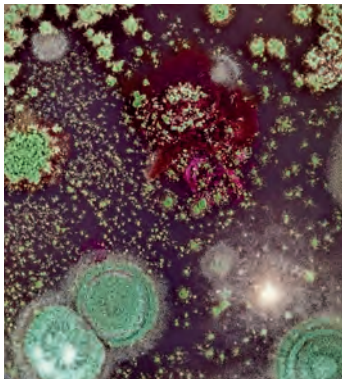
Valuing biodiversity to take action

october 2023

entreprises pour l'environnement

CHAIRMAN'S MESSAGE

The erosion of biodiversity is a global challenge that creates major uncertainties in terms of resources and health worldwide. The Kunming-Montreal agreement adopted last year calls for action by businesses for the first time, inviting them to acknowledge and raise awareness of their impacts and dependencies, and identify opportunities for making tangible contributions.

Many businesses in France and EpE member companies are already committed to integrating this issue into their processes and decisions, in particular through the act4nature international voluntary commitment initiative.

In adapting their business models across the value chain to take into account the societal benefits delivered by more prosperous and resilient biodiversity, corporates can go further. This has been the focus of EpE's work over the last three years through its Biodiversity Commission, which is a platform for identifying and discussing best practices already implemented by member companies.

This publication presents the commission's findings. Three key points stand out in my mind.

The first concerns the observation that the solutions developed by businesses are multiple and diverse, reflecting the very diversity of local ecosystems and the services they deliver to human society, often difficult to integrate into an economic model.

The second is that the beneficiaries of ecosystem services are often human societies as a whole, rather than the economic players who impact them. The challenge for businesses therefore is to take into account throughout the lifetime of their projects society's plural and collective ecosystem-related expectations, be it at local or national level. This publication sheds light on a number of concrete solutions developed by our members.

The third is that existing business models will not suffice to meet Kunming's goals. Many issues remain pending, such as the contribution of biodiversity credits to biodiversity preservation. Our publication is therefore an invitation to continue the thinking process and the search for robust outcomes by involving local stakeholders as well as regulators.

We hope this progress report will be instrumental in persuading many businesses that a commitment to action for nature is inseparable from action for the climate, and that they have everything to gain by integrating the two issues as part of their contribution to the ecological transition in which we are engaged.

Patrick Pouyanné
CEO of TotalEnergies
Chairman of Entreprises pour l'Environnement

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INTRODUCTION

The scientific community and public opinion are alerting and challenging economic decision-makers on the accelerated degradation of nature on a global scale, which has reached the point that some scientists now call it the 6th mass extinction. IPBES, IPCC and WHO stress that nature, the health of living beings and ecosystems, and climate are connected and interdependent and that the causes of their widespread degradation are similar and man-made.

The degradation of nature is reflected in the occurrence of its first resulting disruptions. Because of the dependence of every business and human society on the ecosystem services provided by nature, financial players, who are particularly exposed to those risks, are playing a key role as they seek to control the risk of destabilisation of the financial system and of loss of investment profitability.

This increasing level of mobilisation has led a substantial number of economic stakeholders for the first time to positively participate in the negotiations on the Kunming-Montreal Agreement, following COP15 of the Convention on Biological Diversity in December 2022. In proposing global objectives including indicators, implementation monitoring and financing, this framework provides businesses an additional benchmark with which to guide their actions and strategy formulation. At the same time, the Green Deal in Europe and the development of a regulatory framework in France require greater transparency and stimulate actions by economic players.

While the specific difficulties encountered in scaling up have now been identified and factored in by companies, the complexity of life and the intrinsically local, multidimensional and evolutionary nature of biodiversity make it difficult to standardise actions and policies. Several options are being tested to integrate nature value indicators into business decisions, by creating attractive business models that enable the much-needed mainstreaming of nature-friendly actions.

Under the chairmanship of Géraldine Vallejo, Director of Sustainable Development Programs at Kering, between 2019 and 2023 the member companies of the EpE Biodiversity Commission shared their best practices and engaged in several substantive debates.

Based on sixty testimonials from corporates, financial players, NGOs and academics, this publication first notes the issues and reviews the practices that have enabled better corporate valuations of nature. Despite the amount of work that has already been achieved, monitoring and measuring biodiversity remains one of the preferred ways for businesses to estimate the value of nature. The indicators, therefore, are becoming more diversified and the methods finer tuned.

As well as gaining a better understanding of their own impacts and dependencies, many businesses are seeking to build economic opportunities related to nature preservation and restoration. These include placing biodiversity at the heart of their existing operations and the increasing use of new instruments to strengthen business models based on nature-oriented solutions. Among them, Payments for Environmental Services (PES), environmental offsetting schemes, and biodiversity certification are seen as having real potential to support scaling-up actions.

Lastly, this publication examines different approaches that can be used by businesses to build pathways to progress with the aim of contributing to the implementation of the post-2020 Global Biodiversity Framework. The already operational international act4nature initiative stands out as a robust and effective component of it.

1

Mounting concerns

A watchful scientific community and informed public opinion clearly perceive the erosion of biodiversity and are concerned about it. Civil society's expectations of corporate action in support of nature are also high as businesses are called upon to do more.

The role of nature in the thinking, strategies and actions of businesses has greatly increased in recent years due to several factors.

1 Increasingly accurate scientific alerts

Science regularly confirms that the collapse of biodiversity is an integral part of a much wider environmental crisis. It is intrinsically linked to the climate crisis, which is better understood and appropriated by all stakeholders and still seems to be the primary driver of the ecological transition[1].

1.1 A heightened awareness of nature degradation

The publication by IPBES in 2019 of the Global Assessment Report on Biodiversity and Ecosystem Services[2] confirmed an alarming scientific consensus: 85% of the world's wetlands have disappeared, 75% of the terrestrial environment and 66% of the marine environment have been severely degraded by human activities, and 50% of the corals present in 1870 have disappeared - a trend that has accelerated recently.

The report states that a quarter of the plant and animal groups surveyed are threatened with extinction, i.e. more than a million species in total, and that species extinction rates are 10 to 100 times higher than in the last 10 million years.

These changes are associated with the loss of 83% of the biomass of wild mammals and of half the biomass of plants. Livestock and humans now account for nearly 96% of all mammalian biomass on Earth, and more species are facing extinction than ever before in human history[3]. Many scientific experts now call this erosion momentum the «sixth extinction»[4].

The 2022 update of the IUCN Red List of Threatened Species shows that 28% of the species assessed to date are threatened with extinction (i.e. 42,100 species). Cycads (gymnosperm plant order), amphibians, sharks and rays, and corals are the categories with the highest proportion of endangered species.

1 Business and carbon neutrality. A collective transformation. May 2022 Entreprises pour l'Environnement (EpE).
2 The International Platform on Biodiversity and Ecosystem Services (IPBES) is an international group of scientific experts on biodiversity.
3 IPBES (2019): Summary for policymakers of the global assessment report on biodiversity and ecosystem services of the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services. S. Díaz, J. Settele, E. S. Brondízio E.S., H. T. Ngo, M. Guèze, J. Agard, A. Arneth, P. Balvanera, K. A. Brauman, S. H. M. Butchart, K. M. A. Chan, L. A. Garibaldi, K. Ichii, J. Liu, S. M. Subramanian, G. F. Midgley, P. Miloslavich, Z. Molnár, D. Obura, A. Pfaff, S. Polasky, A. Purvis, J. Razzaque, B. Reyers, R. Roy Chowdhury, Y. J. Shin, I. J. Visseren-Hamakers, K. J. Willis, and C. N. Zayas (eds.). IPBES secretariat, Bonn, Germany. 56 pages.
4 Scientific outcome of the IPBES-IPCC co-sponsored workshop on biodiversity and climate change (2021). Pörtner, Hans-Otto, Scholes, Robert J., Agard, John, Archer, Emma, Arneth, Almut, Bai, Xuemei, Barnes, David, Burrows, Michael, Chan, Lena, Cheung, Wai Lung (William), Diamond, Sarah, Donatti, Camila, Duarte, Carlos, Eisenhauer, Nico, Foden, Wendy, Gasalla, Maria A., Handa, Collins, Hickler, Thomas, Hoegh-Guldberg, Ove, Ichii, Kazuhito, Jacob, Ute, Insarov, Gregory, Kiessling, Wolfgang, Leadley, Paul, Leemans, Rik, Levin, Lisa, Lim, Michelle, Maharaj, Shobha, Managi , Shunsuke, Marquet, Pablo A., McElwee, Pamela, Midgley, Guy, Oberdorff, Thierry, Obura, David, Osman Elasha, Balgis, Pandit, Ram, Pascual, Unai, Pires, Aliny P. F., Popp, Alexander, Reyes-García, Victoria, Sankaran, Mahesh, Settele, Josef, Shin, Yunne-Jai, Sintayehu, Dejene W., Smith, Peter, Steiner, Nadja, Strassburg, Bernardo, Sukumar, Raman, Trisos, Christopher, Val, Adalberto Luis, Wu, Jianguo, Aldrian, Edvin, Parmesan, Camille, Pichs-Madruga, Ramon, Roberts, Debra C., Rogers, Alex D., Díaz, Sandra, Fischer, Markus, Hashimoto, Shizuka, Lavorel, Sandra, Wu, Ning, Ngo, Hien. IPBES secretariat, Bonn, Germany.
5 Bruno David (2021). A l'aube de la 6ème extinction : Comment habiter la Terre ?. Grasset.

