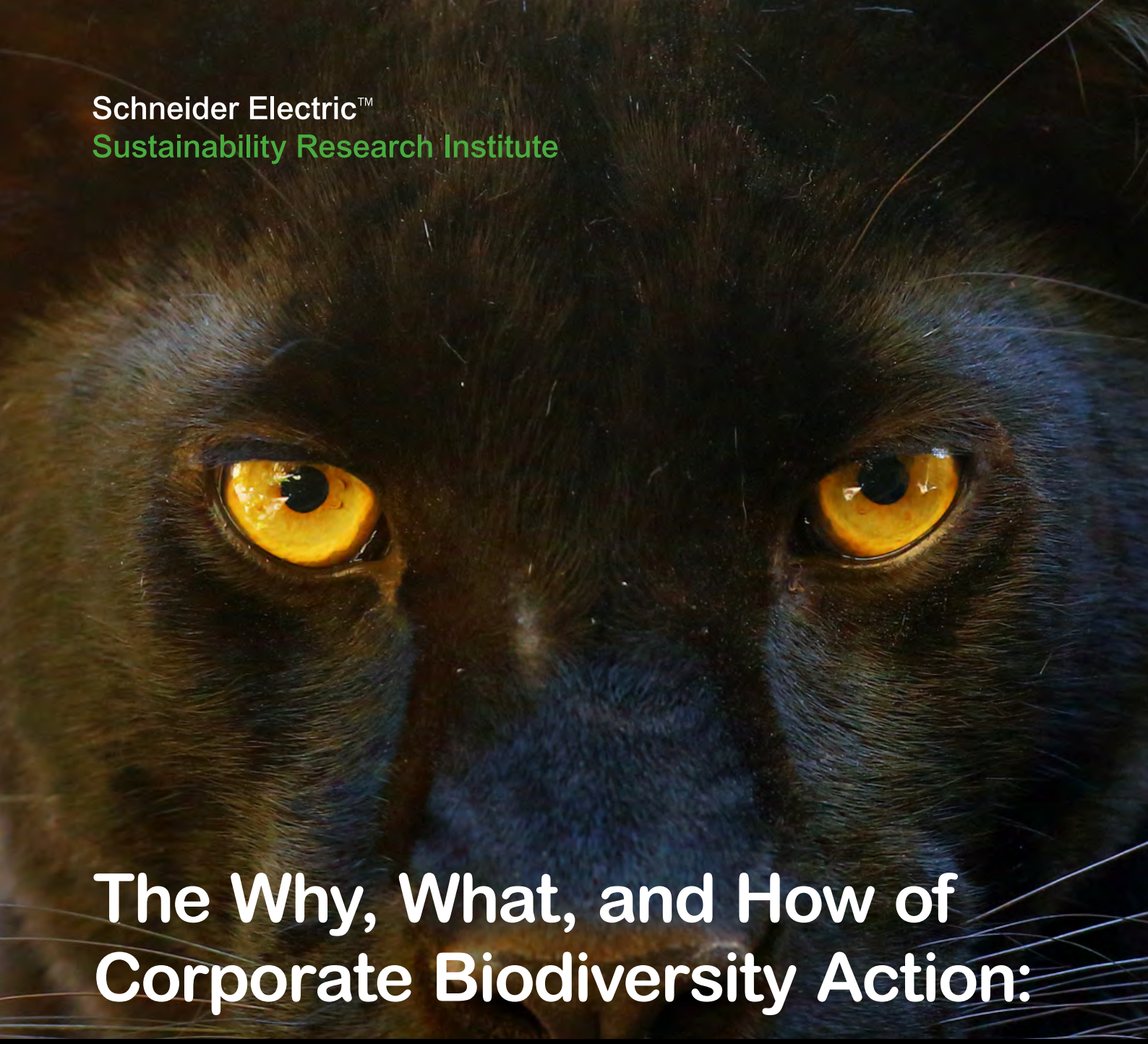

The Why, What, and How of Corporate Biodiversity Action:

An Introduction for Manufacturing Companies

February 2023

Life Is On Schneider Electric

Introducing the Schneider Electric™ Sustainability Research Institute

Gwenaelle Avice-Huet (left)
Chief Strategy & Sustainability Officer,
Schneider Electric

Vincent Petit (right)
SVP Strategy Prospective and External Affairs,
head of the Sustainability Research Institute,
Schneider Electric

Global awareness for a more inclusive and climate-positive world is at an all-time high. This includes carbon emissions as well as preventing environmental damage and biodiversity loss.

Nation states and corporations are increasingly making climate pledges and including sustainability themes in their governance. Yet, progress is nowhere near where it should be. For global society to achieve these goals, more action and speed is needed.

How can we convert momentum into reality? By aligning action with United Nations Sustainable Development Goals. By leveraging scientific research and technology. By gaining a better understanding of the future of energy and industry, and of the social, environmental, technological and geopolitical shifts happening all around us. By reinforcing the legislative and financial drivers that can galvanize more action. And by being clear on what the private and public sectors can do to make all this happen.

The mission of the Schneider Electric™ Sustainability Research Institute is to examine the facts, issues, and possibilities, to analyze local contexts, and to understand what businesses, societies and governments can and should do more of. We aim to make sense of current and future trends that affect the energy, business, and behavioral landscape to anticipate challenges and opportunities. Through this lens, we contribute differentiated and actionable insights.

We build our work on regular exchanges with institutional, academic and research experts, collaborating with them on research projects where relevant. Our findings are publicly available online, and our experts regularly speak at forums to share their insights.

Set up in 2020, our team is part of Schneider Electric, the leader in the digital transformation of energy management and automation, whose purpose is to bridge progress and sustainability for all.

In this report, we provide an introductory overview of the why, what and how of corporate biodiversity action. It is meant to support companies, especially manufacturing ones, in recognizing the imperative for such action, understanding key concepts and developments, identifying priorities with the right frameworks and tools, and ultimately realizing some of the opportunities that a nature-positive economy can bring for all.

Gwenaelle Avice-Huet
Chief Strategy and Sustainability Officer, Schneider Electric

Vincent Petit
SVP Climate and Energy Transition research, head of the Sustainability Research Institute, Schneider Electric

Figure 1 – Great Barrier reef, Australia

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Executive summary

With almost 70% of wildlife already lost at what seem to be accelerating extinction rates, upwards of USD 20 trillion in economic damages from lost ecosystem services a year, and another USD 53 trillion globally at risk from further biodiversity losses, it is abundantly clear that business as usual is no way forward. Current business practices cause too many negative impacts on society, not just on nature but also human health. The feedback effects from these negative impacts find their way back to corporations through various channels, including direct or supply chain dependencies, and legal, regulatory, reputational, and financial exposure risks. There can and have been delays in these feedback mechanisms, but today, they may have accumulated to the point where corporate biodiversity action makes sense not just from a moral standpoint, but also from a purely economic one. This report provides a first view of what this may entail for companies, especially those in manufacturing, that are ready for real corporate biodiversity action.

Biodiversity encompasses the living nature in all its variety. It provides many services, including climate regulation, pollination and soil formation, decomposing wastes, provision of raw materials, and contributions to our mental and physical well-being. There are three dimensions to biodiversity: ecosystems, species, and genetics. More than 90% of biodiversity loss is caused by five drivers: land degradation and habitat destruction, resource (over) exploitation, climate change, pollution, and invasive species. Any meaningful corporate biodiversity action thus starts by mapping a company's contributions to these pressures.

The approach towards corporate biodiversity action shows similarities with that of climate action at several points along the way. There are many frameworks to guide corporate biodiversity action. Which one to choose depends on many company-specific factors. Manufacturing companies might find the combination of the cross-sectoral Science Based Targets Network (SBTN) and Taskforce on Nature-related Financial Disclosures (TNFD) frameworks sufficient and useful. The SBTN and TNFD complement one another by focusing on the footprint and dependencies, respectively, and their general applicability enable comparability with other companies. Most frameworks consist, at the highest level, of a three-step repeating cycle of Assess, Commit, and Take Action.

In the assessment, the company's biodiversity footprint and dependencies will be measured. Despite measurement in biodiversity being even less straightforward than with greenhouse gasses due to the complexity of nature, well-chosen tools and metrics will still allow for a sufficiently accurate result to enable proper prioritization. The Global Biodiversity Score (GBS), Species Threat Abatement and Restoration metric (STAR), or Product Biodiversity Footprint (PBF) will probably suit manufacturing companies most for footprint measuring. These priority areas are where biodiversity targets will be set for in the second step of commitment. These targets should be science-based, and organizational structures should enable employees to innovate towards them. In the third and last step, the organization designs and executes mitigation actions in accordance with the conservation hierarchy of Avoid, Minimize, Restore, and Offset. Local stakeholder engagement is an integral part of this, from the design of the mitigation plans to the last part of communicating progress towards the targets in external reporting.

Influencing the economic and societal system a company operates in can be part of meaningful biodiversity action too. Educating and otherwise influencing employees, suppliers, and customers in how to conserve biodiversity or reduce their contributions to pressures, are one way to do so. Government lobbying is another way, and when it results in structural changes like new regulations, its accumulated effects can be large.

Supply chain traceability and offset methods for biodiversity need to mature rapidly, some aspects of which can be developed together with, or otherwise at least leapfrog from, similar developments in carbon offset efforts. A new global biodiversity framework, which was negotiated during the COP15 in December 2022, set out a plan to halt biodiversity loss by 2030 and move to restoration after that. This would mean government commitments towards what is increasingly referred to as a nature-positive economy.

To prepare themselves for such economic changes, companies will have to innovate. Such innovation will come down in practice to asking: what in this 21st century economy needs to go, what can be changed, and what must come in? Solutions lie in circularity concepts, new digital technologies, and mimicking strategies found in nature (biomimicry), among other things. Some companies have started this transformative journey already with success, and they have found that the earlier mentioned feedback mechanisms work for positive impacts too. From net-zero service models to zero-waste business solutions, from nature-positive production facilities to increased worker well-being, the most exciting part of corporate biodiversity action lies in its abundant opportunities.

Figure 2 – Kelp forest, California, USA

1 Why: The necessity

Why: The necessity

The corporate imperative

Biodiversity and other nature-related risks have been rapidly gaining attention from the corporate sector over the past few years, and rightly so; society is already losing an estimated USD 4–20 trillion per year in lost ecosystem services[1] and that seems only the beginning. 55% of global GDP relies on high-functioning ecosystems, yet, one out of five countries is already on the brink of ecosystem collapse[2]. Biodiversity loss can be expected to impact industries economy-wide, through various channels. These channels include direct, supply chain, and indirect risks which vary significantly in estimated impact per industry. Direct impacts typically stem from a sector's dependencies. Sectors with obvious direct nature dependencies include forestry, agriculture, food and beverages, and construction. These last three sectors alone account for about USD 8 trillion globally, or roughly twice the size of the German economy[3]. But many more sectors have a high nature dependency hidden in their supply chains, including the automotive, electronics, transport, retail, consumer goods, aviation and tourism sectors. Indirect risks come in various forms, and include regulatory and reputational risks, such as legal liabilities, difficulty in attracting and retaining talent, and pressures from investors and the public[4]. For the services sector, there is also exposure risk. Banking, insurance, and digital services companies have low nature dependencies either directly or in their supply chain, but they fund, take on the risks from, or service companies in the more nature-dependent sectors. Therefore, disruptions in these latter companies will inevitably impact these services companies too. This might be why, for example, biodiversity is quickly rising up the ESG investing agenda[5]. In short, biodiversity matters, either directly or indirectly, for every company. As the Boston Consulting Group put it in a 2021 report: "The Biodiversity Crisis Is a Business Crisis"[6].

The urgency

A "crisis"? Yes, we are living in Earth's sixth mass extinction[7]. Wildlife populations have plummeted by an average of 69% since 1970[8]. Animals and plant species are dying out at estimated rates 1,000 times higher than the pre-human background extinction rate. According to researchers, these rates are still accelerating. As they put it in a 2020 article[9]: "The ongoing sixth mass extinction may be the most serious environmental threat to the persistence of civilization, because it is irreversible". The threat is not just severe, it is also urgent. Research indicates that we have less than a decade to halt and reverse biodiversity loss, before "points of no return" are reached for many species and ecosystems[10]. Indeed, in the Global Risks Report 2023 of the World Economic Forum (WEF), "Biodiversity loss and ecosystem collapse" is ranked as the fourth highest long-term risk; not the fourth highest environmental risk, but fourth highest of all global economic, geopolitical, environmental, societal, and technological risks. Over a 10-year horizon, the world threat that biodiversity loss poses is seen as being surpassed in severity only by the risks from failure of climate mitigation as well as adaptation, and the resulting extreme weather events and natural disasters. Yet, as much as the world is falling short of climate action, even less action is being taken on biodiversity and ecosystem protection.