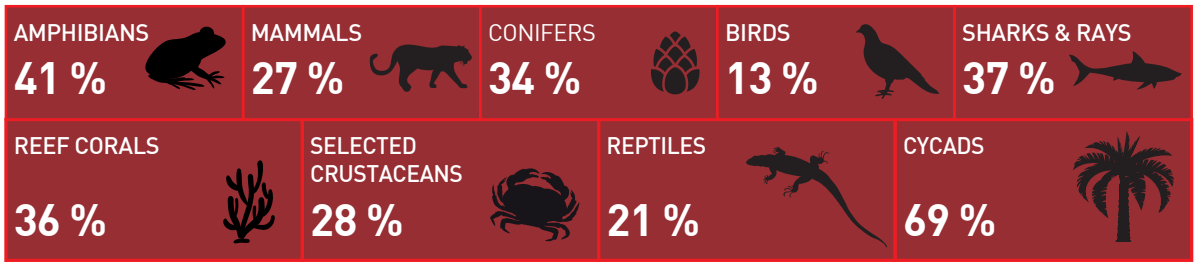


Figure 1 / Number of endangered species in nine groups.
Source: IUCN Global Red List of Threatened Species[6].

The Living Planet Index updated in 2022[7] by WWF (Figure 2) contributes to building awareness of biodiversity loss, and shows that between 1970 and 2018 the relative abundance of wildlife populations monitored declined by 69% on average. This trend is especially marked for freshwater environments, which have seen an average decline of 83% in the Living Planet Index of their populations.

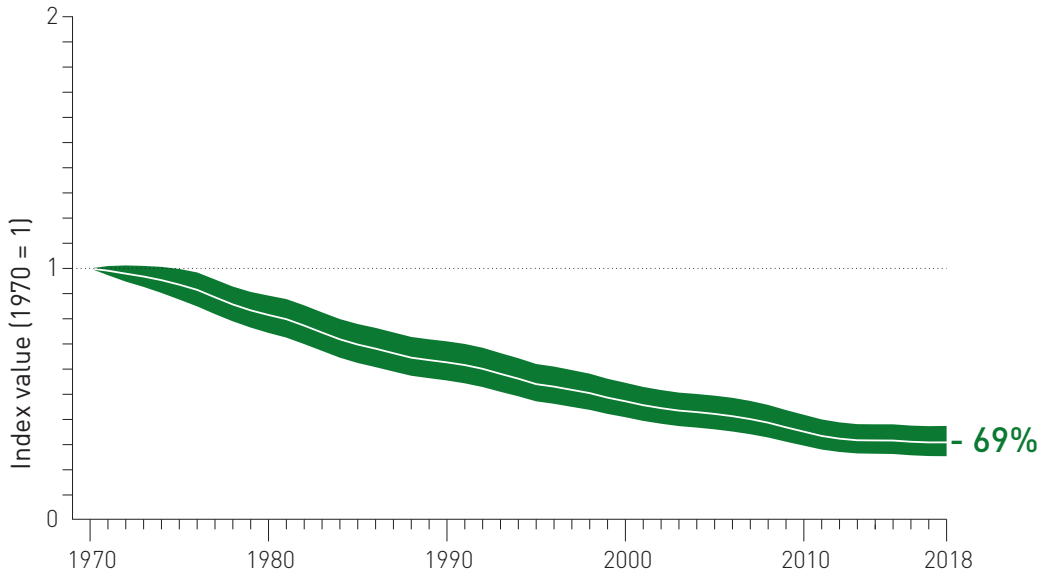


Figure 2 / World Living Planet Index from 1970 to 2018. The average decline in the relative abundance of 31,821 populations representing 5,230 monitored species worldwide shows a 69% loss. The white line shows the index values and the coloured areas the confidence interval surrounding the trend (95% confidence interval, range of 63% to 75%).
Source: WWF (2022).

The new findings confirm that nature degradation is accelerating. While more and more businesses are factoring biodiversity into their operations and strategies, this observation reflects a real difficulty in mainstreaming known solutions for preserving and restoring biodiversity[8] across the world economy. Businesses are increasingly being called upon and required to transform their business models more quickly.

6 The IUCN red list of threatened species. Looked up on 19/06/2023.
7 WWF (2022) Living Planet Report 2022 – Building a nature positive society. Almond, R.E.A., Grooten, M., Juffe Bignoli, D. & Petersen, T. (Eds). WWF, Gland, Switzerland
8 Entreprises pour l'Environnement (2020). Biodiversity solutions for business: scaling up.

1.2 Planetary boundaries for biodiversity

The cross-cutting and interconnection between different environmental issues have been confirmed by the planetary boundaries model known to business. Its updated version in 2022 revealed that six of the nine planetary boundaries have now been crossed, including that relating to the integrity of the biosphere (Figure 3) where the Stockholm Resilience Center team seems to believe the situation is more serious than it is for climate change.

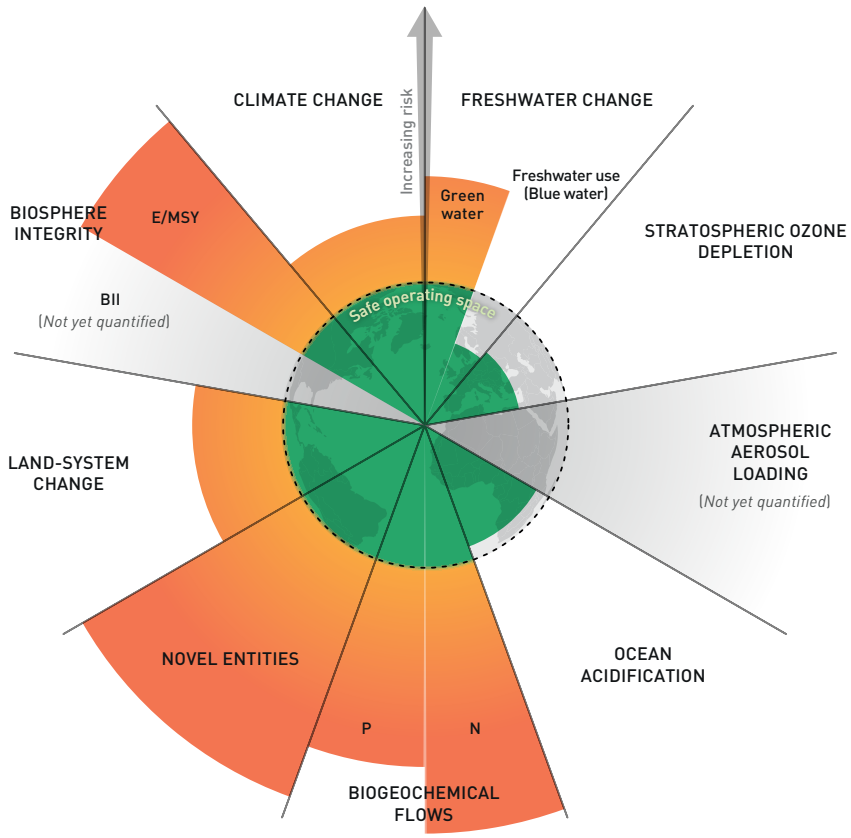


Figure 3 / Illustration of planetary boundaries, updated in April 2022.
Source : Stockholm Resilience Center[9].

The conceptual framework of planetary boundaries is a useful awareness-building and educational tool for companies because it acknowledges the physical limitations of the planet, the notion of carbon budget, and the limits of biomass and the soil surface. However, the concept still appears to be evolving and would require global governance to be operational.