Figure 3 – White-tailed sabrewing in tropical forest, Trinidad and Tobago

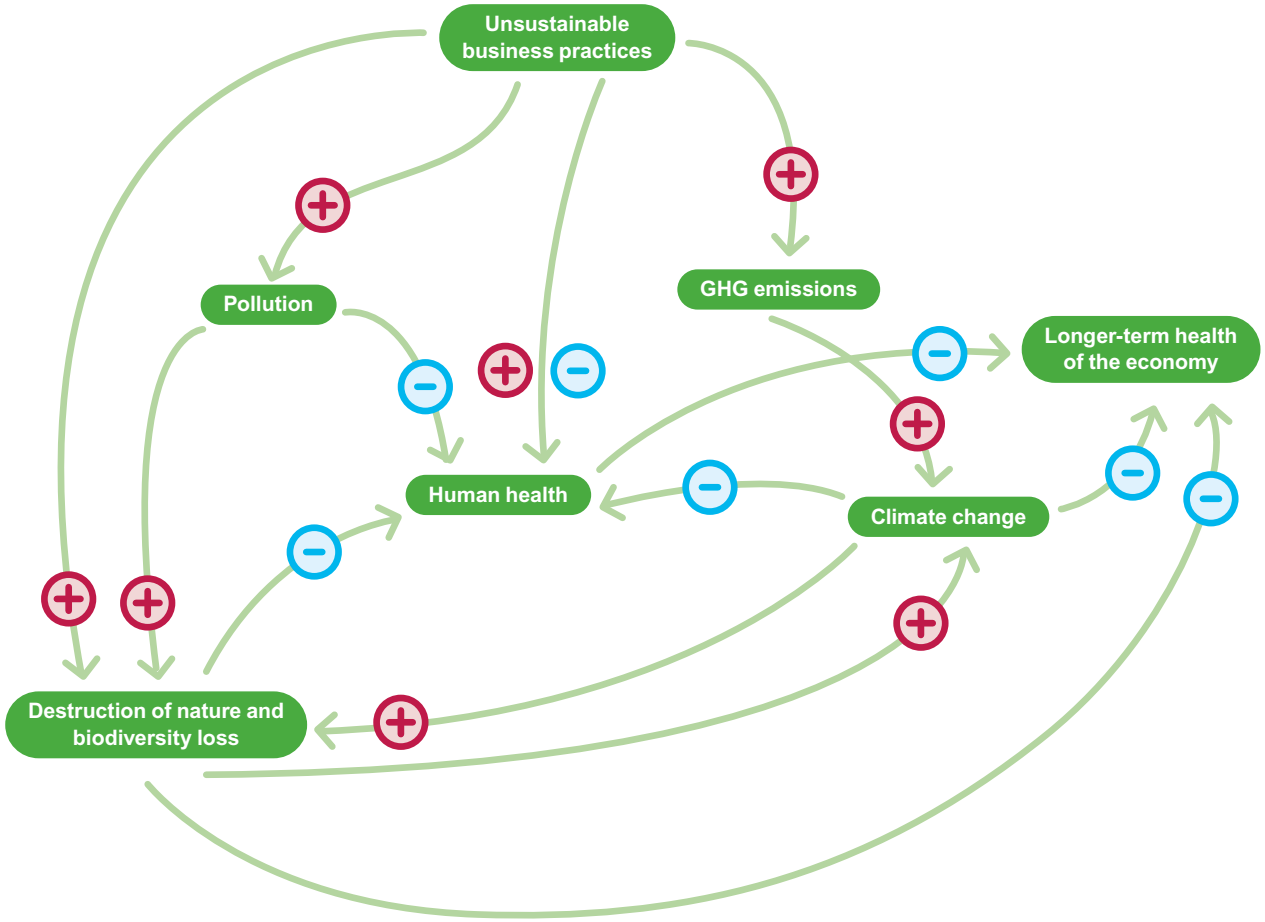
(1) JPMorganChase (2022).
(2) Swiss Re Group (2020).
(3) WEF (2020a).
(4) Agnew (2022).
(5) Kurth et al. (2021).
(6) Agnew (2022).
(7) Cowie et al. (2022).
(8) World Wildlife Fund (2022a).
(9) Ceballos et al. (2020).
(10) Steffen et al. (2018).
(11) WEF (2023).

Interconnections

Of course, biodiversity and climate change are deeply interlinked through various channels, and because of that can only be solved together[12]. They are also connected to human health, and ultimately, they are driven by business practices that are not sustainable, even economically speaking[13]. It's important for corporations to have a basic understanding of these interlinkages. Not just to recognize the economic imperative, but also to be able to identify effective solutions, some of which hold enormous business opportunity.

The natural world – land, water, living organisms, natural resources like fossil fuels, wood, metals, and minerals – is either directly or indirectly used as a pollution sink and/or resource for practically every economic activity. Unsustainable business practices then, have the predictable impacts of natural destruction, causing biodiversity loss directly or indirectly through damaged habitats. Additionally, globalization-spurred introduction of invasive species, even if they are sometimes simply an unintentional consequence of international travel and trade, are another major cause of species extinction and ecosystem disruption. Damaged ecosystems have a reduced ability to cope with rising greenhouse gasses[14], which is why conservation targets were an integral part of the Paris Agreement. On the other hand, climate change drives biodiversity loss by changing the natural environment that species have adapted to[15] and worsens the impacts of the other drivers of biodiversity loss[16]. A contaminated environment also impacts human health. The pollution that results from industrialization and urbanization – including greenhouse gasses, air pollutants, plastics, pesticides, heavy metals, and toxic chemicals – are estimated to cause one out of six deaths in the world today, according to The Lancet[17]. As this 2022 study states, "Pollution, climate change, and biodiversity loss are closely linked". Of course, polluting business practices sometimes also lead to products and services that are beneficial to human health[18]. Still, the negative human health impacts that result from unsustainable business practices carry direct health care costs and bring down labor productivity[19]. The negative impacts of climate change on economic performance are well documented[20], and this report started with the link from biodiversity loss to economic performance. All of these described interlinkages are depicted in Figure 4.

Figure 4 – Causal loop diagram of business practices and social and environmental impacts. By author.



(12) Pörtner et al. (2021).
(13) Lampert (2019).
(14) Martin (2016).
(15) Pulgar-Vidal (2022).
(16) World Wildlife Fund (2022b).
(17) Fuller et al. (2022).
(18) A simple recent example is the single-use face masks that protected people's health by significantly reducing the spread of the COVID-19 virus.
(19) E.g., Borg et al. (2021); Chen & Zhang (2021); He & Ji (2021); International Labour Organization (2019).
(20) E.g., International Monetary Fund (2022a); Swiss Re (2021).

Our food system is the primary driver of biodiversity loss[21] and illustrates all of the above-mentioned issues. For example, much forest is cleared for agricultural use every year. Less forest means less habitat for species that used to live there, but those cut trees will also no longer absorb CO_2. The agricultural sector's heavy pesticide and fertilizer use contaminates local ecosystems, reducing its climate resilience and destroying habitats. There are many negative health effects associated with chemical pesticides, including dermatological, gastrointestinal, neurological, carcinogenic, respiratory, reproductive, and endocrine effects[22]. Additionally, and despite persistent hunger rates in some parts of the world, the current food system has also been blamed for epidemics of obesity and chronic diseases[23]. These environmental and human health impacts make our current food system unsustainable, to the extent that some researchers label what we eat as "fossil food"[24]. Yet, despite its destructive impacts, agriculture is also very dependent on biodiversity. A WEF report estimated that the agricultural sector – which accounts for about 4% of global GDP[25], or roughly USD 3.5 trillion – has a 100% direct dependency on nature[26].

Agricultural practices are hardly the only unsustainable business practices, though. For reasons laid out in the introduction, most business practices, either directly or indirectly, drive biodiversity loss. The above interlinkages are only a few amidst the complexities of life, which humans are only just beginning to fathom, but we already know enough to understand that society will not be able to stay prosperous without also addressing biodiversity. Yet, there is no commonly shared approach around biodiversity, no global alignment on metrics, let alone a legal mandate on target-setting or reporting.

This report

This report serves as an introductory document for companies that are in that category of having relatively little direct exposure to nature-related risks, but still want to do more for biodiversity. Companies that realize they drive significant indirect pressure on biodiversity, understand that they operate in larger economic, societal, and ultimately planetary systems, and want to do their part. Schneider Electric started this journey a few years back[27], and aims to share the knowledge and insights it has gained in hopes that it may provide a head start to other similar companies, particularly manufacturing ones. Schneider Electric does not imagine that this report will be all any company needs to transform itself into one that positively contributes to biodiversity across its entire value chain. Rather, it is the kind of document that Schneider Electric would have liked to have when it first embarked on this journey: a digestible introduction with plenty of references to continue learning as needed.

This report contains the basic definitions, some key organizations, and past and expected international biodiversity policy efforts. It then continues to frameworks, tools, and metrics, that are available to companies as of early 2023. It ends with a forward-look of what needs to happen next – or rather, given the urgency of this matter, what needs to happen now. Some of these "now steps" on biodiversity, although necessary, also offer tremendous rewards. Therefore, the report concludes with a general overview of the upward potential for corporations that include biodiversity in their strategy.

Figure 5 – Sunset, Mongolia

(21) UNEP (2021a).
(22) E.g., Nicolopoulou-Stamati et al. (2016).
(23) UNEP (2021b).
(24) Holden et al. (2018).
(25) Statista (2022).
(26) WEF (2020a).
(27) Schneider Electric was the first company in the world to measure its biodiversity footprint in 2020. See more information in the Annex or Schneider Electric white papers (2020a; 202b).

2 What

What

Definition, dimensions, and realms

Most of us have a general idea of what biodiversity means, but for the remainder of this document it is useful to introduce some more formal definitions first. Biodiversity is the variety of life on Earth, it includes all organisms, species, and populations; the genetic variation among these; and their complex assemblages of communities and ecosystems[28]. Beyond its inherent value, biodiversity provides essential benefits for a good quality of life and indeed our survival. Next to the direct benefits that nature has on our mental and physical well-being, societies rely on what are broadly termed "ecosystem services", some of which were already mentioned in the introduction. Ecosystem services that a diverse natural environment can provide include climate regulation, pollination and nutrient-rich soil formation (essential for growing food), decomposing wastes in our water, land, and air (including those generated by human activity), and provision of raw materials like wood, fish, and building blocks for medicine (almost half of the pharmaceuticals used in the United States are manufactured using natural compounds[29]).

There are typically considered to be three dimensions to biodiversity: ecosystems, species, and genetics.

Figure 6 – The three dimensions of biodiversity

Ecosystem diversity relates to how many different ecosystems there are in the world. Almost 47% of today's global and sub-global ecosystems are either endangered, critically endangered, or collapsed[30], which means ecosystem diversity is already at serious risk of being halved.

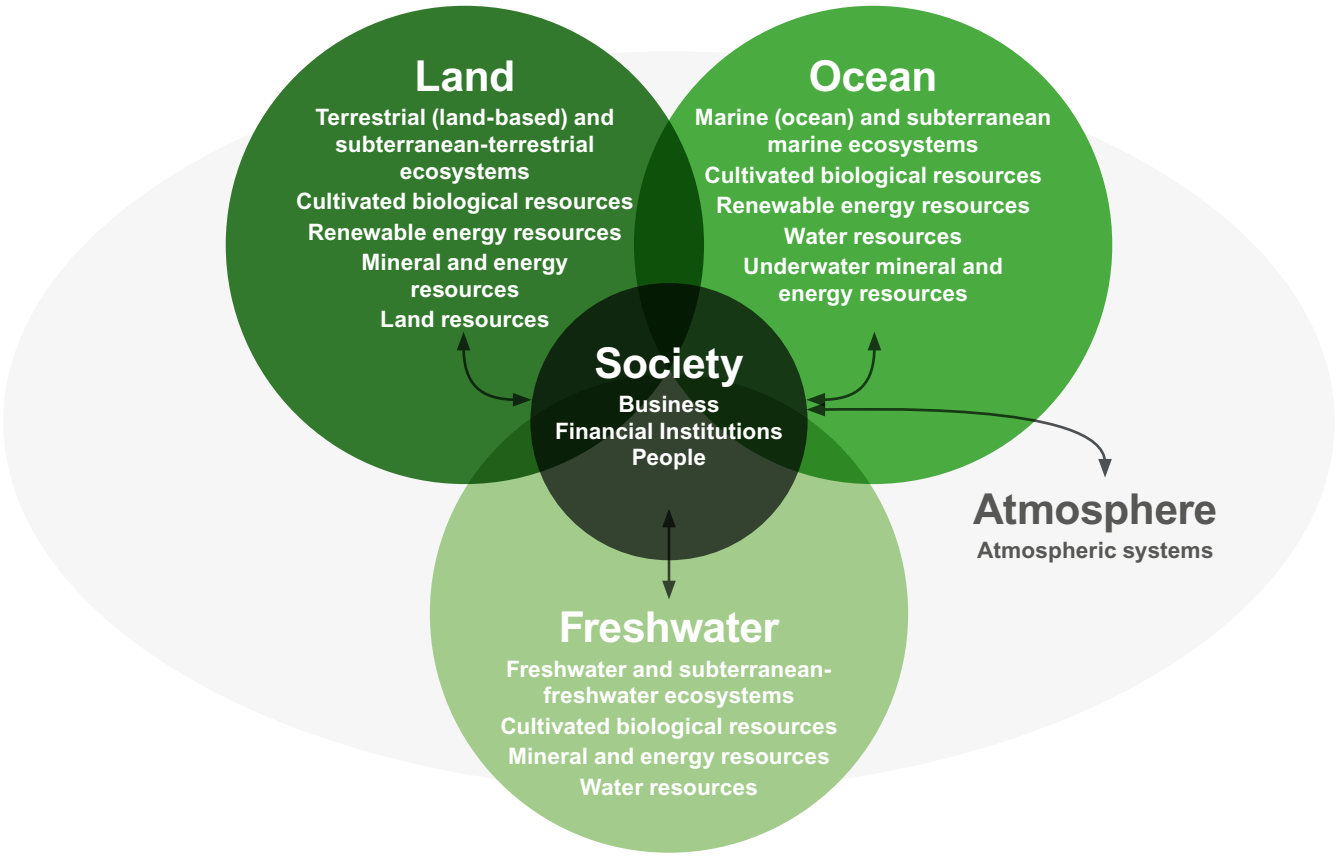
Species diversity refers to the variety of different animals, plants, bacteria, and fungi. In practice, this dimension of biodiversity is typically approximated by animal species that are comparatively less difficult to track[31]. More than 41,000 species are threatened with extinction today, which is 28% of all assessed species[32].

Genetic diversity refers to the variety of genetic information in a single species. Low variety in a species' genetic information renders it vulnerable, as it is less able to cope with diseases, pests, or changes in climate, among other potential stresses[33]. This is important because it raises the risk of extinction of that species, but it can also pose a direct risk to humans. For example, the United Nations (UN) Food and Agricultural Organization has warned that low genetic diversity in some staple plants and cattle poses a risk to global food security[34].

(28) UNEP (2010).
(29) Center for Biological Diversity (2022).
(30) IUCN (2022a).
(31) Most animals are insects, for example, but it takes an unrealistic amount of effort to count them, so they are typically not included in proxies.
(32) IUCN (2022b).
(33) CBD (2021).
(34) FAO (2019).

Three overarching realms of biodiversity are usually distinguished: terrestrial, aquatic (lakes, rivers, wetlands), and marine (oceans and seas). Some organizations, like the Taskforce on Nature-related Financial Disclosures (TNFD), have recently added atmosphere as a fourth realm type, to account for the link of biodiversity with climate. The TNFD also places society at the heart of these realms (Figure 7). This visualizes how society, and the economy, are embedded within these realms, rather than functioning separately from them.