For example, a study published in the journal Nature[10] in 2023 proposed a reformulation of these boundaries, and defined two new biodiversity-related boundaries not to be crossed to maintain the habitability of planet Earth as follows: first, between 50% and 60% of the world's land surface to be covered by largely intact natural ecosystems (terrestrial and oceanic) and, next, the land areas managed by humans to host no less than 20% to 25% diversified semi-natural habitats. The study, therefore, calls for preserving and restoring critical natural ecosystems and reintroducing nature on a local scale into anthropised spaces.

Accordingly, corporate biodiversity action is valuable even if merely local and modest, so long as it is continued over time. Some corporates, such as Saint-Gobain and Renault group, have started restoring biodiversity in anthropised areas through a range of measures aimed at preserving protected areas, reducing the pressures due to their activities, and rehabilitating biodiversity locally.

Thanks to actions such as these industrial sites in some regions are becoming biodiversity shelters.

9 Planetary Boundaries. Looked up on 19/07/2023.
10 Rockström, J., Gupta, J., Qin, D. et al. Safe and just Earth system boundaries. Nature (2023).

Development of Biodiversity Management and Action Plans (B'MAP)

In 2018, Saint-Gobain committed, through its biodiversity policy, to reducing impacts on biodiversity throughout the value chain of its activities. That same year, the group joined the «act4nature international» initiative. To live up to its ambitions, the group:

1. identified sites within and in close proximity to protected areas using data from the IUCN. This process was renewed in 2022, as pinpointing biodiversity risk sites allows for the implementation of resilience actions.

2. established a list of priority sites and quarries that must develop a Biodiversity Management and Action Plan (B'MAP) by the end of 2025. About forty B'MAPs have already been completed and approved by the group's biodiversity committee.

The B'MAP aims to enhance knowledge about the site's biodiversity and its impacts in order to mitigate and/or restore the state of the site's ecosystems. It should define the biodiversity management issues and objectives, and provide justification for the implementation of planned and tailored practices as well as actions for each site.

In response to this commitment, for example, the Pilisvorosvar quarry completed its B'MAP and implemented actions such as uprooting invasive species, converting an old warehouse into a bat shelter, reintroducing historical prairie fauna and dolomites, and creating a permanent wetland area. This project received an internal award called «Emerald,» which recognizes the best environmental projects carried out by the group's sites and serves as inspiration for all Saint-Gobain sites.

The Jas-de-Rhodes quarry also undertook a project to protect local wildlife. Shelters for ocellated lizards were constructed around the quarry in collaboration with the National Forestry Office (ONF). These shelters aim to serve as refuges in both winter and summer, as well as breeding areas.



From left to right: quarry in Hungary before, then after restoration; bat observed on the site.
©Saint-Gobain.

Renault Group

Following a process of identifying biodiversity issues, the time for taking action has come

After having improved its understanding of biodiversity issues on the majority of its industrial sites, the Renault Group is now entering a phase of action.

This translates into the daily life of the sites through more ecologically conscious management, including the implementation of good practices such as differentiated management of green spaces, maintenance without phytosanitary products, the installation of nesting boxes when there is a specific interest, and the identification and monitoring of sites with invasive exotic species. The level of deployment of these good practices is regularly monitored, and the group is working on defining an indicator to quantify the biodiversity gains from the implemented actions.

Furthermore, as part of the fight against processionary caterpillars, the Cléon site in Normandy has implemented a nature-based solution with the installation of nesting boxes for tits and bats. This way, the fight against caterpillars and butterflies is effective day and night.

Regarding projects, the group has integrated a new requirement into its internal major risk mapping tool to ensure that the mitigation hierarchy «Avoid, Reduce, Compensate» (ARC) is implemented during development, artificialisation, or intervention projects in areas with biodiversity stakes.

For example, during a soil drilling project, an ecological monitoring of the site was carried out, and protected species were marked to prevent any harm.

Finally, communication actions are undertaken with employees to raise awareness about the importance of biodiversity preservation and to help them discover the biodiversity present on their sites.

Marking off an area to protect protected species before carrying out construction work.

1.3 The values of nature: what are we talking about?

A 2022 IPBES report[11], prepared by 82 experts from 47 countries and based on more than 13,000 references, states that the way nature is valued and taken into account in political and economic decisions is both a key indirect driver of the biodiversity crisis and an opportunity to remedy it.

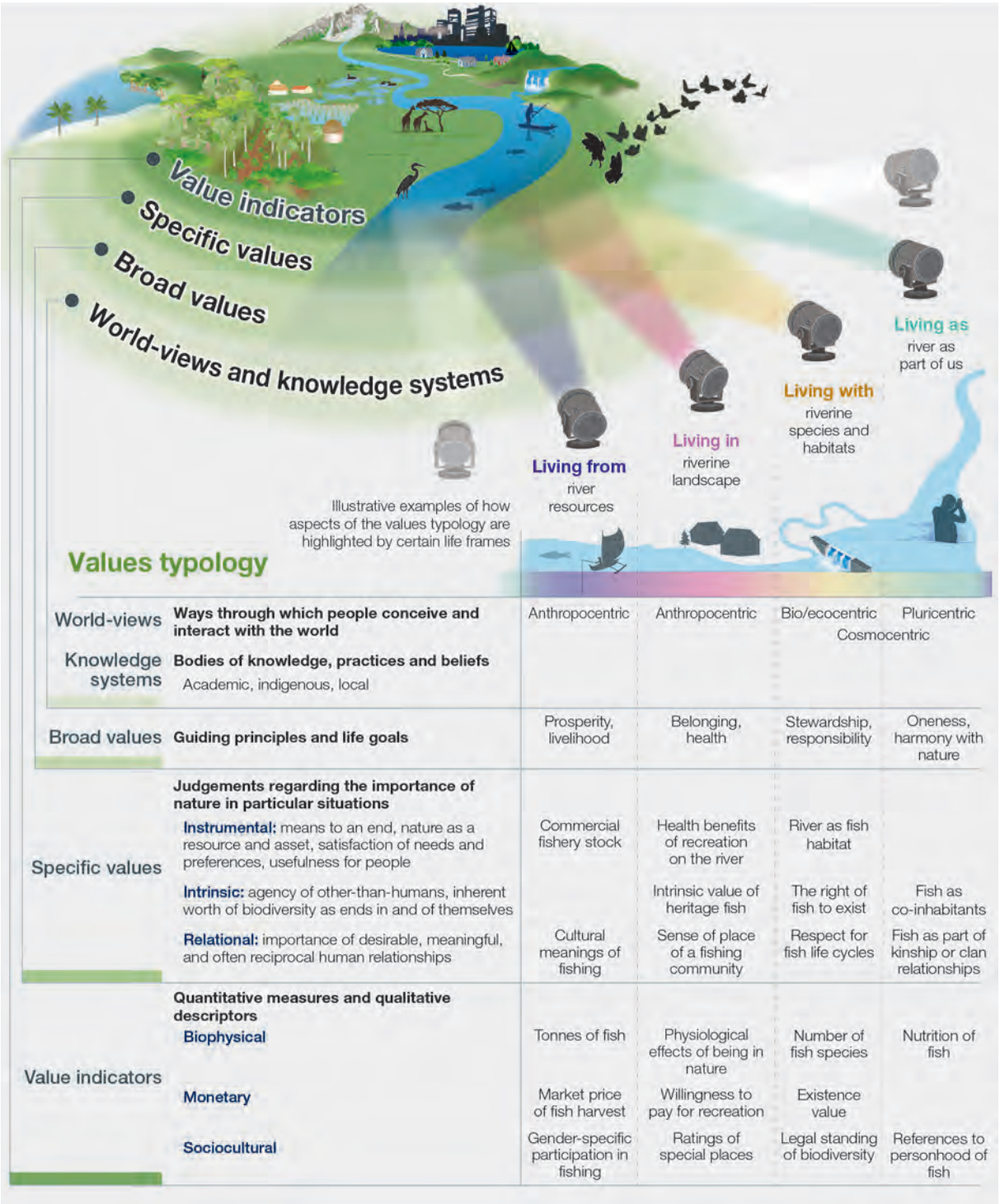
According to the report, most economic and political decisions today prioritise a limited set of values at the expense of nature and society. The decisions are mainly based on so-called «instrumental» market-based values, where nature is valued for its ability to produce goods that are themselves appropriable, and often overlook the many other non-market values associated with nature's contributions to people and societies (such as climate regulation and cultural identity).

To guide decision-making towards integrating these values in their diversity, IPBES proposes a conceptual framework that illustrates the four most frequently observed lifestyles (presented in Figure 4), and summarises the main ways humans value nature. The use of different types of specific values (instrumental, intrinsic or relational), and the choice of value indicators (biophysical, monetary or sociocultural) by individuals and institutions depend directly on broader value systems that themselves derive from different world-views and knowledge systems.