Figure 7 – The realms of biodiversity. Adapted from the Taskforce on Nature-related Financial Disclosures[35]



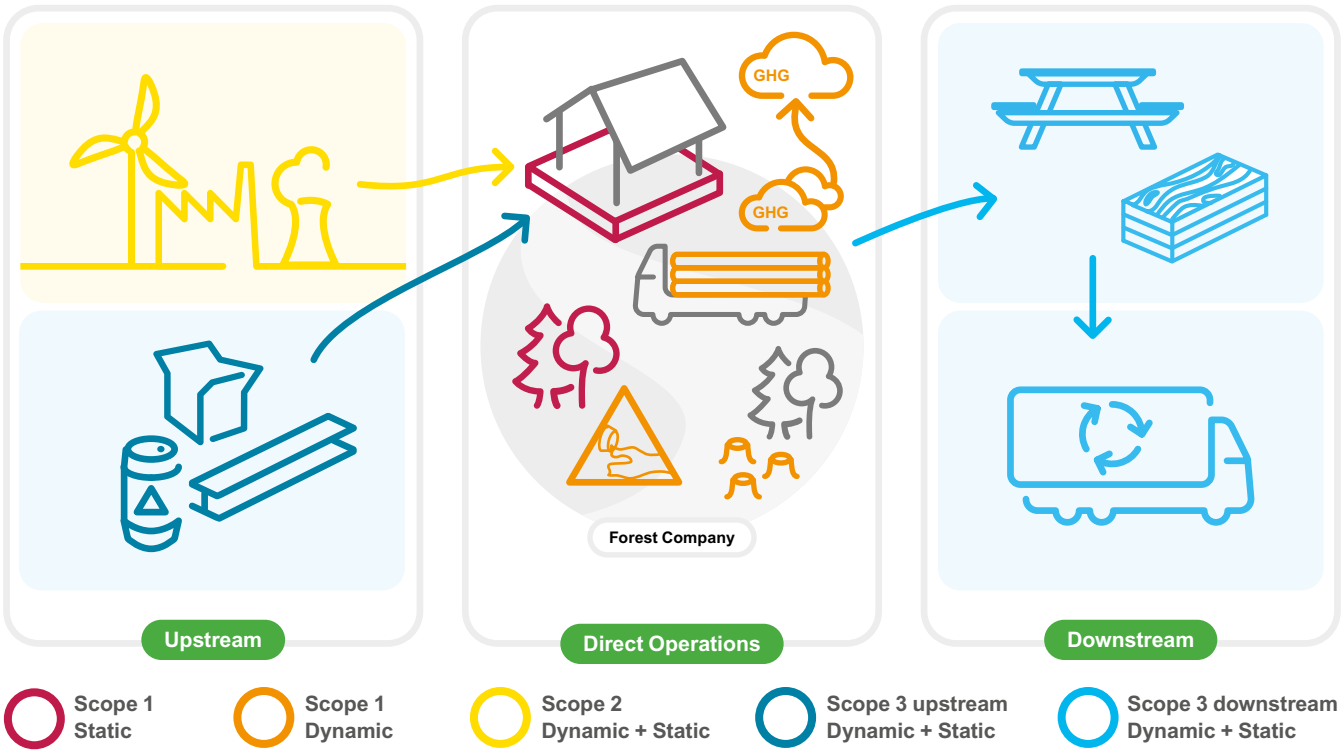
(35) TNFD (2022a).

Scopes

To measure a company's negative impact on biodiversity, i.e., its footprint, an approach similar to carbon footprints – as defined in the Greenhouse Gas Protocol[36] – is used. To avoid double counting of pressures, the biodiversity footprint is expressed in scopes 1, 2, and 3[37]. There is also a difference between the carbon and biodiversity footprint scopes: biodiversity impacts are classified as either "dynamic" or "static". Dynamic impacts are the changes, consumptions, or indeed restorations resulting from the company's activities. Tree-logging for production in paper and pulp is an example of such an activity. These dynamic impacts can be summed over time. Static impacts, simply put, result from the company's existence rather than its activities. The spatial pressure that a factory or plantation exerts by preventing that area to regenerate in biodiversity is an example of such a static impact. A company's static biodiversity impacts should not be summed over time.

Scope 1 biodiversity pressures are direct impacts from company owned or controlled sources. They are further divided into either "scope 1 static" or "scope 1 dynamic", a subdivision not widely used for the carbon footprint scope 1. *Scope 2* encompasses both the dynamic and static impacts of energy generation upstream, such as the emissions from acquired and consumed electricity, steam, heat, or cooling. *Scope 3* biodiversity impacts are the upstream and downstream impacts, both dynamic and static, that occur from the company's activities through sources not owned or controlled by the company.

Figure 8 – Biodiversity scopes 1, 2, and 3 illustrated



(36) CDC Biodiversité (2020).
(37) Berger et al. (2018).

Key players

There are many intergovernmental organizations, government agencies, business coalitions, and NGOs, that drive policy agreements, target-setting frameworks, and reporting standards or amplify best practices and relevant research to guide corporate biodiversity action. There are also many consulting companies, some of them specialized, that have been contributing to business action on biodiversity, some of which are mentioned in the next chapter (How). And while academic institutions are not listed here, their publications form the basis for any of these organizations' works. Some of the most relevant players for corporate biodiversity action are summarized in Table 1. The categories give a general idea of the organization's strategic posture, although it should be kept in mind that many organizations do not fall neatly in one category[38].

Table 1 – Key organizations in biodiversity

Policy and regulation	Science platforms	Sharing knowledge	Committing	Target-setting	Reporting
Secretariat of the UN Convention on Biological Diversity (post-2020 biodiversity framework)	Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES)	Business @ Biodiversity	Business For Nature	Science Based Targets Network (SBTN)	Capitals Coalition
	International Union for Conservation of Nature (IUCN)	Centre for Nature and Climate platform	Act4nature		Taskforce for Nature-related Financial Disclosures (TNFD)
	Alliance for Zero Extinction	Capitals Coalition			Align

The *Secretariat of the UN Convention on Biological Diversity (CBD)* is responsible for organizing the Conference of the Parties (COP) for Biodiversity. The last biodiversity COP, which was number 15 and so in this setting is referred to as "COP15" for short, took place on December 2022 and brought together governments around an agreement on a new global biodiversity framework with goals and targets for 2030[39].

The *Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES)* is an independent body to strengthen the science-policy interface among States[40]. Much like the IPCC (Intergovernmental Science-Policy Platform on Climate Change) for climate change, the IPBES publications are the authority on biodiversity research. Another authority is the *International Union for Conservation of Nature (IUCN)*, composed of thousands of government and civil society organizations around the world[41]. The IUCN publishes the Red List of Threatened Species[42], the world's most comprehensive inventory of plant and animal species at risk of extinction, and the Red List of Ecosystems[43], which assesses conservation status and risk of collapse for ecosystems. Many species that are Endangered or Critically Endangered on the IUCN Red List exist in only one site in the world. The *Alliance for Zero Extinction (AZE)* produces an interactive map with these "globally irreplaceable" sites[44].

Although focused primarily on state governments, the above-mentioned organizations produce crucial guidelines and reports for companies to base their own plans on. To help them do so, there are also several organizations focused on spreading biodiversity knowledge within the business community.

One "blended" form of this is the *European Business for Biodiversity Platform*, which was set up by the European Commission (EC) with the aim to work with and help companies integrate natural capital and biodiversity considerations into business practices[45]. The *Centre for Nature and Climate platform*[46], hosted under the WEF, brings together 150 leading companies from around the world to identify systemic solutions for ecosystem preservation, in collaboration with governments and civil society. The Capitals Coalition[47] offers knowledge for companies to improve on what they typically measure, i.e., financial and physical capital, with guidance on how to incorporate natural, social, and human capital in valuations. Incorporating such valuations, the Capital Coalition advises, will benefit the organization by "a more holistic understanding of the system in which they operate, leading to better informed decisions"[48].

(38) This is especially true for the Capitals Coalition, which is why it is listed twice in the table.
(39) UNEP (2022).
(40) IPBES (2022).
(41) IUCN (2022c).
(42) IUCN (2022b).
(43) IUCN (2022a).
(44) AZE (2022).
(45) EC (2022a).
(46) WEF (2022b).
(47) Capitals Coalition (2022a).
(48) Capitals Coalition (2022c).

Business for Nature[49] is a more externally focused global coalition, with a purpose to amplify a credible business voice for nature and influence the larger economic system. Its membership comprises of individual companies, business membership organizations, research institutes and NGOs, including the World Resources Institute, The World Wildlife Fund, and the World Business Council for Sustainable Development (WBCSD). Business for Nature started the Make It Mandatory[50] campaign, a COP15 business statement urging governments to require all large businesses and financial institutions to assess and disclose their impacts and dependencies on nature by 2030[51], [52]. *Act4nature* is another such cross-sector platform, spanning businesses, NGOs, academic bodies, and public institutions, to accelerate concrete business action for nature[53].

The *Science Based Targets Network (SBTN)* is working to enable companies to set targets for climate and nature[54]. The SBTN corporate guidance will be aligned with the post-2020 goals of the COP15, as also discussed further down in this document.

Delivering on corporate biodiversity commitments requires indicators and metrics. The Natural Capital Protocol[55], created by the aforementioned Capitals Coalition, offers a framework for capturing biodiversity aspects. Another notable framework comes from the *Taskforce on Nature-related Financial Disclosures (TNFD)*. It is a company-focused risk and opportunity assessment for biodiversity[56], like the better-known *Task Force on Climate-related Financial Disclosures (TCFD)*[57] framework is for climate. The EC-funded *Align* project[58] is working to "maximize synergies" among the several broader sustainability reporting initiatives, including from the International Financial Reporting Standards and the Global Reporting Initiative as well as the aforementioned SBTN and Capitals Coalition, to form recommendations for one common standard on biodiversity measurements and valuation.

Main drivers of biodiversity loss

Figure 9 – The five main drivers of biodiversity loss

Habitat loss and degredation | **Overexploitation** | **Climate change** | **Pollution** | **Invasive species**

More than 90% of biodiversity loss is caused by land degradation and habitat destruction, resource (over)exploitation, climate change, pollution, and invasive species (Figure 9).

The main driver of biodiversity loss today is habitat loss and degradation due to land conversion. Every year, the world loses 12 million hectares of productive land due to desertification[59] – about the size of North Korea.

Overexploitation in this context happens when animals, plants, and other organisms are exploited at a rate faster than their population can grow. There are rates at which these organisms can be harvested, logged, hunted, or fished, but current rates are far above sustainable in many places in the world. For example, logging for paper and pulp drives about 5.4 million hectares of tree loss annually[60] – more than a large-sized football field every five seconds.

Climate change is just the third driver of biodiversity loss to date, but it is the fastest growing and might become the most important driver before 2050[61]. Climate change endangers species' survival on land and seas because it affects the balance of ecosystems – for example through changes in air temperature, sea levels, and increased intensity and frequency of fires, storms, or periods of drought – faster than many of these species can adapt (or migrate).

Additionally, climate change-spurred extreme weather events are a direct cause of disruptions to local habitats[62]. The Bramble Cay Melomys, for example, is the first mammal reported to have gone extinct as a direct result of climate change, since its habitat on an island in the Great Barrier Reef was destroyed by rising sea levels[63].

Pollution is the introduction of harmful materials into the environment. Pollutants can be natural, such as volcanic ash, or created by human activity, such as trash, chemicals, or runoff produced by factories. Oceans are full of large and micro plastics, for example, entangling animals or causing harm after ingestion. At current rates, plastic is expected to outweigh all the fish in the sea by 2050[64]. Burning fossil fuels does not just release greenhouse gasses, but also chemical compounds that form smog, which can reduce plant growth and animals' breeding success[65]. Nitrogen, phosphorus, and acid rain pollutes rivers and lakes to the point where fish suffocate[66], and land is often seen polluted by fertilizers, pesticides, or antibiotics which stunt the growth of plants, fungi, and bacteria. These contaminants can also disrupt the local ecosystem. For example, excessive fertilizer use encourages the growth of more robust grass species at the expense of wildflowers, which in turn are important for bees and other pollinating insects.

Figure 10 – Plastic washed onto beach

(49) Business for Nature (2022a).
(50) Business for nature (2022b).
(51) Business for nature (2022c).
(52) Schneider Electric was one of the more than 300 signatories.
(53) Act4nature (2022).
(54) SBTN (2022a).
(55) Capitals Coalition (2022b).
(56) TNFD (2022a).
(57) TCFD (2022).
(58) EC (2022b).
(59) UN (2019).
(60) Curtis et al. (2018).
(61) Harvey (2018).
(62) Arneth et al (2020).
(63) IUCN (2022d).
(64) WEF (2016).
(65) IPBES (2019).
(66) IPBES (2019).

Invasive plant and animal species are threatening almost one-fifth of the Earth's surface. Because globalization is the main driver of invasive species introductions, it is not surprising that the IPBES stated in 2019 that the rate of these introductions seemed "higher than ever before" and showed "no signs of slowing"[67]. Since then, society has experienced a worldwide pandemic and heightened geopolitical tensions, so many corporations have been rethinking and redesigning their supply chain strategy[68], [69] in a trend dubbed "regionalization"[70] or "slowbalization"[71]. Although it is possible that this might impact the introduction rate to where perhaps some signs of slowing are observable, it seems unlikely there would be a reduction to the point where invasive species introductions cease to be a threat to biodiversity.

Figure 11 – Spotted lanternfly, invasive species to the United States

Historical obstacles for corporate action and recent sign of change

Based on the key drivers of biodiversity loss, necessary corporate actions to reduce these pressures can be identified. Such corporate actions lie in (overlapping) areas of radically increased efficiencies in land use and resources, value-retention and zero-waste, decarbonization, non-toxic material use, and increased efforts to detect non-native species in international transports[72].

It cannot be denied that some of these corporate actions are hard to turn a profit on. Take the introduction of invasive species through international transport: countermeasures require much effort (especially for smaller organisms), and both direct risks from non-compliance and direct benefits from compliance are low. Still, generally speaking, biodiversity actions do offer more potential than most corporations are taking advantage of today. The above-mentioned corporate actions could include things like non-toxic and renewable materials use, product design for longevity and resource-efficiency, and circular business models[73][74], with biomimicry principles (strategies inspired from nature) and nature tech (new technologies like connected low-cost sensors, robots, distributed ledgers, or laser remote sensing applied to deployment and verification of such corporate action[75]) as critical enablers. Many of these can form a business solution, meaning they can prove profitable[76]. Efficiencies and decarbonization solutions are comparatively easy to turn into direct profits, and indeed these have been applied most of the above corporate actions. Yet so far, their applications too have fallen short of the upward potential that these products and services offer, and certainly of being sufficient to halt biodiversity loss.

(67) IPBES (2019).
(68) Zurich (2022).
(69) Park (2022).
(70) Vakil (2022).
(71) Morgan Stanley (2022).
(72) Entreprises pour l'Environnement (2021).
(73) Ellen MacArthur Foundation (2022a).
(74) Holdorf (2022).
(75) Eng et al. (2022).
(76) This profitability can be either direct or indirect. Indirect payoffs typically come in the form of boosted talent acquisition and retention, productivity, and reputation. For example, for the kind of companies that this document is focused on, corporate action to reduce land use may mostly lie in supporting nature conservation and restoration projects, as well as design choices of their office buildings and production facilities. As described in the next section, biodiversity friendly buildings boost reputation and employee well-being and productivity.

Historical obstacles towards broader deployment of biodiversity solutions can ultimately be summarized as a lack of feedback loops from negative impacts on nature to those that cause those impacts. People tend to not change their behavior if they are not aware of its negative consequences. Feedback loops can be created in many ways, a common one in the business setting is paying for the costs of the negative impacts. So far, however, many so-called externalities have been mispriced[77]. Pollution and overexploitation of natural resources (water, land, organisms, etc.) have not carried the costs they bring on society. On the other hand, nature has not been valued in the market for its economic and societal contributions. It is beyond the scope of this document to go into details of how our market economies are structured, but one of the more generous interpretations of this market failure could be that people feel biodiversity's value is inherent and expressing this value in economic terms would be antithetical to that notion. But although all life forms exist for their own reasons and not for their economic contributions, there is no escaping the fact that this intrinsic value is not reflected in how society has been treating them. As Ralph Chami, Assistant Director at the International Monetary Fund (IMF) and advocate for adequately valuing ecosystem services in financial terms, puts it: "People are telling me that nature should not have a price tag on it. But the truth is that it already has one: the current system values nature at a price of zero. That's why it is dying."[78]

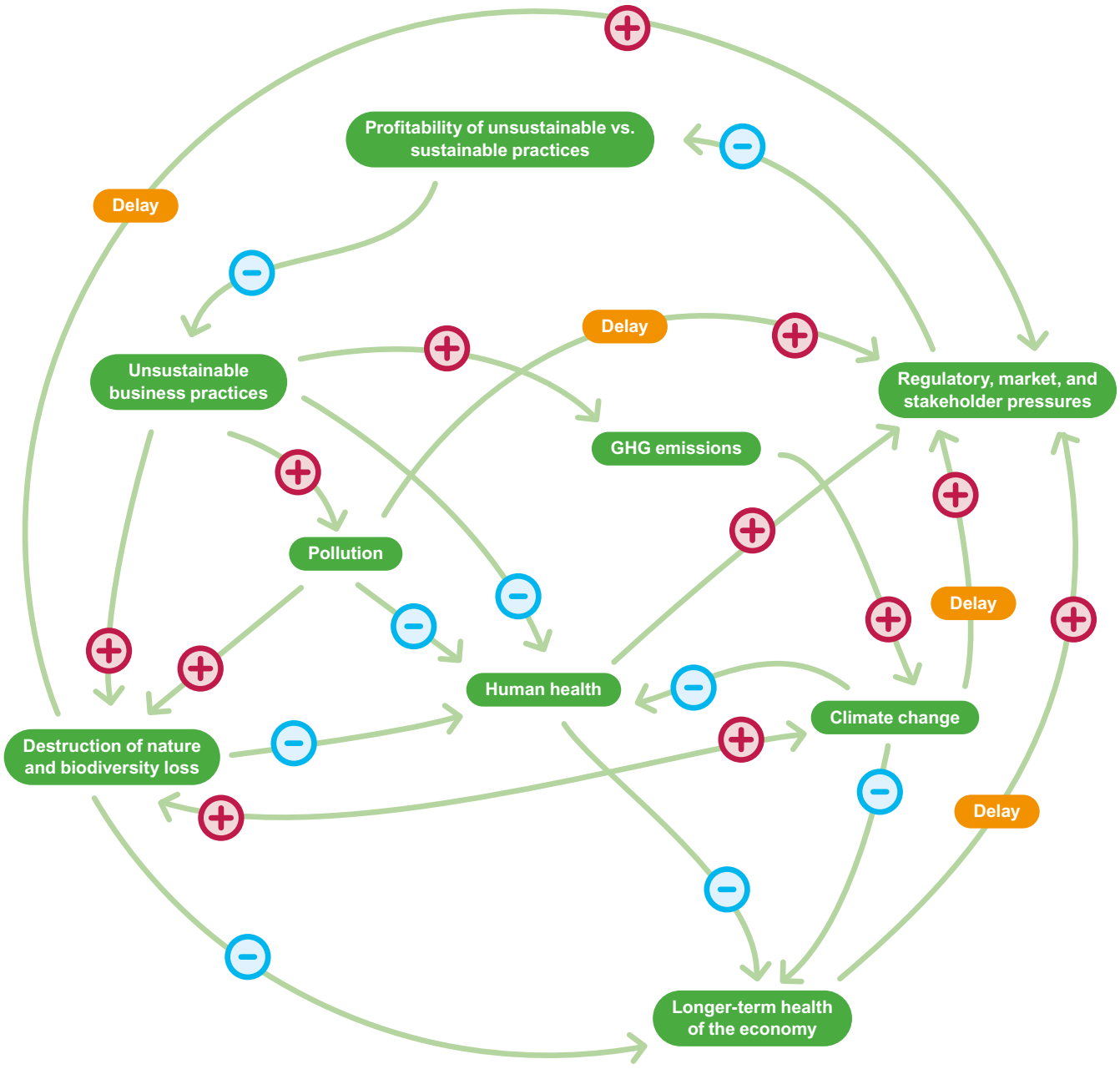
The above obstacle can be referred to as structural, they lie in the domain of laws and regulation as well as market functioning. Other obstacles are behavioral, operational, and financial[79]. Behavioral obstacles could be described in simple terms as the human inclination to stick with what you know. Such "social inertia" can exist on either the company or customer side. Circular solutions, for example, might be able to provide consumers with the same utility, but if the user experience is perceived as less convenient or less prestigious, the product or service might still not see much adoption. And not every company perceives biodiversity conservation as their responsibility, or even in its realm of capabilities[80]. Such attitudes generally stem from a lack of knowledge and understanding of biodiversity's importance and the many nature-based and technological solutions that already exist. Operational barriers may include a lack of necessary infrastructure, for example for proper waste management or supply chain engagement. Setting these up takes time and money. In that way, operational obstacles are closely related to financial obstacles; apart from externalities not yet being fully priced in, the main financial obstacles are lock-in barriers from past investments[81] or up-front investment costs for new business practices.

Despite these persistent obstacles, the ever-growing impacts from unsustainable business practices do tend to increase stakeholder pressures for change through political, market, and other channels, albeit with often considerable delays. Supply chain disruptions[82], intensifying water and commodity shortages, changing customer preferences, activist protests, and a global slowdown of economic growth[83], could be interpreted as signs of this dynamic. There is a sleuth of recent and upcoming biodiversity-related government agreements, laws, and regulations (e.g., COP15, the European Green Deal, environmental disclosure laws around the world), against the background of a seemingly intensifying discussion about a so called "nature-positive economy". In a nature-positive economy, businesses, governments and others take action at scale to minimize and remove the drivers and pressures fueling the degradation of nature, to actively improve the state of nature itself and to enhance the resilience of our planet and societies[84]. If society is moving in that direction, that would change the structure of the interactions depicted in Figure 4, to where profitability of unsustainable practices keeps diminishing and the profitability of sustainable practices keeps increasing.

Figure 12 – Burning of Amazon rainforest for land clearing to cattle ranching

(77) Dasgupta (2021).
(78) LinkedIn (2022).
(79) Ritzén & Sandström (2017).
(80) Kirchherr et al. (2017).
(81) WEF (2022d).
(82) Many supply chain disruptions can be attributed to the pandemic, however, there is compelling research that climate change and human encroachment on wildlife habitats, among other factors, boost viruses like COVID-19 (e.g., Holmes, 2022).
(83) E.g., World Bank (2022); IMF (2022b).
(84) University of Cambridge (2022).

Figure 13 – Causal loop diagram. By author.



If the business environment is changing to where nature-related issues are more priced in, there are diminishing barriers for companies that understand that biodiversity is the key for life and business, that want to increase their resilience by reducing what they ask from the natural world, and who see the business opportunity in nature-positive solutions. On the other hand, companies uninterested in corporate biodiversity action might experience increasing difficulties in continuing with business as usual. Good corporate strategy is to anticipate a changing business environment rather than be caught unprepared. Although a healthy company can be expected to possess the innovative capabilities to change business practices, this process does take time. It will have to be an iterative process between internal pilots, customer responses, regulatory developments, and other stakeholder feedback. That is why it's important to start this change process now. As the UN Environmental Programme (UNEP) states[85]: "… clinging to business-as-usual is not just risky, but a narrow and irresponsible approach. The only way to prepare for the future is to explore how companies can take on a nature positive approach, starting today."

(85) UNEP (2021c).

3 How

How

There are several biodiversity frameworks, tools, and metrics at companies' disposal to help them understand, measure, and mitigate their biodiversity impacts and dependencies. Many of these focus on a company's footprint, i.e., the extent to which a company is adding to the five biodiversity pressures. Some frameworks work more along the line of risk and opportunity assessment. Some lend themselves better for external reporting than others. There are no standardized approaches today, for two main and distinct reasons. The first one is that the area of corporate action and reporting on biodiversity is young and very much still in development. Some maturation can be expected to take place over time, which would include a certain level of standardization. The second reason is that by its nature, relevant biodiversity action means decision making amidst complexity. That aspect is something that organizations to some extent will need to accept, as it results from the abundant variety of life's manifestations – exactly that which biodiversity action is trying to preserve.

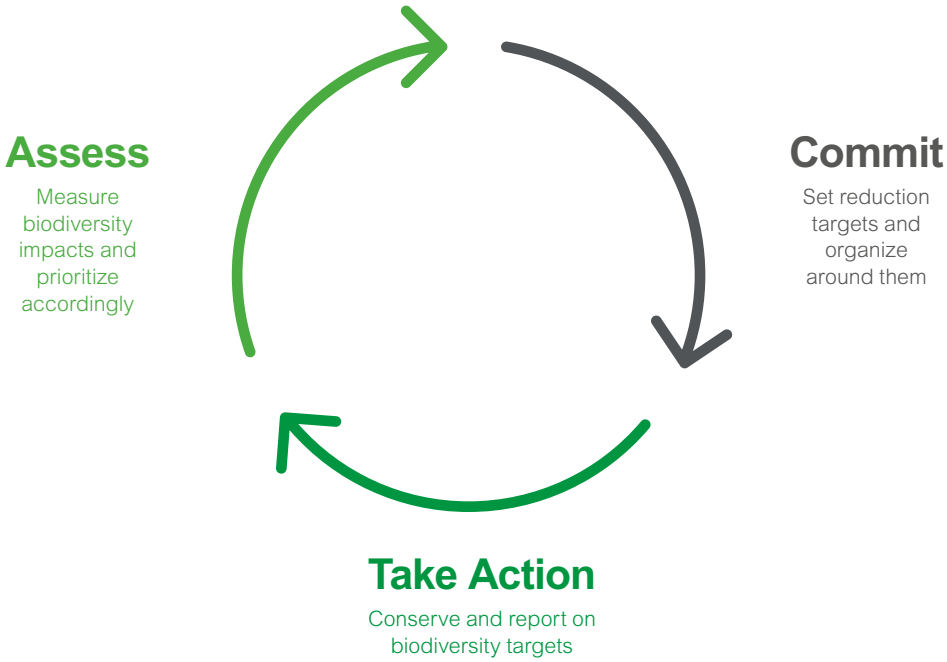
Frameworks

Frameworks that can help with biodiversity strategy setting and/or risk management are really nature frameworks, which means they also include non-living parts of nature, such as water and land. Given that these are habitats of all life forms, nature actions and biodiversity actions will practically always align. Some nature frameworks include the Natural Capital Protocol of the Capitals Coalition[86], the Accountability Framework[87], or the Nature-Related Risk & Opportunity Management and Disclosure Framework of the TNFD[88]. Although details for science-based target-setting are still being developed by the SBTN, its *Initial Guidance for Business*[89] could serve some companies well as a framework too. The WBCSD has summarized the several frameworks out there in their report "*What does nature-positive mean for business?*"[90].

Which one of these frameworks is the optimal choice depends on a company's sector, size, and in-house capabilities, among other things. The Accountability Framework, for example, has been developed for corporations producing commodities (e.g., soy, palm oil, and paper) and thus would not be well-suited for companies in a different sector. It is also not necessary to choose only one; some frameworks complement one another well. In fact, manufacturing companies might find the combination of the SBTN and TNFD frameworks most useful. The SBTN guidance focuses on the footprint and whether the set reduction targets align with global goals in government commitments, like the 30% land conservation by 2030 target that came out of COP15. The TNFD is a risk and opportunity assessment designed more to inform a company's investors, and focuses more on dependencies (and opportunities).

It is beyond the scope of this document to go into all of the frameworks in detail, but broadly speaking, they typically come down to three general and repeating steps[91]: Assess, Commit, Take Action[92]. This is also the case for the SBTN guidance, for example. These three steps will be discussed in more detail in the following sections. Given that the target audience of this report consists of companies who generally speaking have less direct dependencies on biodiversity, the below text is written more towards footprint mitigation.

Figure 14 – The virtuous cycle of biodiversity action



(86) Capitals Coalition (2022b).
(87) Accountability Framework (2022).
(88) TNFD (2022b).
(89) SBTN (2022b).
(90) WBCSD (2021).
(91) Business for nature (2022d).
(92) These steps might remind the reader of the classic continuous improvement loop.

Assess: measure and prioritize

There are several useful tools and metrics to help companies understand their biodiversity footprint and dependencies. They vary greatly in scope, applicability, ease of use, and maturity, among other things. Some tools and metrics require much more detailed data than others, for example, so a company will want to take the needed data into consideration before settling on a specific tool. The biggest determinant for a tool and metric's applicability is the company's sector. There are, for example, relatively mature tools that were developed for assessment specifically for agricultural and mining companies. Because of the unique nature of finance, tools for that sector have been developed more recently too. It is beyond the scope of this report to go into all the different tools and metrics. An overview of biodiversity tools and metrics by the *European Business for Biodiversity Platform*[93] contains a fairly intuitive "flywheel" to help guide decisions. This flywheel does not contain the *Nature Risk Profile* developed by the UNEP and S&P, which was released in January 2023[94]. The Nature Risk Profile does merit mentioning as it is designed for analyzing both a company's impacts and dependencies on nature, and is purportedly aligned with the TNFD. The methodology uses STAR (Species Threat Abatement and Restoration), one metric manufacturing companies might find particularly useful in their biodiversity assessments. Two other metrics that might prove of particular value for manufacturing companies are the Global Biodiversity Score (GBS) and Product Biodiversity Footprint (PBF)[95].