According to IPBES, a shift towards better consideration of sustainability-aligned values across society is a condition for triggering the transformative change needed to address the global biodiversity crisis.

For businesses that must contend with the imperative of economic viability the challenge is to better integrate this diversity of values into their activities and economic decisions, and to do so in harmony with the entire economic system.

11 IPBES (2022). Methodological Assessment Report on the Diverse Values and Valuation of Nature of the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services. Balvanera P., Pascual U., Christie M., Baptiste B., Gonzalez-Jimenez D.(eds.). IPBES secretariat, Bonn, Germany.



Values typology

World-views	**Ways through which people conceive and interact with the world**	Anthropocentric	Anthropocentric	Bio/ecocentric	Pluricentric
Knowledge systems	**Bodies of knowledge, practices and beliefs** Academic, indigenous, local			Cosmocentric	
Broad values	**Guiding principles and life goals**	Prosperity, livelihood	Belonging, health	Stewardship, responsibility	Oneness, harmony with nature
Specific values	**Judgements regarding the importance of nature in particular situations**				
	Instrumental: means to an end, nature as a resource and asset, satisfaction of needs and preferences, usefulness for people	Commercial fishery stock	Health benefits of recreation on the river	River as fish habitat	
	Intrinsic: agency of other-than-humans, inherent worth of biodiversity as ends in and of themselves		Intrinsic value of heritage fish	The right of fish to exist	Fish as co-inhabitants
	Relational: importance of desirable, meaningful, and often reciprocal human relationships	Cultural meanings of fishing	Sense of place of a fishing community	Respect for fish life cycles	Fish as part of kinship or clan relationships
Value indicators	**Quantitative measures and qualitative descriptors**				
	Biophysical	Tonnes of fish	Physiological effects of being in nature	Number of fish species	Nutrition of fish
	Monetary	Market price of fish harvest	Willingness to pay for recreation	Existence value	
	Sociocultural	Gender-specific participation in fishing	Ratings of special places	Legal standing of biodiversity	References to personhood of fish

Figure 4 / Representation of four living environments into which individuals or groups may fit according to IPBES, and presentation of key concepts and relationships of interdependence for understanding the diverse values of nature. Concentric circles denote different types and dimensions of values (worldviews, knowledge systems, general and specific values, and value indicators). The figure provides examples of different perceptions of freshwater ecosystem values based on the living environment.
Source: IPBES, 2022[12].

12 IPBES (2022). Methodological Assessment Report on the Diverse Values and Valuation of Nature of the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services. Balvanera P., Pascual U., Christie M., Baptiste B., Gonzalez-Jimenez D.(eds.). IPBES secretariat, Bonn, Germany.

2 Strong interdependence of environmental issues

The establishment of a sound scientific basis for understanding the interrelationships between biodiversity, climate and health helps to alert and mobilise companies. It reinforces the perception of the systemic nature of the crisis and the conviction that the responses to it must also take into account all environmental and social issues.

2.1 Biodiversity and climate are interdependent

Other recent works drive the need for mainstreaming an integrated view of the ecological transition and contribute to its development by enriching knowledge of the interrelations between climate and biodiversity.

Back in 2021, the scientific report drawn up by the IPBES-IPCC co-sponsored workshop on biodiversity and climate change stated that biodiversity and climate are interdependent and connected, notably through the carbon cycle whose proper functioning depends on living organisms. It also stated that biodiversity decline and climate change share several direct and indirect underlying drivers (see Figure 5) which interact, can have cascading and complex effects, degrade people's quality of life and undermine the achievement of sustainable development goals.

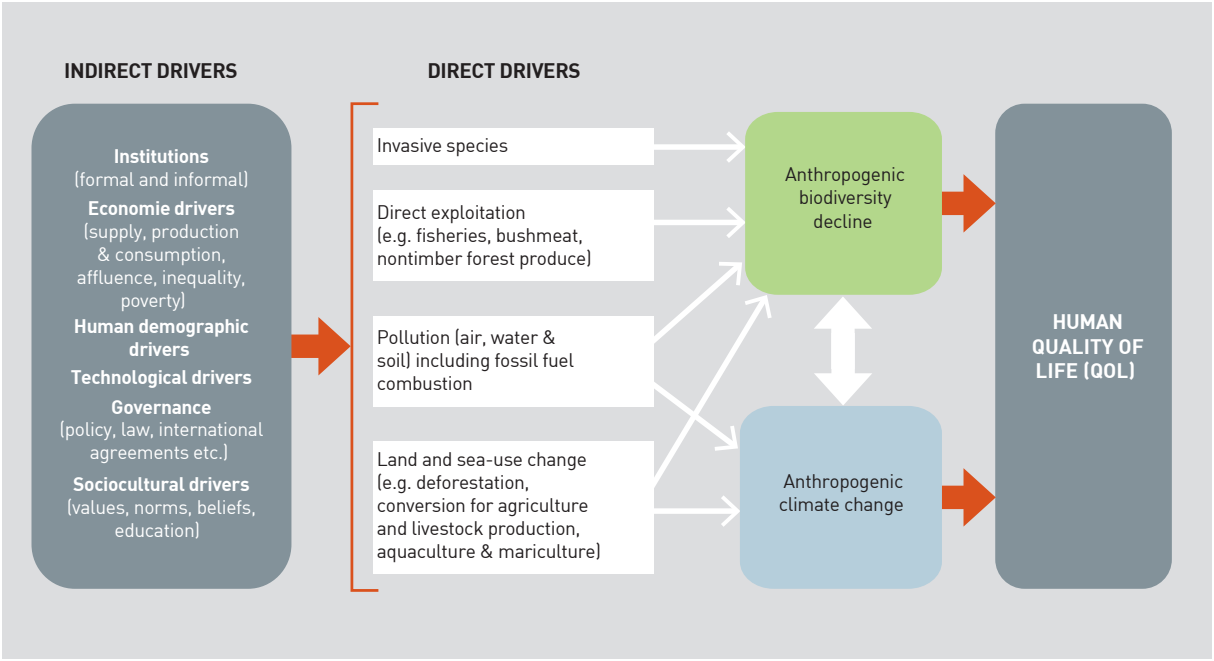


Figure 5 / Indirect and direct drivers of biodiversity loss and climate change due to human activities.
Source : Scientific outcome of the IPBES-IPCC co-sponsored workshop on biodiversity and climate change, 2021[13].

13 Scientific outcome of the IPBES-IPCC co-sponsored workshop on biodiversity and climate change (2021). IPBES, secretariat, Bonn, Germany.

In 2023, the Sixth Assessment Report of the Intergovernmental Panel on Climate Change (IPCC)[14] confirmed that ecosystem degradation is one of the causes of man-made climate change and that, conversely, the consequences in terms of extreme weather and climate conditions are already contributing to the erosion of nature and its ability to regulate climate. For example, in 2019 human-managed ecosystems (agriculture, forestry and other land uses) accounted for 22% of global greenhouse gas emissions, with the bulk coming from deforestation. The IPCC also stated that the sequestration capacity of ecosystems would continue to deteriorate in CO_2 emissions increase scenarios.

At the same time, many synergies exist between solutions to the two crises, with several being identified in the 2021 joint IPBES/IPCC report (Figure 6). The study goes on to argue that almost all biodiversity-friendly solutions are also climate-friendly, although a larger number of actions initially targeting climate may, under certain conditions, have negative effects on biodiversity (e.g. afforestation, bioenergy production or hydro-electricity).