Measure

GBS, STAR, and PBF have the benefit of broad applicability[96]. The GBS tool has been developed by CDC Biodiversité, a research agency dedicated to the design and implementation of concrete actions to restore and preserve biodiversity[97]. Its output uses the metric of mean species abundance per square kilometer ($MSA.km^2$)[98]. STAR has been developed by experts from 55 organizations and is based on the IUCN Red List of Threatened Species[99]. Its output is expressed as one score for extinction risk and another for restoration potential. The scores are scalable and summable, meaning a score can be used for a single site, a multinational organization, a country, and even the entire world. The PBF[100] combines Life Cycle Assessment with Ecology knowledge to arrive at an output that covers both the species and ecosystems dimensions of biodiversity[101]. Its output consists of percentages on the five biodiversity pressures (habitat loss, overexploitation, climate change, pollution, and invasive species).

From a single metric to dashboard approach

There is considerable pluriformity among biodiversity tools and metrics in terms of the format of the final output and what is included or not. For example, despite the three dimensions around biodiversity (ecosystems, species, and genes) being well-established, none of the metrics available today include the genetic dimension. Only a minority include ecosystems impacts. All tools measure species abundance, however, the metrics in

Figure 15 – Chameleon

(93) EC (2021).
(94) UNEP-WCMC (2023).
(95) PBF (2022).
(96) Schneider Electric used the GBS for its end-to-end biodiversity footprint in 2020.
(97) CDC Biodiversité (2021).
(98) Next to the reference to the CDC Biodiversité's website with details on the GBS, Schneider Electric (2020b) also released a white paper in 2020, with details of the calculation.
(99) Mair et al. (2021).
(100) PBF (2022).
(101) Asselin et al. (2020).

this dimension are hardly uniform. The five biodiversity pressures are measured in various ways, and some pressures are not incorporated at all. Land use, for example, is included in all existing biodiversity measures (rightly so as it is the biggest driver of biodiversity loss today), but invasive species is only included in about half of the currently available options. All of this variation has made comparison between companies' biodiversity performance difficult so far.

To make such comparisons between companies more straightforward, there has been a call for a common metric, the biodiversity version of what the CO_2-equivalent stands for in climate change. One candidate for such a common metric at the moment of writing seems to be the MSA.km^2. A score, such as in the STAR metric, also holds the promise of easing comparability among companies[102]. It is important to realize, however, that any metric will miss relevant aspects of what is being measured. For example, the STAR scores focus on species only. MSA.km^2 measures ecosystem abundance, but not species diversity nor genetic diversity. The MSA.km^2 also does not include invasive species or biological resource overuse such as overfishing. For a manufacturing company, this may be an acceptable boundary to draw for a first-time biodiversity footprint assessment. But the purpose of drawing comparisons between companies is to help accelerate their biodiversity efforts. And although a common metric might make it easier to mainstream biodiversity efforts into business, scaling of these efforts based on one metric will inevitably also scale the impact of this metric's drawbacks.

This trade-off between comprehensiveness and a straightforward metric, experts seem to have concluded, is inescapable; for tracking progress towards biodiversity targets, one metric is not expected to be enough[103]. Although a single metric can have its usefulness, especially in shorter-term small projects, the consensus has been moving towards aspiring for a standardized dashboard of several complementary metrics.

Prioritize

Based on the assessment, a company should have gained an understanding of which biodiversity pressures form the main part in which scope of its footprint. This can be used to identify so-called biodiversity "hotspots", and thus where it should focus efforts. These prioritization areas, or hotspots, is where it will want to start with setting targets for improvements.

Commit: Set targets and organize around them

Targets

After the assessment has taken place and the results have been analyzed, the company will have a good idea where to begin with setting targets. These can sometimes flow naturally from the chosen framework, and some are more substantial on the metrics than others. The SBTN framework is particularly useful for setting targets because it is science-based and designed to be aligned with government commitments. This matters because simply achieving a footprint reduction target does not mean this reduction is sufficient. For example, corporate pledges for carbon reductions have been found to be insufficient to avoid climate deregulation[101]. In that sense, the SBTN targets should be taken as a minimum. But nothing is holding a company back from committing to more. Former Unilever CEO recommends zero or 100% targets, for example, because, he argues, when a company commits to say, a 70% reduction, this means you are also committing to keep making a 30% negative impact[105].

Figure 16 – Bees working in a beehive

(102) We cannot state anything beyond the promise it holds, as STAR has been introduced for commercial use to companies only since September 2022, and thus has seen limited private sector uptake so far.
(103) IUCN (2018).
(104) New Climate Institute (2022).
(105) Polman (2022).

Conducive organizational structures

A company will need so called key performance indicators (KPIs) to be able to track progress towards the targets. The frameworks typically offer useful suggestions for these. *The Development and use of biodiversity indicators in business* by IUCN, also provides a high-level overview of indicator frameworks to apply based on whether the biodiversity scope is one single site, product level, corporate level, or a third party[106]. Next to this more quantitative aspect, most frameworks also offer, to various extent, organizational guidance. Such guidance covers qualitative aspects like how to operationalize data collection and facilitate two-way communication on the company's strategy and progress. Many corporations have started to offer optional or mandatory internal courses on sustainability, for example. It is interesting to note the similarities between such recommendations and those around the management trend towards "agile companies". This is not surprising; after all, reversing the biodiversity loss constitutes a break with business as usual, so an organization's structures should be conducive to an atmosphere of innovation. It is beyond the scope of this document to go into the details of a "learning organization"[107], but as we are seeing with carbon pledges[108], without aligning a company's technology, governance, as well as culture around them, only setting biodiversity targets does not constitute actual commitment[109].

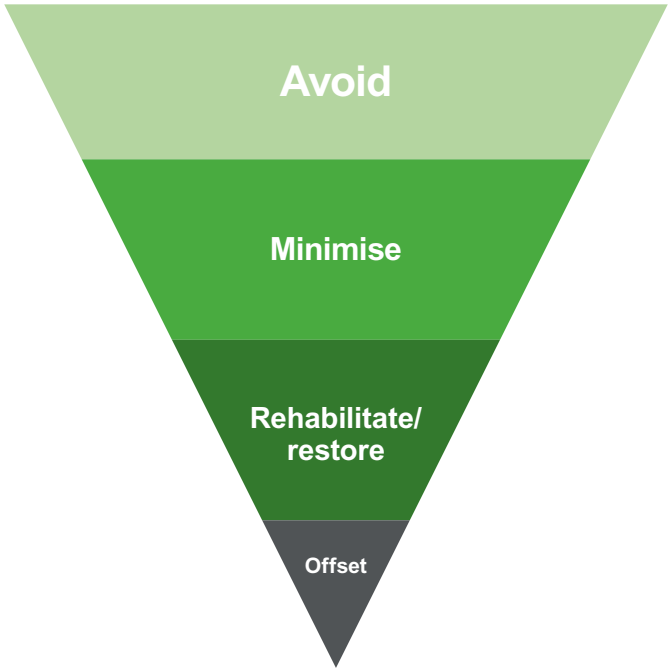
Take Action: Conserve and report

With the assessment done, priorities identified, targets determined, and conducive organizational structures in place, an optimal mitigation plan can be designed and executed. A company typically will want to report on progress afterwards.

The conservation hierarchy

In designing a plan towards the targets that have been set, the conservation hierarchy[110] should be used. We have seen with carbon reduction goals that some companies have relied almost entirely on offsetting to achieve their targets. However, it is widely accepted that offsetting is a method of last resort.

Figure 17 – The biodiversity mitigation hierarchy



(106) IUCN (2018).
(107) Smith (2008).
(108) UN (2022).
(109) Herrington (2021).
(110) Sinclair et al. (n.d.).

With each biodiversity target and the related hotspot company activities, the below questions – in this order – should be asked:

1. What impacts are we able to avoid?
2. What can we do to minimize some of the unavoidable impacts?
3. What impacts that have been made by us can we rehabilitate/ restore?
4. What is left to offset and what are the best ways to do so?

As a simple illustration of applying the conservation hierarchy, consider a company's intent to build a new facility. The company could decide to use an existing old building, *avoiding* any new disturbance of undeveloped land. It could use low-impact development on the site where possible to reduce additional disturbances, and although the building's occupants and activities will require water and energy, the amounts used can be *minimized* with features like good insulation, solar panels, low-flow faucets, LED lights, and smart optimization controls[111]. The company could further *restore* the developed land with integration of nature into the building itself and the site[112]. Any remaining impacts could then be *offset* with nature conservation projects (more on offsets in the next chapter)[113].

Establishing detailed plans based on the above questions will always entail wide internal and external stakeholder consultations. Ensuring participation of relevant local communities and key players is particularly important in the case of biodiversity, because of the often-unique natural elements in many locations. Stakeholder engagement will not only provide potentially useful input for the plans themselves, but likely make them easier to execute; people tend to not oppose their own ideas.

Reporting

Companies will need to report on progress towards targets on a regular basis. Several frameworks are designed to facilitate publication of some of the outcomes, including the TNFD. The company will want to elaborate on how targets were achieved, or why not (yet). This reporting is somewhat different from disclosing ESG aspects in general, therefore, because companies using these latter reporting frameworks[114] also disclose data on ESG aspects they have not (yet) set targets for. The more targeted reports and general ESG reporting thus complement each other well, so companies will typically want to report using both kinds of frameworks.

Figure 18 – Group of lions, Africa

(111) Ellen MacArthur Foundation (2022b).
(112) Kellert et al. (2013).
(113) There are, of course, many more options to reduce and restore the biodiversity footprint of a building. In fact, facilities have been built now that mimic the local environment's ecosystem services, requiring no offsets. These are described in more detail in the last chapter on building the biodiversity handprint.
(114) Widely used examples of such reporting frameworks include SASB, GRI, and CDP.
(115) Bush (2021).

Changing the system

Throughout each of the three steps, a company might also be influencing how the societal and economic systems it is part of work. It can change the attitudes and behavior of other players in these systems, or it can change their structures, such as legal frameworks. In doing so, it has entered the space of making systemic changes. Corporations can change the larger system either towards, or away from, halting biodiversity loss. Positive or negative, systemic efforts will not show up in a company's footprint calculation. Its effects are distributed and hard to detect to the point where they probably can never be fully measured. But they have an impact nonetheless, and the accumulated impacts over the entire societal system from systemic changes can become large. So, any company that is serious about meaningful biodiversity action should be conscious of potential systemic impacts.

Examples of influencing the behavior of other players in the broader business environment include the best practices described in the next chapters of companies educating customers and employees, or engaging with suppliers on their biodiversity footprint reduction journey. These actions can contribute to a footprint reduction, but they also raise people's awareness to these issues in general, and thus contribute to a cultural shift towards a nature-positive economy.

Another example of systemic action is government lobbying, because a system's policies and regulations shape how it works. An example is the circa 40% of S&P 100 companies engaging with lawmakers on science-based climate policy[116]. Companies dedicated to corporate action for biodiversity loss do not need to engage with policymakers on nature-positive laws, but when they do it's important to realize that the accumulated impacts of such systemic efforts can be major, both in positive or negative (in the case of actively opposing them) ways.

Start next round

Once the third step ("Take Action") has been taken, the company is not done. Rather, the process of Assess, Commit, and Take Action starts again. First and foremost, that is because humans do not understand nature very well yet, and so meaningful biodiversity action will be a process of continuous learning. To quote Richard Phillip Feynman: "I think Nature's imagination is so much greater than man's, she's never gonna let us relax!"

There are various more practical reasons to repeat the three-step cycle. For one, it is possible that some targets were not achieved due to unforeseen obstacles. Lessons from the previous attempt can be integrated into action plans for the next round. It is also just as possible that targets were more than met, and the company realizes it should be more ambitious! Additionally, it is almost guaranteed that scope and ambition need to be increased. It is likely that the company's biodiversity footprint was brought down but is not yet net zero. And even if that were the case, this might only be so in certain areas – such as those measured by the metric(s) of the organization's choice – but not all biodiversity aspects. For example, genetics are probably not addressed because as mentioned, there are no tools to measure this dimension yet. And most tools do not measure all biodiversity pressures (yet). Additionally, the company probably set their targets based on a reduced scope, which should be broadened in the next iteration of the process. For example, many companies keep their first targets on scope 1, while the majority of their impacts may lie in scope 3, its supply chain[117]. This brings us to future steps for biodiversity efforts for business.

Figure 19 – Natural loop formed by a nautilus shell

(116) Ceres (2021).
(117) Schneider Electric is no exception. When it set biodiversity loss targets, it did so for its scope 1 operations. But its footprint assessment indicated that the majority of the company's impact lies in the supply chain, so future targets should include scope 2 and eventually scope 3.

4 What now

What now

Biodiversity efforts can be expected, to various extents, to develop in tandem with, leapfrog from, or catch up to climate approaches.

Supply chain traceability is a next frontier that has only recently started to be explored by corporations. It's easy to see the benefits of pursuing traceability of carbon, biodiversity, and other environmental impacts at the same time. Or at the very least, once infrastructure and practices for carbon mapping in the supplier network have been established, mapping of biodiversity impacts throughout the supply chain – albeit still far from a press of the button – might require less time.

Biodiversity is poised to catch up to climate approaches through the development of biodiversity scenarios and offset methods. Carbon offsets have been shown to be vulnerable to misuse, either intentionally or unintentionally. We can expect such issues with biodiversity offsets too, especially because biodiversity is less amenable to being expressed in a single metric than greenhouse gas emissions. One hopes that corporate biodiversity efforts will also be able to enjoy some leapfrogging from lessons learned from climate efforts, in offset markets and beyond.

COP15 was scheduled for December 7 to 19, 2022, with the aim of governments agreeing to a new global biodiversity framework for 2030[118]. Frameworks like the TNFD and SBTN will align themselves with this global biodiversity framework, so it is of major relevance for companies working on biodiversity too.

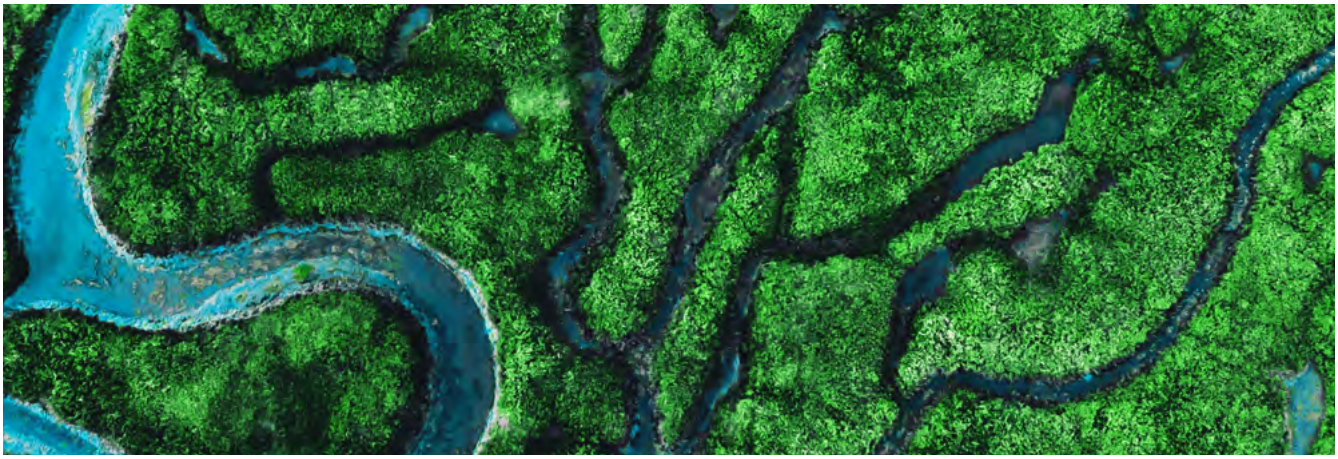
The new global biodiversity framework is widely expected to provide an impetus for biodiversity action across all players. This opens up a space for innovative companies to provide nature-positive business solutions to reduce their own and other companies' footprint. This space is so abundant that it merited its own chapter, but it is very much a step to take now. By starting today with the transformation of their organizations towards positive impact, i.e., building their handprint, corporations will be able to capitalize on the upward potential in the bending of the biodiversity curve.

Supply chain traceability

Once your company has mapped its biodiversity footprint, you may find that the biggest impact lies in scope 3, i.e., your supply chain. This is especially likely if you're a manufacturing company, for example[119]. Most companies have relatively little influence in their supply chain, and even less data availability. But there are several options to get started with identifying priority areas in the supply chain based on estimated biodiversity impacts. One such option is the online tool Bioscope[121], which uses the relatively common method in biodiversity assessment called the ReCiPe method. Bioscope was released in 2022 by e-commerce company *Code*, and consultants *Arcadis* and *PRé Sustainability*. Both Arcadis and Pré Sustainability have been thought-leadership-producing biodiversity consultants for years, and advocate for going beyond reporting to find the competitive advantage in a sound biodiversity strategy[121]. The *Integrated Biodiversity Assessment Tool* (IBAT)[122] offers access on a subscription basis to three key global biodiversity data sets, including the IUCN Red List of Threatened Species. Companies could use these together with specialized consultants, such as *Fair Supply*[123], to derive estimates for their biodiversity impacts along the supply chain.

Organizations like *Trase*[124] have started to map supply chains for some commodities, including beef, soy, cacao, and cotton. Over time, such efforts might help to bring down the need of assessment tools to rely on extrapolation. So far, the Trase environmental assessment focuses on deforestation, and longer supply chains, such as for electronics, are not in the database. But it's an example of how the latest methodologies, in combination with the latest technologies like remote sensing, artificial intelligence (AI) and statistical modelling, can be hugely helpful with improving traceability in a company's supply chain. Unilever, for example, uses AI, satellite, and blockchain technology to monitor its "no net deforestation by 2023" commitment[125].

Figure 20 – Point Reyes National Seashore, California, United States



(118) UNEP (2022).
(119) Unsurprisingly, Schneider Electric found this to be the case as well.
(120) Bioscope (2022).
(121) Arcadis (2022).
(122) IBAT (2022).
(123) FairSupply (2022).
(124) Trase (2022).
(125) Unilever (2020).

These technologies are only part of the solution though. They are best put to use in combination with social outreach in a participatory manner. To stay with the Unilever example, next to applying the latest technology, the company is also known for working with its suppliers in a spirit of partnership[126]. Salesforce generated some media buzz when it announced a punitive element to its request of suppliers to disclose the environmental impacts of their products and services, but in the letter announcing this so-called *Sustainability Exhibit*, the tech giant also stated: "We want to collaborate more deeply with you"[127]. Such collaborations could include education on sustainability, including perhaps, among other things, the importance of compliance with invasive species laws. There is an obvious reputational benefit from this kind of quality engagement around sustainability impacts, but it can be expected to generate further positive "externalities" like innovation and supply chain resilience[128]. In a world of increased uncertainty around geopolitical developments, changing customer preferences, and environmental risks, this kind of supplier engagement just might turn out to have resulted in the mitigation of a crucial supply chain disruption.

Offset methods

Another finding from a company's footprint mapping might be that the biggest impacts result from its core activities, such as was the case for Oxford University[129]. This means that the footprint likely cannot be brought down only with actions on the first three levels of the conservation pyramid (Avoid, Minimize, Restore), or at least not at first. If this is the case, zero-net biodiversity loss will have to be achieved through biodiversity offsets, which means external nature conservation and restoration projects.

There is no common standard for biodiversity offsets today, but as a minimum, corporations will want to ensure that biodiversity offset projects align with best practices such as laid out by international organizations like the Organisation for Economic Co-operation and Development (OECD)[130] and the World Bank[131]. As already mentioned, offsetting is not appropriate for impacts that can be avoided, reduced, or rehabilitated. It is also important to note that because of its nature, some biodiversity impacts simply cannot be offset; think of the destruction of a local ecosystem consisting of one or more species that are unique to that location. Key considerations in designing or selecting the right offset method are Additionality, Equivalence, and Permanence.

Additionality, simply put, means that the offset must be real; the biodiversity project must deliver conservation gains beyond those that would have been achieved by activities that are not part of the offset project, just like with carbon offsets. *Equivalence* means that offsets should conserve the same biodiversity values (in all dimensions) as those lost to the original project, a feature that is less straightforward to put into practice with biodiversity than with carbon offsets. *Permanence* considers the time factor; it means that the biodiversity offsets can be expected to last for at least as long as the adverse biodiversity impacts the offset is supposed to compensate for.

There are many other issues to consider, such as that the payment structure to the local community involved in the offset project is equitable. More exhaustive guidance can be found in the guides referenced in this report.

The latest technologies can enhance many of the offset methods. Geographic Information Systems can, for example, help scientists map where species are most at risk and which ecosystems are most pivotal for a healthy planet to protect[132], thus providing useful input for optimal offset project design. Digital capabilities can help ensure that the key features of additionality, equivalence, and permanence are met. Rebalance Earth, for example, offers a trustworthy way for businesses to fund protection of keystone species by using bank grade blockchain technology in its global ecosystem services platform[133].

Figure 21 – Sea stack at Dun Briste, Ireland

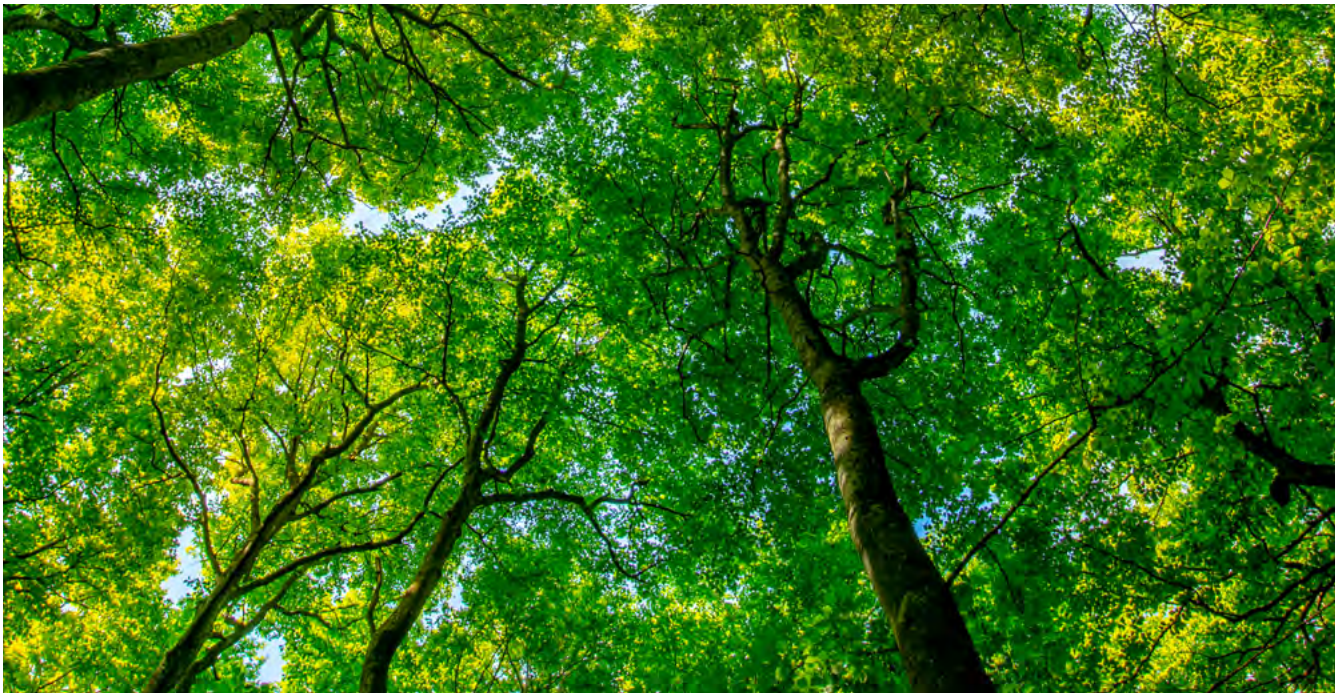
(126) Googins et al. (2007).
(127) Makower (2021).
(128) WEF (2022e).
(129) Bull et al. (2022).
(130) OECD (2016).
(131) World Bank (2016).
(132) WEF (2022f).
(133) RebalanceEarth (2022).

CBD biodiversity framework post-2020

On 29 December 1993, the Convention on Biological Diversity (CBD) entered into force as part of the 1992 Rio Declaration[134]. It was the first global adoption of goals for biodiversity. These goals, set for a deadline in 2020, were not achieved. During the COP15, 7–19 December 2022, in Montreal, Canada, governments adopted a post-2020 global biodiversity framework with new goals and targets[135]. Targets in this Global Biodiversity Framework (GBF) include protection of 30% of Earth's lands, oceans, coastal areas, inland waters, and reducing environmentally harmful government subsidies with $500 billion every year. The Parties recognized that corporate activity will have to be aligned with government biodiversity efforts. Target 14, for example, is to "progressively align all relevant public and private activities, fiscal and financial flows with the goals and targets of this framework". The private sector is specifically mentioned as a finance source in Target 19, which concerns the mobilization of at least $200 billion per year by 2030 in biodiversity-related funding. The commitment to Target 15 "to encourage and enable business… to… monitor, assess, and transparently disclose their risks, dependencies and impacts on biodiversity…" has been interpreted by some biodiversity players as "a strong signal to businesses from governments that requirements on nature-related assessment and disclosure are on the horizon[136][137]. Some other targets that do not address company behavior directly might still be very relevant for the private sector. Target 16, for example, is aimed at purposefully reducing consumption footprints by, among other things, changing customer preferences through education on impacts and information on alternatives.

There is broad consensus from the scientific community that the GBF is the minimum to halt further biodiversity loss and perhaps even avoid a potential ecosystem breakdown[138]. In fact, some recent studies reveal that, as a minimum, 44% of terrestrial land must be ecologically sound to prevent major biodiversity loss[139]. Additionally, the 30% conservation target by 2030 has generally been understood as a milestone towards preserving at least 50% of land by 2050[140]. A 30% conservation target has also been identified as a bare minimum for freshwater and ocean bodies[141], with studies indicating here too that 50% might be a better goal[142]. At the same time, the GBF is also very ambitious; the targets go beyond the CBD 2020 goals, which, as mentioned, were not achieved. At the moment of writing, about 17% of land is protected[143] and based on current development plans, the 44% of land conservation will not be met[144]. This means, in short, that governments will be stepping up their biodiversity efforts, and they will demand that companies do the same. The many and major risks to the corporate sector of failing to do so have already been discussed. But there is another dimension for corporate biodiversity efforts; not one of necessity, but of opportunity.

Figure 22 – Trees, Larvik, Norway



(134) CBD (2022a).
(135) CBD (2022b).
(136) Capitals Coalition (2022d).
(137) Notably, this requirement includes "supply and value chains" for transnational companies, supporting the first Now Step of this Chapter.
(138) UNEP (2021d).
(139) E.g., Allan et al. (2022).
(140) E.g., Dinerstein et al. (2017); Allan et al. (2022).
(141) https://www.science.org/doi/10.1126/sciadv.aaw2869
(142) B. C. O'Leary, M. Winther-Janson, J. M. Bainbridge, J. Aitken, J. P. Hawkins, C. M. Roberts, Effective coverage targets for ocean protection. Conserv. Lett. 9, 398–404 (2016).
(143) UNEP-WCMC and IUCN (2021).
(144) Allan et al. (2022).