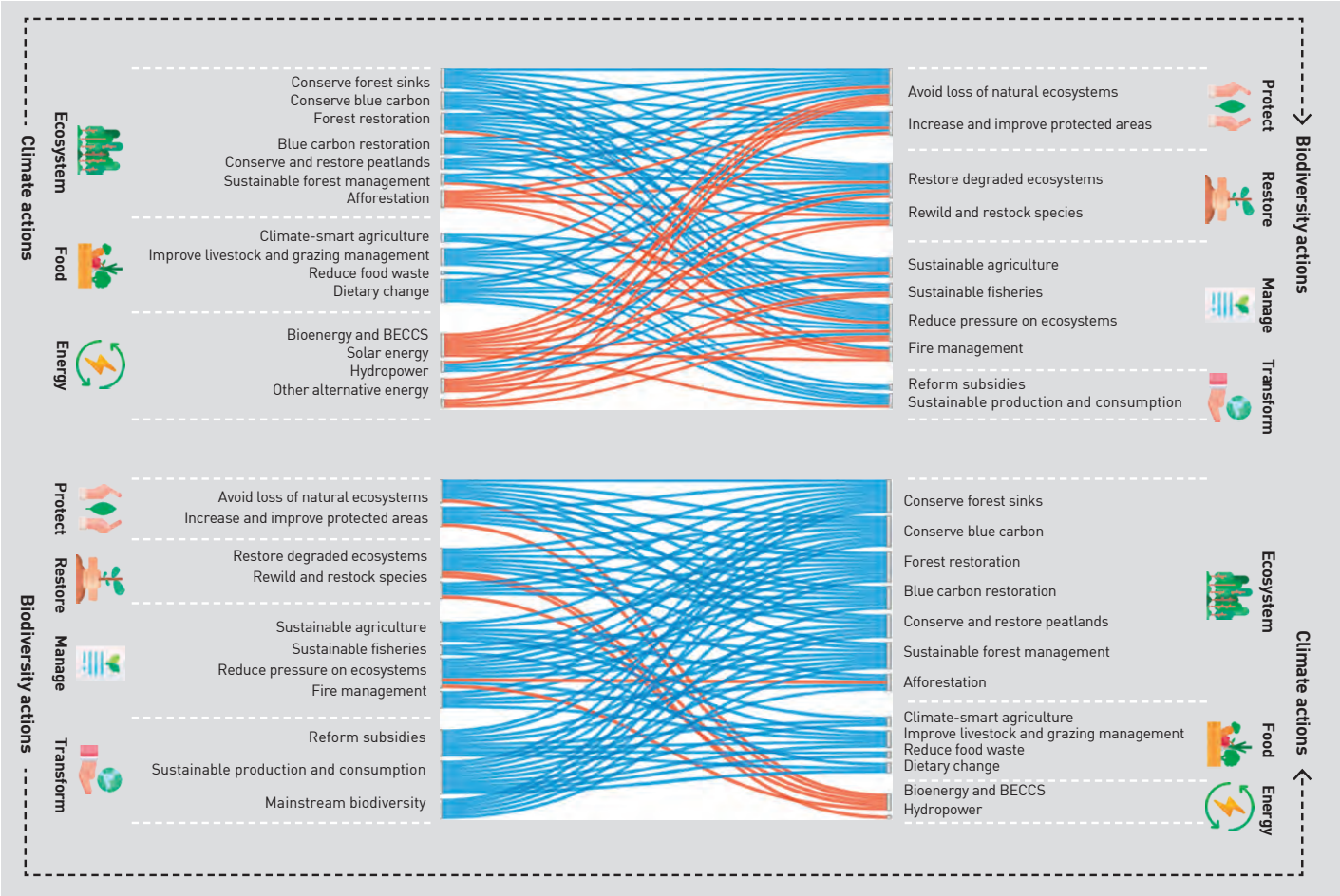


Figure 6 / Sankey diagram mapping the effects (positive in blue, negative in red) of climate change mitigation actions on biodiversity loss mitigation actions (top), and of biodiversity loss mitigation actions on climate change mitigation actions (bottom).
Source: Scientific outcome of the IPBES/IPCC co-sponsored workshop on biodiversity and climate change, 2021.

14 IPCC (2023): Summary for Policymakers. In: Climate Change 2023: Synthesis Report. A Report of the Intergovernmental Panel on Climate Change. Contribution of Working Groups I, II and III to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change [Core Writing Team, H. Lee and J. Romero (eds.)]. IPCC, Geneva, Switzerland, 36 pages. (in press).

Since ecosystems play a critical role in mitigating climate change, many emissions reduction solutions rely on their proper functioning. On average 56% of annual CO_2 emissions from human activities over the past six decades have been captured by land and ocean sinks as part of what is sometimes known as Nature-based Solutions (NbS), a concept we will discuss in greater detail in section 1.2.3.

In its assessment report published in 2023, the IPCC proposed an even finer characterisation of nature-based solutions by estimating their cost of implementation and their emissions reduction potential. Several solutions in agriculture, forestry and relating to land and ocean use could be deployed in the short term to most parts of the world. Of these, conservation, improved management and restoration of natural and managed ecosystems have the greatest economic mitigation potential (see Figure 7).

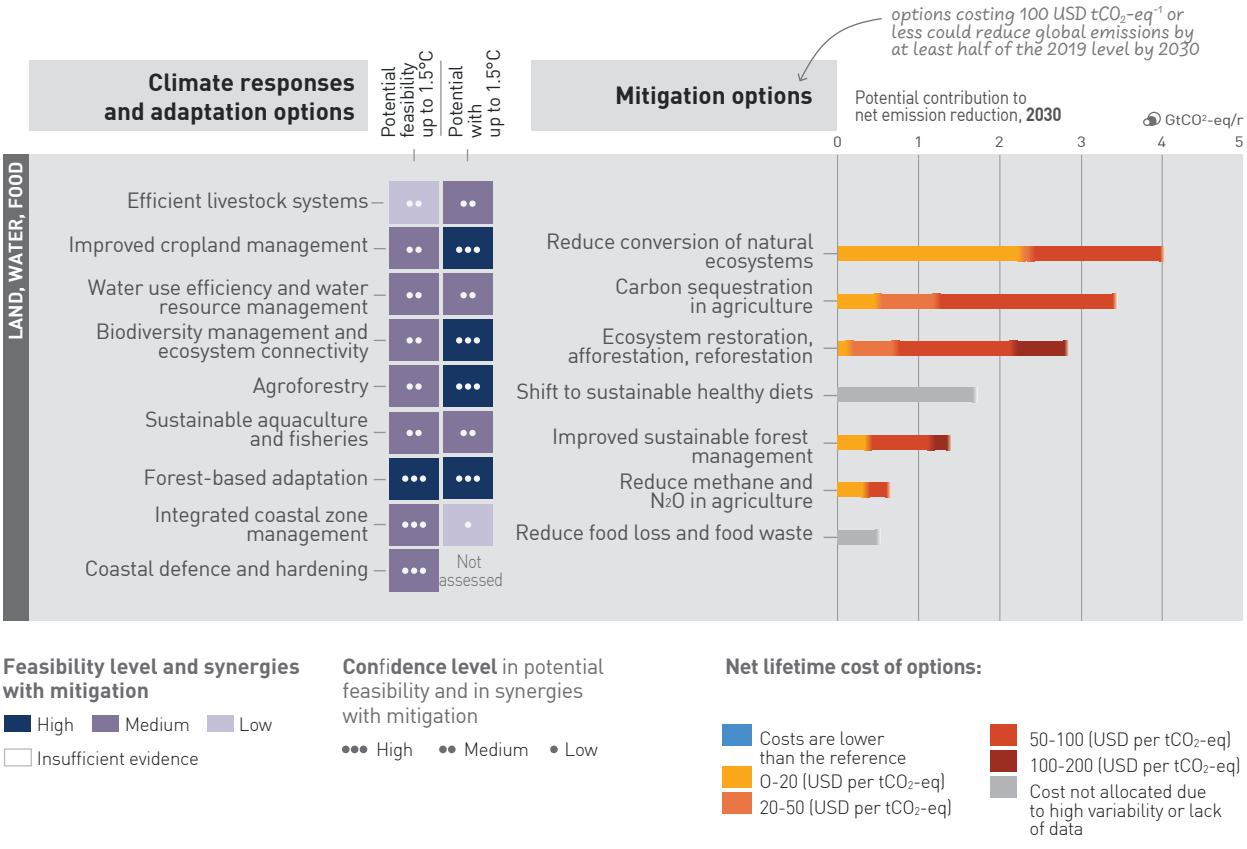


Figure 7 / Excerpt of a figure drawn from the policymaker summary in the IPCC Sixth Assessment Report. Presentation of selected mitigation and adaptation options in the fields of land, water and food use. The **left side** shows the climate responses and adaptation options assessed for their feasibility on a global scale in the short term and within the 1.5°C global warming limit. Forest-based adaptation includes sustainable forest management, forest conservation and restoration, reforestation and afforestation. The **right side** provides an overview of the selected mitigation options and their estimated cost and potential in 2030. Potential (horizontal axis) is the net reduction in GHG emission (sum of reduced emissions and/or improved sinks) broken down into cost categories (coloured bar segments).

The reduction of deforestation and the widespread adoption of agricultural practices conducive to carbon sequestration are among the solutions with the greatest contribution potential. Agroecology, promoted in particular by the International «4 per 1000» Initiative, is one of the solutions to enhance biodiversity in agriculture and increase carbon sequestration in soils.

The International «4 per 1000» initiative - soils for food security and climate

Paul Luu, *Executive Secretary*

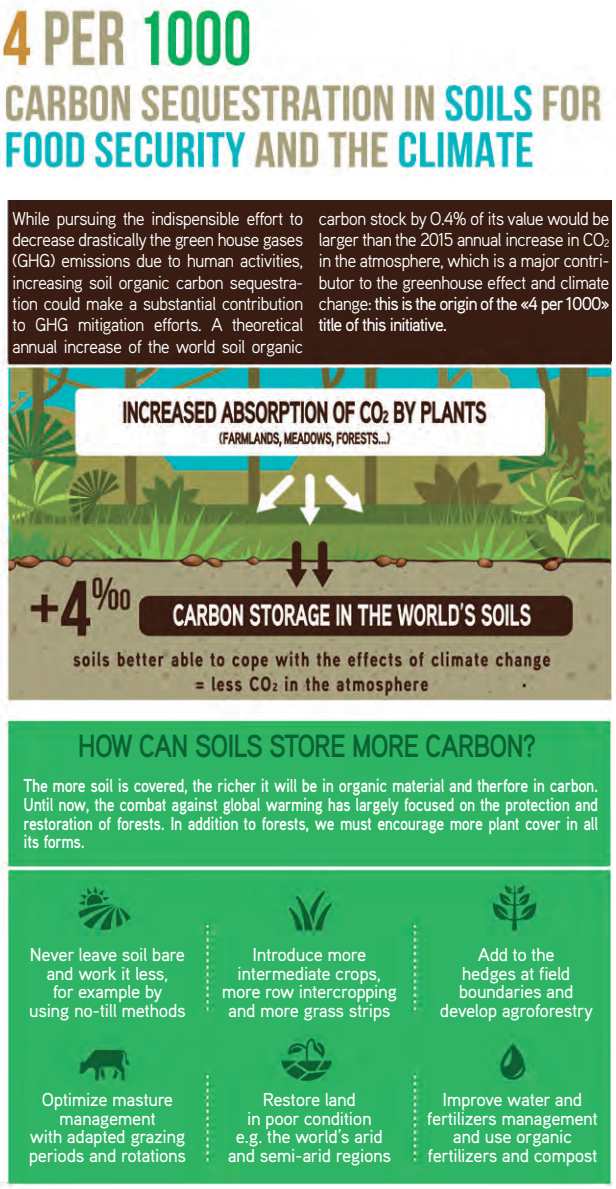
« There are more organisms in a teaspoon of healthy soil than people on Earth»[15]

Launched at COP 21, the international «4 per 1000» initiative aims to show that farming, in so far as it concerns agricultural and forestry soils, can provide concrete solutions to climate change and food security through the implementation of agroecological practices tailored to local conditions. The initiative promotes the natural sequestration of organic carbon in soils and supports the vision of healthy, carbon-rich soils on a global scale. Based on sound scientific literature, the initiative seeks to bring together all voluntary public and private stakeholders worldwide as part of a Global Climate Action Plan, and invites them to engage in a transition towards regenerative, productive and highly resilient agriculture, based on appropriate land and soil management. The initiative is designed to create jobs and income, and contribute to sustainable development. It brings together nearly 800 partners (May 2023) and has a strategic plan that guides its action until 2050, as well as an operational plan.

Healthy, carbon-rich soils mitigate climate change, preserve biodiversity and ensure food security

A growth rate of 0.4% per year in soil carbon stocks (or «4 per 1000») stored in the top 30 to 40 cm of soil would significantly reduce the concentration of carbon dioxide linked to human activities in the atmosphere. Through photosynthesis, plants recover about 30% of CO_2 from the atmosphere every year. They are subsequently transformed by living organisms in the soil into organic matter, which is essential to maintain soil fertility because it retains water, nitrogen and phosphorus.

Soil biodiversity, as an expression of soil health, is the starting point for restoring global biodiversity. The amount of carbon in soils, their biodiversity and global biodiversity are directly correlated because the greater the biodiversity of a soil, the richer it is in organic matter and the more it locks carbon in. Several members and partners of the initiative promote the restoration of agricultural and natural (forest) ecosystems and focus on soil health and biodiversity in order to measure its effects on global biodiversity.



«*This international initiative allows for reconciling the objectives of food security and combating climate change, thus involving all the countries concerned in COP21*» . Stéphane Le Foll, President of the International Initiative «4 per 1000» and former French Minister of Agriculture, Agri-food, and Forestry.

15 FAO (2015). Information material for the international year for soils (AIS 2015).
16 Plant and animal microorganisms, invertebrates, etc.
17 Set of dead or living organic constituents, of plant or animal origin, transformed or not.

The restoration of ecosystems is also an important driver of climate action. For example, mangroves could be the subject of enhanced conservation and restoration efforts. Their carbon storage capacity per unit area can be up to four times that of tropical forests.

According to the IPCC, the implementation of these actions is generally facilitated by the simultaneous deployment of production-oriented measures (such as sustainable intensification of agriculture) and demand-oriented measures (such as transition to healthy and sustainable diets and reduction of food waste) which would reduce ecosystem conversion and free up land to restore ecosystems.

There are other nature-based mitigation and adaptation priority actions. For example, green and blue infrastructure (urban forestry, green roofs, conservation and restoration of ponds, lakes and rivers, etc.) can contribute to mitigation efforts while reducing the risk of extreme events and providing multiple health and wellness co-benefits.

2.2 One Health

The institutionalisation of the «One Health» approach is also a response to the need to adopt a holistic approach, link issues related to biodiversity and human health and foster interdisciplinarity between several fields of scientific research, traditionally pursued separately. The concept is based on the principle that the health of humans, domestic and wild animals, plants and the wider environment (including ecosystems) is closely interrelated and interdependent[18, 19].

Defined by the WHO as «the state of complete physical, mental and social well-being and not merely the absence of disease or infirmity,»[20] human health has many relations of dependence with the health of ecosystems and the good overall state of biodiversity. Many of nature's contributions to people contribute to human health, and their decline due to biodiversity erosion directly threatens people's quality of life. Following a healthy and varied diet, maintaining a healthy and unpolluted environment, regulating pathogens, reducing natural risks (flooding, drought, fire, etc.), contributing to psychological well-being and producing a variety of natural compounds and medications are essential for human health[21].

In a baseline report on biodiversity and pandemics coordinated and published in 2020 by IPBES[22], twenty-two leading global experts stated that almost all pandemics are caused by some of the main drivers of biodiversity loss and climate change. The unsustainable use of the environment, (especially changes in land use), the expansion and intensification of agriculture and wildlife trade and consumption are the main factors disrupting natural interactions between wildlife and its microbes as they increase interaction between wildlife, livestock, people and their pathogens. Climate change too is responsible for the emergence of diseases and is likely to cause a major future pandemic due to population displacement and the resulting close contact.

Paradoxically, biodiversity reduces pathogen multiplication[23]. We now know that the more diverse ecosystems are, the fewer the diseases transmitted (dilution effect). Several factors are involved. For example, some species that cannot transmit pathogens to others, thus limiting their transmission, are more prevalent in sound ecosystems; similarly some predators participate in the regulation of reservoir species.

However, this regulating service provided by wildlife keeps deteriorating despite the fact that the scientific community clearly predicts the onset of a new «era of pandemics» with repeated, lethal and extremely costly consequences. More than five new diseases are already appearing every year in humans, each with the potential to spread and become a pandemic.

The «Integration of Environmental Health Issues» report[24] published by EpE in 2019 revealed that corporates are directly affected by these factors and are beginning to build them into their operational and management strategies.

18 INRAE. One Health. Looked up on 23/06/2023.

19 One Health High-Level Expert Panel (OHHLEP), Adisasmito WB, Almuhairi S, Behravesh CB, Bilivogui P, Bukachi SA, et al. (2022) One Health: A new definition for a sustainable and healthy future. PLoS Pathog 18(6): e1010537.

20 Constitution of the world health organization. Looked up on 23/06/2023.

21 Brauman, K. A., Garibaldi, L. A., Polasky, S., Zayas, C., Aumeeruddy-Thomas, Y., Brancalion, P., DeClerck, F., Mastrangelo, M., Nkongolo, N., Palang, H., Shannon, L., Shrestha, U. B., and Verma, M. (2019). Chapter 2.3. Status and Trends – Nature's Contributions to People (NCP). In: Global assessment report of the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services. Brondízio, E. S., Settele, J., Díaz, S., Ngo, H. T. (eds). IPBES secretariat, Bonn, Germany. 76 pages.