5 Why again: The opportunity

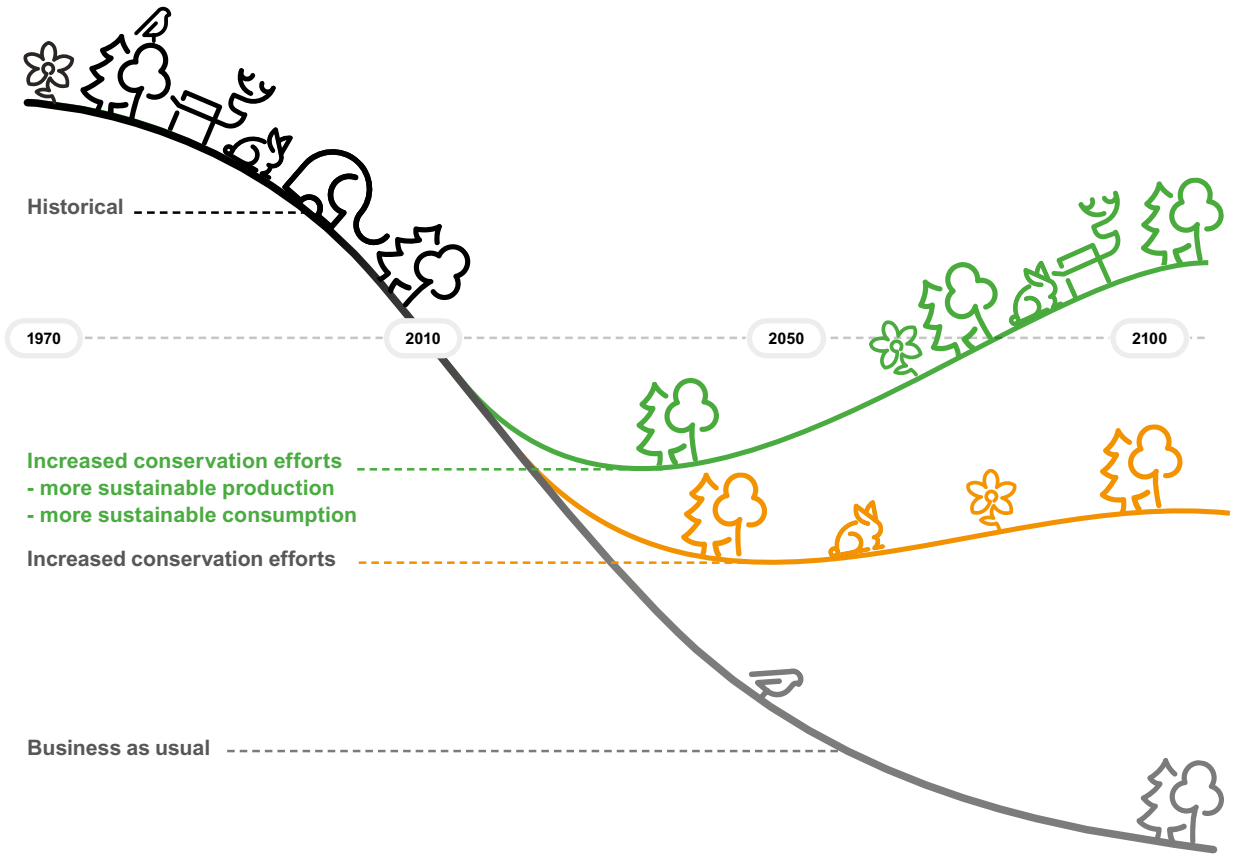
Why again: The opportunity

After having repeatedly gone through the cycle of determining priority areas for bringing down the biodiversity footprint and risks from nature-related dependencies, setting targets, and determining and execution a mitigation plan, a company should have reached net zero (within its chosen scope). But future fit companies go way beyond that, from the realm of damage control into that of opportunity. The next step for business is to become net positive, a concept described in the 2022 book "*Net Positive: How Courageous Companies Thrive by Giving More than They Take*"[145].

In the context of biodiversity, this would mean business practices that restore biodiversity, or put differently, work on a nature-positive economy.

To pursue such restoration, and ultimately regeneration, is not a new concept. In the context of biodiversity research, a widely shared and adapted graph is that of Leclère et al.[146], which illustrates this restorative concept by proposing that an effective post-2020 biodiversity strategy displays an upward bending curve in biodiversity, rather than a flattening of the current downward sloping one.

Figure 23 – Bending the curve. This is an adaptation form Leclère et al.[147] by Schneider Electric. Artwork does not intend to accurately represent the results



Also acknowledging the imperative to go beyond just halting biodiversity loss, the UN declared 2021-2030 as the "Decade on Ecosystem Restoration"[148]. Restoration is also explicitly mentioned in the GBF. Target 2, notably, is to ensure "that by 2030 at least 30 per cent of areas of degraded terrestrial, inland water, and coastal and marine ecosystems are under effective restoration"[149].

Restorative corporate efforts can happen through reductions in an organization's footprint, as some examples further below demonstrate. But perhaps the most interesting aspects of net-positivity lie in the nature-positive products, services, and ultimately broader systemic actions that a company can offer and take. Building this part of the handprint – the positive impacts a company has on society – is the topic of focus in this last section.

(145) Polman (2022).
(146) Leclère et al. (2020).
(147) World Wildlife Fund (2022c).
(148) UNEP and FAO (2022).
(149) CBD (2022b).

Before delving into that discussion, however, it should be pointed out that nature-positive products and services complement conservation and footprint reduction efforts – they can never replace these efforts. Despite the enormous potential for nature-positive products and services, the technologies that enable them are unlikely to scale quickly enough to prevent tipping points[150]. Sustainable production alone will not be sufficient to halt biodiversity loss now. Conservation is a key tool that, despite its own challenges, can in principle be implemented faster at the necessary scale. As Figure 23 above and Figure 26 further down in this report also illustrate, the opportunity to "bend the curve" lies in the handprint, but it stands on conservation efforts (and, as discussed towards the end of this report, amplifies more sustainable consumer behavior).

A company's solutions around biodiversity (or another sustainability aspect) do not in any way make up for a company's footprint[151]. After all, other organizations may use the company's biodiversity products or services to lower their own footprint, and so allowing them to compensate for a footprint would lead to double counting. Furthermore, the argument that the positive impacts a company has on society somehow offsets its footprint have been heard many times in the climate change context; at this point in the 21st century, your stakeholders will have little tolerance for it. Lastly, getting footprint credits for biodiversity solutions is not necessary for it to be a worthwhile endeavor, because this is the part of the handprint where a wealth of business opportunity lies.

Figure 24 – Mushrooms on a tree stump

(150) Dinerstein et al. (2019).
(151) Even if it were practically feasible, which to date it is not because there is no agreed methodology on how to measure a handprint.

Building the biodiversity handprint

The interlinkages mentioned at the beginning of this document can be leveraged as synergies. The case studies in this report show examples of companies that managed to capitalize on the interlinkages between environmental, and often also social and governance issues. Indeed, a 2020 report from the WEF's Centre for Nature and Climate found that nature-positive business transitions could generate over USD 10 trillion business value per year by 2030[152]. The concrete details of such transitions will depend very much on a company's profile, including its sector, size, and location(s)[153], but in general, companies will want to evaluate their business from three angles. For ease of memory, these three angles are described below as simply as possible:

1. **What needs to go**
2. **What needs to come in**
3. **What can be changed**

These three angles can also help identify ways to bring down the footprint, of course. Indeed, some of the examples in this section enabled companies to reduce their footprint, rather than offering nature-positive products and services. But once a company gets more practice with stepping out of its "business as usual box" and looking at it from these three angles, they start to fuel some powerful innovation, and markets tend to reward innovation. As a strategist at JPMoganChase puts it[154]: "Companies working to improve biodiversity health or minimize impacts may present new investing opportunities".

What needs to go

Nature-positivity means that some activities, notably those with a high negative impact in areas particularly rich in biodiversity, simply should not take place anymore. Six major European supermarket chains announced last year that they would stop selling some or all beef products from Brazil, for example, due to links with destruction of the Amazon rainforest[155]. Sometimes, what needs to go is part of a companies' core activities. The energy company Ørsted is a by now well-known example[156]. We can assume that when it started to ask the question of what needed to go about a decade ago, when it was one of the most coal-intensive energy companies in Europe, its biggest impact on biodiversity came from the climate change pressure. Today, it has transformed itself into a green energy company that operates more offshore wind energy projects than any other company in the world. Ørsted is on track for carbon-neutrality in its energy generation and operations by 2025 (their next decarbonization goal is the supply chain) and aims to deliver a net-positive biodiversity impact from all new renewable energy projects it commissions from 2030. Because it started its transformation in time, it has been able to capitalize on market changes, for example, in the growing clean energy sector in the United States.

What needs to come in

On the other side of the spectrum from harmful corporate activities are the restorative and regenerative ones. Nature-positive technologies, business models and other innovations need be built up and scaled. Such solutions come in endless shapes and forms, some examples of which are given below. But what they generally have in common is that they do not just address one biodiversity pressure or offer a solution to only one ESG issue. Rather, they capitalize on the synergies that exists among these aspects.

Biomimicry solutions are prime examples of this. Biomimicry is a practice that learns from and mimics the strategies found in nature to solve human design challenges[157]. Take the built environment. Researchers have determined that much of the land area that needs to be conserved is in fact already occupied by human populations[158]. Therefore, they emphasize the importance of "improving sustainable cohabitation and ecosystem protection in these regions". This means integrating the built environment way more into the natural one than is currently standard practice. But that's all the better. People are biophilic, meaning they enjoy feeling connected to nature. It makes them healthier, more productive, and happier[159]. That holds a lot of promise for or architects and construction companies that can design and build nature-

Figure 25 – A view of Interface's Paramit Factory's "forest" parking and adjacent offices in Malaysia
Photo Credit: Lin Ho Photography

(152) WEF (2020b).
(153) One project of the WEF's Centre for Nature and Climate, the Nature Action Agenda, has published such specific guidance for companies in three socio-economic systems: Food, land & ocean use, Infrastructure & the built environment, and Energy & Extractives. WEF (2022c).
(154) JPMoganChase (2022).
(155) Spring and Deutsch (2021).
(156) Ørsted (2022).
(157) Biomimicry Institute (2022).
(158) Allan et al. (2022).
(159) E.g., Kellert et al. (2013).

positive buildings and infrastructure. But many more companies can expect to benefit from catering to this human biophilic trait. Interface, for example, produces carpets and flooring in factories that are designed to be as regenerative as an ecosystem[160]. The factories contain large windows, which improve the well-being of workers because they enjoy the natural sunlight and outdoor views, including the butterfly garden which "employees seem to appreciate as much as the pollinators". Of course, worker well-being is just one of many benefits from Interface's *Factories as a Forest* approach. Interface's factories are designed to generate environmental benefits, including biodiversity services like habitat and nourishment provision for local species, to the same extent as local high performing ecosystems[161]. And in addition, it provides for everyone an excellent example of net positivity on the production side.

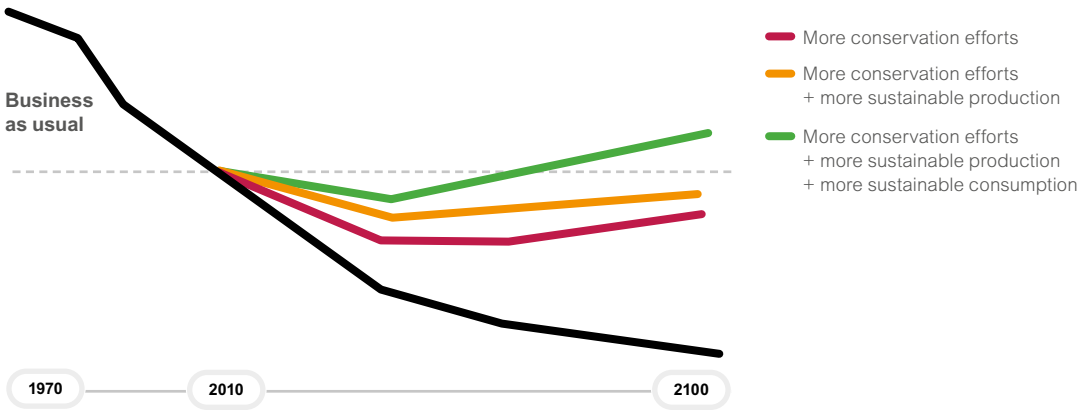
On the goods side, there are many established products in the market already that offer energy solutions, i.e., by increasing efficiencies and generating energy from renewable sources. The pollution abatement and resource use reduction space is more nascent, but here too many companies are proving the business case, especially in areas with more conducive (upcoming) regulations. Take the Finnish company Infinited Fiber as an example. Fast fashion has created enormous piles of habitat-polluting waste all over the world[162]. Because the majority of these clothes are made from synthetic fibers, derived from fossil fuels, they do not decay. Infinited Fiber "takes piles of trashed textiles" and uses its technology to create premium textile fibers that look, feel, and are as versatile as cotton[163]. CEO Kari Tuominen describes the company's strategy as follows: "Textile waste recycling is becoming mandatory in the EU in 2025 and we want to be involved in developing new bio-based fibers from this waste. We see substantial opportunities in this."

Some companies have been persuaded more by market pull. The Dow Chemical Company, for example, set itself a target in 2020 of converting 1 billion metric tons of plastics waste and alternative feedstock into sustainable materials by 2030, something that, among other things, reduces the pressure on biodiversity from resource use and pollution. In 2022, Dow tripled its target to 3 billion metric tons "to meet rapidly growing demand"[164]. Interzero[165] has done well in this space too. The company offers zero waste solutions, some of them using what they call "plant technology", including in packaging and electronics. Interzero's handprint is measurable on a global scale; according to the Global Footprint Network, Interzero postpones Earth Overshoot Day by 4 minutes and 20 seconds[166].

What can be changed

Transforming from within is often possible with enough creativity, changing the aspect that is causing the harm while keeping the rest of the activity. Faith in Nature[167], for example, makes the familiar beauty hygiene products, except these are plastic-free (e.g., shampoo bars) or refillable (e.g., body wash). In a world-first, the company also changed its constitution to include Nature on the Board of Directors in September 2022, "giving the natural world a voice and a vote on the future of the business"[168]. The world's largest tire manufacturer Bridgestone, as another example, is planning to keep producing tires. However, the way it goes about it is drastically changing. Using the latest technologies, including bacteria to break down the rubber[169], Bridgestone is scaling up a closed-looped system in which old tires[170] are used to create the raw material for new tires. Many companies are at several maturity levels of moving towards a product-as-a-service business model, which enables them to keep selling what they've been selling in the past, with much less material impacts[171]. Mobility-as-a-service, for example, is an expected double-digit growth market[172], with platforms that offer end-to-end trip planning and payment services across all modes of public transportation and private options like ride-sharing and taxi services, as a recent promising innovation[173].

Figure 26 – Re-interpretation of the bending the curve graph by World Wildlife Fund (WWF). This is an adaptation form the WWF[174], which states that although its artwork illustrates the main findings of the bending the curve article of Leclère et al., it does not intend to accurately represent the results



(160) Interface (2022).
(161) Sustainable Brands Knowledge Library (2018).
(162) Thomas (2019).
(163) InfinitedFiber (2022).
(164) Dow (2022).
(165) Interzero (2022).
(166) Earth Overshoot Day (2022).
(167) Faith in Nature (2022a).
(168) Faith in Nature (2022b).
(169) Brook-Jones (2022).
(170) De Socio (2022).
(171) Schneider Electric (2022) has had several successful pilots in this too, such as its retrofit offers to extend life of equipment — also non-Schneider Electric installed ones — as an alternative to a complete infrastructure replacements under its ECOFIT services.
(172) GlobalNewswire (2022).
(173) Deloitte (2017).
(174) World Wildlife Fund (2022c).