22 IPBES (2020). Workshop Report on Biodiversity and Pandemics of the Intergovernmental Platform on Biodiversity and Ecosystem Services. Daszak, P., Amuasi, J., das Neves, C. G., Hayman, D., Kuiken, T., Roche, B., Zambrana-Torrelio, C., Buss, P., Dundarova, H., Feferholtz, Y., Földvári, G., Igbinosa, E., Junglen, S., Liu, Q., Suzan, G., Uhart, M., Wannous, C., Woolaston, K., Mosig Reidl, P., O'Brien, K., Pascual, U., Stoett, P., Li, H., Ngo, H. T., IPBES secretariat, Bonn, Germany.

23 The FRB was commissioned by the French government to examine the links between Covid-19 and biodiversity. May 2021 version. Fondation pour la Recherche sur la Biodiversité.

24 Entreprises pour l'Environnement (2019). Factoring in environmental health issues facing businesses.

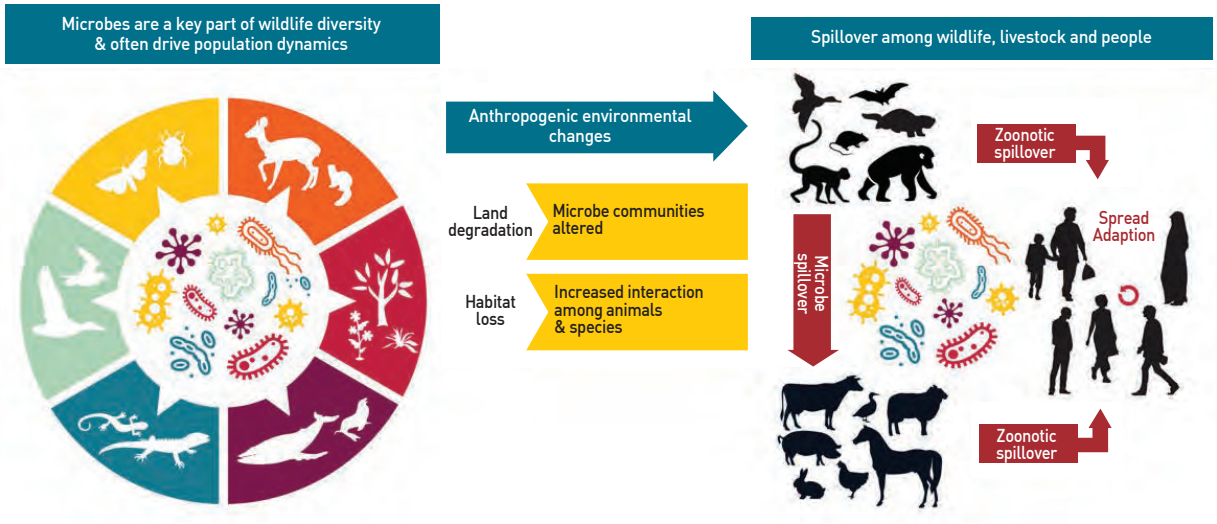


Figure 8 / The origins and drivers of emerging zoonotic diseases and pandemics. Microbes have evolved in wildlife species during evolution (left). These microbes produce infectious diseases when anthropogenic environmental alterations disrupt the structure of their reservoir host populations and cause wildlife, livestock and humans to interact (centre). These changes will in turn affect the microbe transmission dynamics in their hosts, and lead to interspecies microbe transmission impacting livestock and humans, and thus to the emergence of new diseases (right).
Source: IPBES (2020) Workshop Report on Biodiversity and Pandemics of the Intergovernmental Platform on Biodiversity and Ecosystem Services.

2.3 Nature-based Solutions

The systemic nature of this crisis points to the need to develop solutions that address all the issues simultaneously. Accordingly, moves are afoot to develop Nature-based Solutions (NbS), defined by the IUCN[25] as «actions to protect, sustainably manage, and restore natural or modified ecosystems that address societal challenges effectively and adaptively, providing benefits for both human well-being and biodiversity». They include three types of actions:

- the conservation of functioning ecosystems in sound ecological condition;
- the improvement of ecosystem management for sustainable use by human activities;
- the restoration of degraded ecosystems or the creation of new ecosystems.

First mentioned in 2009 by the IUCN at COP15 of the UNFCCC, the concept of NbS has since gained increasing currency in the international community, academia and business. Given the many answers they provide for environmental and social challenges, some companies are beginning to adopt them and combine them with viable business models so as to scale them up. The IUCN French committee has also published a compendium of work[26] carried out with businesses which presents several examples of NbS and helps us better understand the concept.

25 https://uicn.fr/solutions-fondees-sur-la-nature/.
26 UICN Comité français (2022). Entreprises & Solutions fondées sur la Nature : s'emparer du concept pour passer à l'action. Paris, France.

Business and Nature-based Solutions: grasping the concept and taking action

Florence Clap, *Biodiversity Policies Programme Officer*

To keep nature alive and ensure the future of life in its entirety and diversity, our values and ethical principles must provide guidance for collective action. Nature-based solutions are good examples because they unite local stakeholders around the same equitable and viable project to ensure the conservation and restoration of ecosystems, while simultaneously ensuring human well-being and biodiversity preservation.

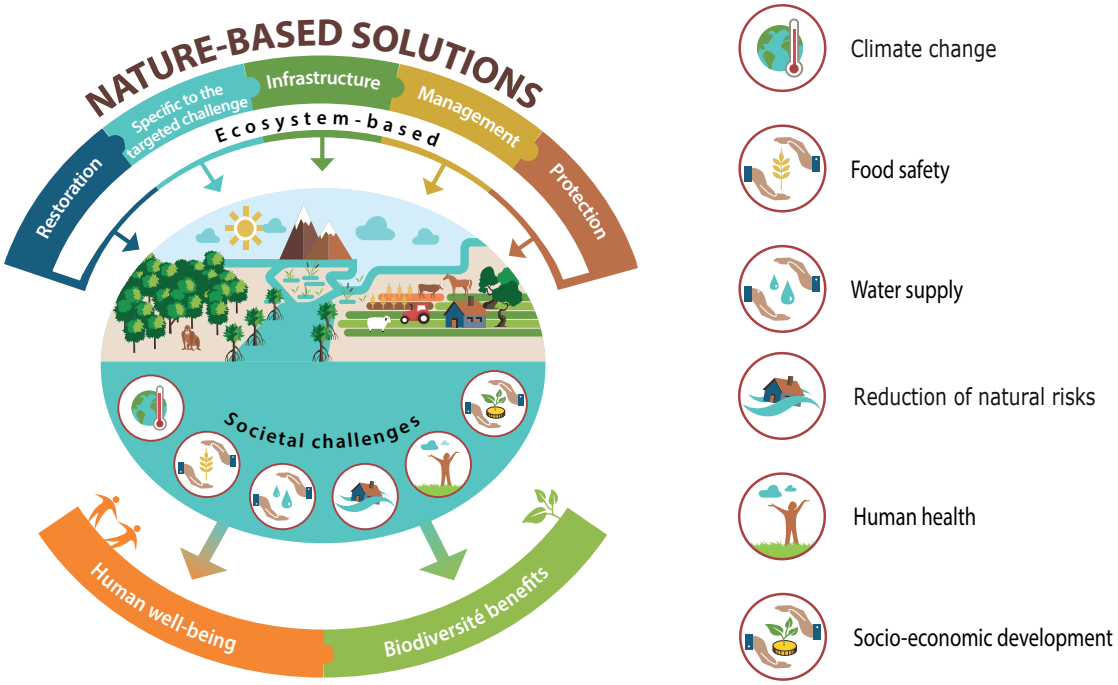
Nature-based solutions (NbS) preserve, improve, restore or recreate sound ecosystems, and provide small- and large-scale solutions in urban as well as rural or natural settings. Because they directly address societal challenges, such as climate change and natural risks, they also contribute to well-being and quality of life.

Given their expertise in engineering and project management as well as their land and financial resources, businesses deploy solutions that are no longer limited to civil engineering but embrace ecosystem functions. In doing so, they combine technological and ecological engineering.

Implementing NbS can enable companies to rethink and reengineer their business model to place nature at the heart of their operations. Based on their field of activity, needs and capacities (human, financial, technical, etc.), corporates can act in various ways:

- implement an NbS linked to their core business,
- develop an NbS to improve their practices along their value chain,
- earmark part of their land for NbS development,
- financially support an NbS project.

Today as the issues of water supply, food security and the adaptation of our society to climate change become increasingly critical, NbS is the best guarantee of our future and that of living beings.



The insurance industry too is beginning to develop innovative solutions that include natural capital and NbS in insurance coverage. For example, several pilot projects are under way to insure coral reefs and mangroves[27], generally recognized as NbS. Axa has made this concept its own and developed a tool that uses NbS to reduce certain risks in its insurance models, values the economic benefits of restoration and leverages those benefits in favour of nature.