Here again, the social aspect should not be underestimated. To make the changes in business practices such as described above a success, for example, customer behavior often needs to change as well. Companies have to address trust issues that buyers may have around retrofitted and remanufactured products, or find ways to help customers transition altogether from identifying as a buyer towards being a user. New technologies hold the promise of enabling product-as-a-service models and helping to build this trust, for example by providing more transparency about a product's supply chain, operational quality, materials, and embedded environmental impacts with "digital products passports"[175]. Companies can also provide information and programs that enable their customers to use their products with less biodiversity impacts. Clothing company Patagonia, for example, is well-known for encouraging behavioral changes in its customers by suggesting they buy less clothes, educating them on clothing maintenance, and offering repair services and trade-in programs[176].

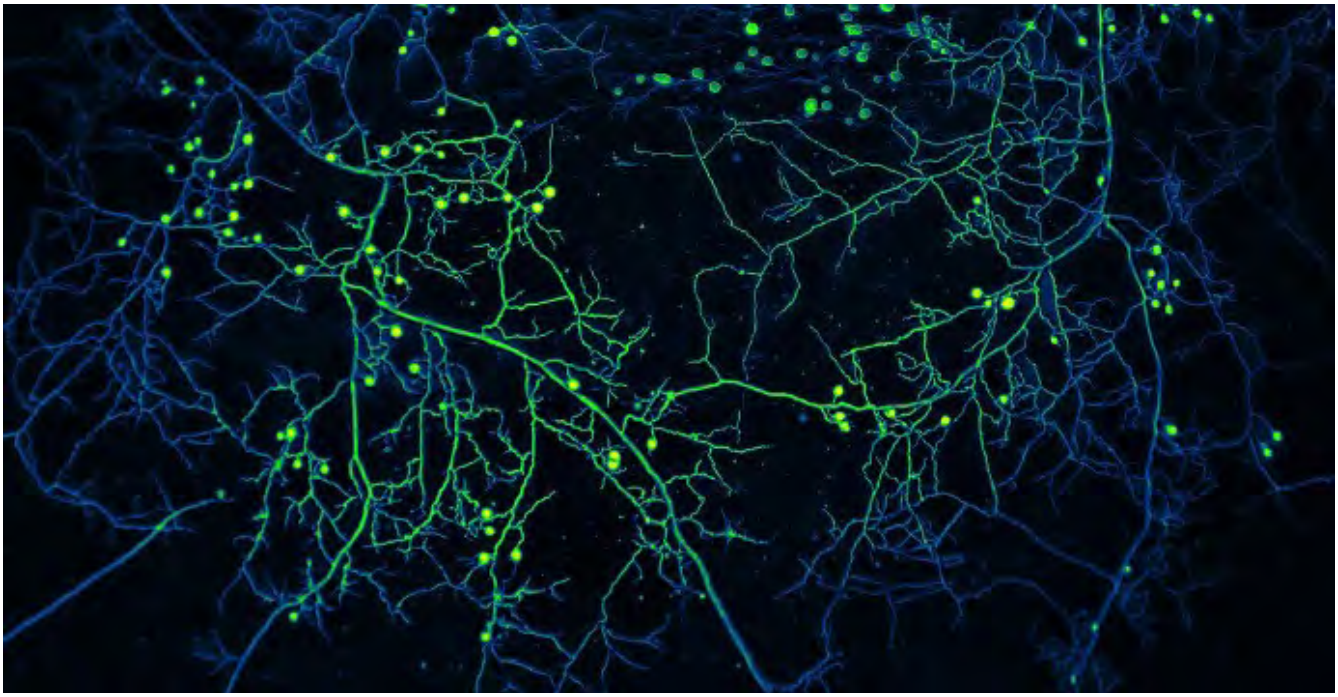
Systemic changes

Much of what needs to be changed resides in the larger system a company operates in. Although not under its direct control, sometimes a company can still influence those parts.

The Patagonia example of educating customers on how to consume less falls under such systemic efforts. These might seem nothing more than clever reputational stunts to some, but changing customer behavior is in fact an indispensable part of reversing biodiversity loss. Next to increased conservation efforts and much more sustainable production, more sustainable consumption is also crucial for reversing biodiversity loss, as a WWF re-interpretation of the "bending the curve" graph illustrates (Figure 26).

A company serious about building its handprint, might consider lobbying for nature-positive policies too. The earlier-mentioned open letter from corporations to government to make nature-related disclosures mandatory (the Make It Mandatory campaign) is an example of corporate lobbying towards nature-positivity. Another example is the Action Declaration on climate policy engagement by 57 companies during COP27[177], which included a pledge to publicly disclose the companies' lobbying efforts[178].

Figure 27 – A high-resolution mycelium network. Photo by: Loreto-Oyarte-Galvez. Fungal underground networks, also called the "Amazon forests of the underground", help store carbon and transport nutrients through the soil[115]. They are threatened by the same biodiversity pressures as above-ground life forms but most biodiversity projects to date have ignored these. About a quarter of all species live underground.



(175) European Parliament (2022).
(176) Patagonia (2022).
(177) Schneider Electric was one of the signatories of this declaration.
(178) Heaps (2022).

6 Conclusion

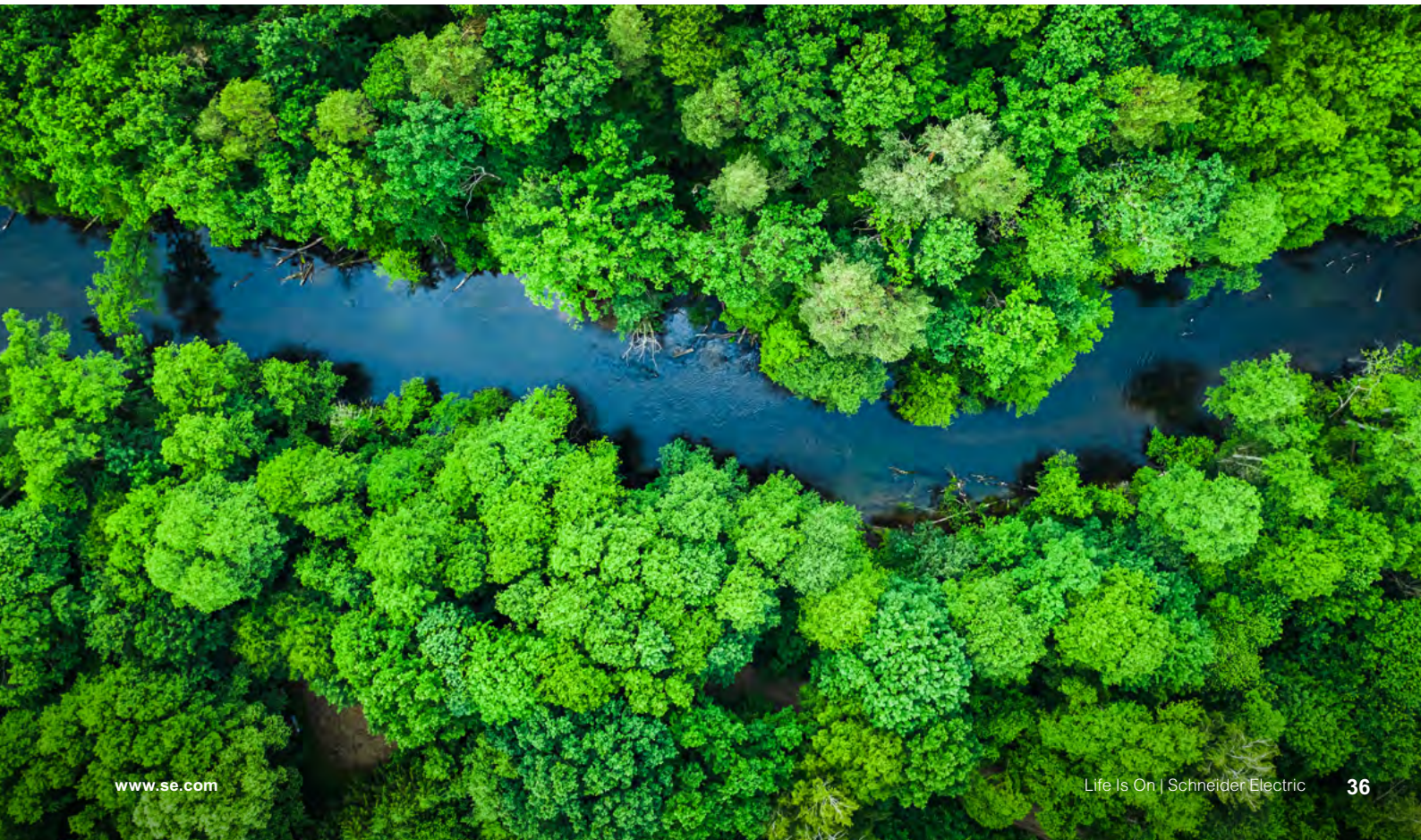
Conclusion

Corporations are part of the economy, which forms a part of larger society, which in turn is embedded in the ecosystem. Environmental, social, governance, technological, and economic issues all interact through these systems, and thus it should not come as a surprise that when biodiversity loss is threatening the integrity of the ecosystem, it is also threatening a healthy economy and prosperous business environment.

This complexity can make it seem difficult to determine how to start with what in making changes for the better, especially with such a diverse issue. This document has been an attempt to lower that threshold for corporate biodiversity action by providing an overview of key information and resources in a digestible format.

Even more than highlighting the imperative of halting biodiversity loss, the purpose of this document has been to make the case of the opportunity in nature-positivity. There is no doubt that new knowledge will need to be gained, internal operations re-designed, and old business practices re-thought, but biodiversity action requires effort because innovation takes effort, and innovation is something which gainful businesses have never shied away from. The 21st century economy is poised to reward those companies that know how to deliver real added value in environmental and social terms. A few frontrunning companies have already demonstrated that this transformative journey can be embarked upon with success. You are invited.

Figure 28 – Green forest and river in Tuchola national park, Poland



Annex. Schneider Electric's biodiversity footprint mapping (content from the annual report)

Biodiversity footprint

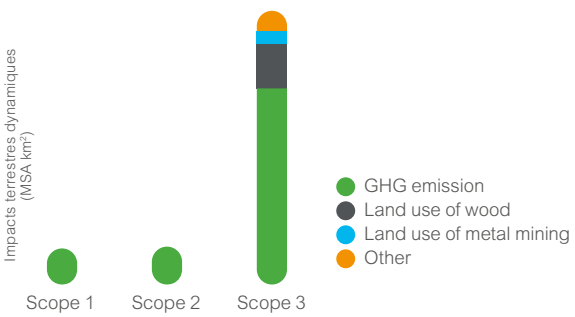
To drive change, companies need quantitative metrics to estimate, monitor, and pilot the impacts of their activities on biodiversity loss or demonstrate their contribution to biodiversity restoration. Creating aggregated and standardized biodiversity metrics and protocols is a much-needed step to ensure nature is truly placed at the heart of the business strategy.

In 2020, Schneider Electric was the first company to publish the end-to-end biodiversity footprint of its activities, using the "Global Biodiversity Score" (GBS) tool developed by CDC Biodiversité. By sharing its experience with other companies and choosing to publish results transparently, the Group aims to demonstrate that measuring biodiversity footprints is a key first step to help companies define relevant and impactful biodiversity strategies, across their entire value chain.

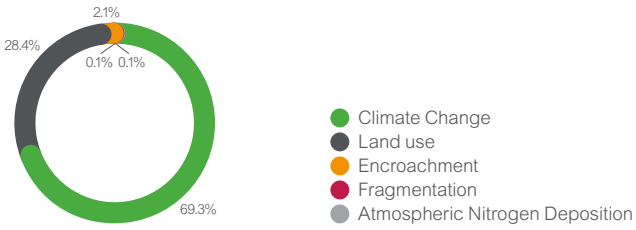
The GBS gives detailed and modular results which can be split by input line (for example, by raw materials such as metal, plastic, or timber); by pressures on biodiversity (such as land use, climate change, fragmentation, or encroachment); or it can be presented by scopes in Mean Species Abundance per square kilometer (MSA.km²) like a carbon footprint. The end-to-end assessment allowed Schneider to identify hotspots around which it is most effective to develop a biodiversity strategy and actions.

The bar chart below illustrates Schneider Electric's dynamic terrestrial impact, with detail by pressure. The pie chart highlights the weight of greenhouse gas (GHG) emissions which represent almost 70% of Schneider Electric's pressure on biodiversity. Land use accounts for almost 30% of "cradle-to-gate" impacts.

Schneider Electric's biodiversity industrial footprint (in MSA.km²)



Cradle to gate terrestrial dynamic pressures on biodiversity



The biodiversity footprint results are expressed in MSA.km², a metric that has all the ingredients it needs to become the international standard: synthetic, easy to understand, and widely applicable. In 2018, the world average terrestrial MSA was only 66%, meaning that a significant part of the species abundance of ecosystem integrity has already been lost. Under a business-as-usual scenario, this number would fall below 60% MSA by 2050. That is far beyond the safe operating zone that respects the planetary boundary, which is estimated at 70% MSA (CDC Biodiversité). Such a high biodiversity loss undermines nature's ability to provide its contribution to people, which is vital for human existence and a good quality of life.

Taking action towards no net biodiversity loss

Climate change is one of the major pressures on biodiversity globally and is the main Group's biodiversity impact. Therefore, Schneider's carbon pledge will have a significant impact on reducing the Group's pressure on biodiversity. Five main levers of actions have been identified and will be addressed through specific actions.

Quantify and regularly publish the assessment of impacts on biodiversity (MSA. km²)

As per the first step of the Group's main commitments, the ambition will be validated thanks to the results of the Biodiversity Footprint Assessment performed with the Global Biodiversity Score (GBS). Consequently, the Group is committed to updating it regularly.

Commit to reduce our impacts and align biodiversity objectives with science

Schneider Electric recognizes the importance of nature and biodiversity for humankind to thrive; we are all dependent on natural resources and ecosystem services. The Group's purpose is to empower all to make the most of our energy and resources, bridging progress and sustainability for all. That is why, in 2021, Schneider stepped up its ambition and publicly committed, through act4nature international, to achieving no net biodiversity loss in its direct operations by 2030 (Scope 1) and to aligning with the recommendations of international bodies (Convention on Biological Diversity by the Science Based Targets Network).

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Author

Gaya Herrington, VP ESG Research at the Schneider Electric™ Sustainability Research Institute