Integrating the protective benefits of coastal ecosystems into insurance risk models

At the UNFCCC COP26, AXA XL launched the «Coastal Risk Index» (CRI). It is the first tool to integrate the effects of coastal ecosystems on coastal flood risks related to climate change into insurance risk models. To do this, it compares scenarios with and without coastal ecosystems, such as coral reefs and mangroves.

Developed in collaboration with AXA's scientific partners, IHE Delft (Netherlands) and the University of Santa Cruz in California (USA), as well as the Government of Canada through the Ocean Risk and Resilience Action Alliance (ORRAA), the CRI allows for:

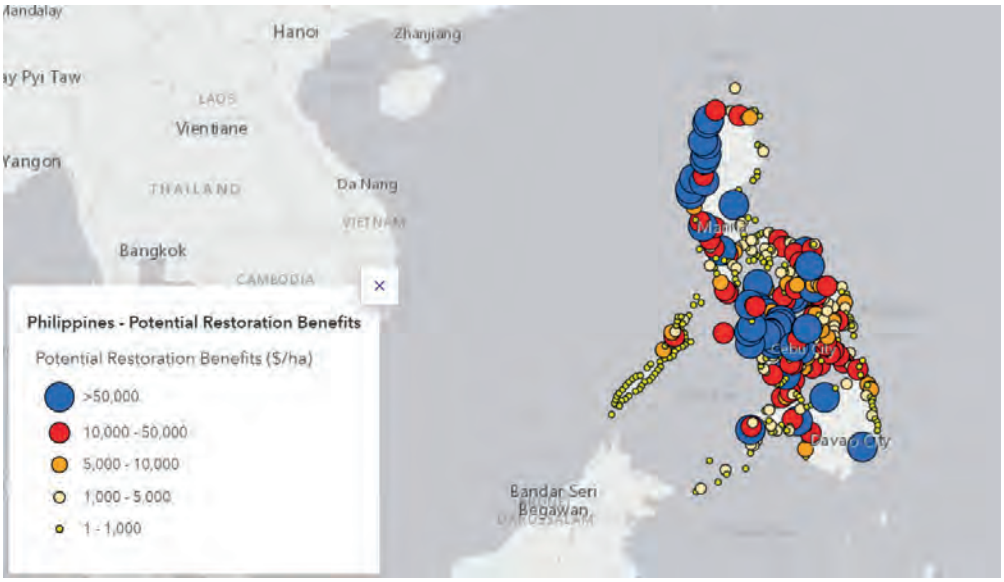
- visualizing the potential benefits of ecosystems for assets and populations under different flood scenarios;
- an estimate of the potential economic benefits resulting from the restoration of lost mangroves, calculated on the basis of an estimate of the reduction in flood risk.

This estimation of the flood regulation service provided by these ecosystems allows for assigning a value to these ecosystems and, more generally, supports advocacy for nature-based solutions.

In practical terms, the tool provides a more precise risk measure that enables communities, policymakers, insurers, investors, and development banks to build more robust resilience strategies that target the protection of coastal natural assets.

In the future, insurers could use the CRI to determine insurance pricing, guide their clients towards a better understanding of their exposure to coastal flooding, or to steer the development of parametric insurance products targeting the protection or restoration of ecosystems. On the investor side, future applications could help identify debt or potential stranded assets along the coast, or identify investment opportunities in nature-based solutions where they offer the most significant resilience benefits.

27 France Assureurs (2021). Assurance et biodiversité : enjeux et perspectives.



Map of the Philippines - Potential Benefits of Restoration (Data from the University of California, Santa Cruz).
Source: Coastal Risk Index[28].

The above examples highlight the great variety of situations in which the concept of NbS is relevant to multiple business models – a concern which is the focus of the remainder of this publication. The meaning of Nature-based Solutions has been evolving ever since the term was coined. IPBES and the IPCC acknowledged in a 2021 co-sponsored report[29] that there are many definitions of NbS, such that the notion is not consistently used in international politics. As a result, scientists have expressed concerns over its use because (among other reasons) the term is sometimes used to refer to measures that also have negative impacts on biodiversity and quality of life. Despite the adoption in 2022, at the Fifth Session of the United Nations Environment Assembly, of a consensual international definition of NbS based on that of the IUCN[30], the term still does not seem to forge consensus. While it is mentioned in two targets of the Kunming-Montreal Global Biodiversity Framework (GBF), the IPCC makes no mention of it in its latest report (6th Synthesis Report) and still prefers to use the term «ecosystem-based adaptation».

In sum, the work of the IPCC and IPBES suggests that successful ecological transition requires a change in our value systems, an acceptance of the complexity of the environmental crisis, and swift implementation of a broad range of measures aimed at both production and demand. The challenge for businesses, therefore, is to act on the underlying causes that often trigger multiple crises by planning and conducting a joint ecological transition covering all environmental metrics, including the well-being of populations.

3 Better risk perceptions by the financial community

The loss of ecosystem services and the resulting increase in risks have led to greater involvement of the financial sector in recent years in the face of increasingly stark biodiversity loss predictions. In 2022, for example, the World Economic Forum ranked this issue as the third most severe global risk over the next ten years[31].

28 Coastal Risk Index. Building resilience through nature. November 2021.
29 Scientific outcome of the IPBES-IPCC co-sponsored workshop on biodiversity and climate change (2021). IPBES, secretariat, Bonn, Germany.
30 https://uicn.fr/le-standard-de-luicn-pour-renforcer-limpact-des-solutions-fondees-sur-la-nature-face-aux-defis-societaux/.
31 World Economic Forum (2022). The Global Risk Report 2022. 17th edition. Insight Report.

3.1 Daunting risk modelling issues

The momentous «There is no business to be done on a dead planet» warning by American environmentalist David Brower (1912-2000), founder of several environmental organisations, is now being echoed around the corporate world. «No business on a dead planet»[32], sums up the idea that all businesses depend on the services provided by nature and that no economic activity would be viable on a planet shorn of its biodiversity.

Although the reality of the risks is now well recognized (forest decline linked to parasites, risks of emergence of infectious diseases, depletion of fish stocks, etc.), their magnitude, timing and conditions of overall materialisation seem impossible to predict and model because the interrelationships and interdependencies between the different components of biodiversity are fluid and poorly understood[33]. The tipping point of cascade effects is extremely difficult to predict given the uncertainties inherent in the behaviour of living beings. These uncertainties were summed up by Paul Ehrlich in his rivet metaphor that compared the functioning of an ecosystem to that of an aircraft: the flight of the aircraft will not be disrupted by the removal of one or more rivets until a certain threshold where the removal of just one more rivet leads to disaster. Similarly, the local extinction of a species, as in the removal of one rivet too many, can have major consequences. Based on an analysis of 4.600 ecosystems, a more recent study[34] suggests that this threshold effect is not systematically verified; in actual fact, the degradation of ecosystems tends to be gradual but with irremediable consequences (function or species loss) from the very first disruptions.

Since all businesses depend more or less directly on the services rendered by nature, the decline in these services exposes them all to different types of risks, usually analysed into physical, transition or systemic risks[35].

3.2 Current acceptance of double materiality

In the private sector, the financial approach to risks has clearly been a driver of engagement in recent years. Some «material» environmental issues[36] may expose companies to a variety of risks and cause their financial value to fall to the detriment of shareholders and, if many players are involved, indeed threaten the stability of the financial system as a whole.

Strictly speaking, in risk analysis businesses are first vulnerable to physical risks and their financial consequences, incurred as a result of the loss of biodiversity or ecosystem services (crop failures or disruption of supply chains). As in the case of climate, they are also vulnerable to transition risks, whether reputational or regulatory. These are more difficult to assess because they are dependent on the social context (regulatory pressure and public opinion). Nonetheless, they can be examined via the intensity and materiality of the impacts. A business consuming a lot of water is more vulnerable to transition risk than one that is more frugal.

As a result, a growing number of financial players are starting to take an interest in the materiality of impacts because it allows transition risks to be appraised, even though their financial consequences are difficult to predict.

The need to improve assessment of these risks has given rise to several views as to what is deemed «material» in the relations between a business and its environment. While *impact materiality* reflects the view that assessing the impacts and dependencies of a business on the environment is the best proxy for estimating the transition risks it runs, *financial materiality* suggests that all physical and transition risks should be monetised, i.e. assessed in terms of the consequences for the value of the business. Double materiality combines the two approaches and recognises that the two provide complementary information for understanding the relationship between a business and the environment.

32 Post-2020 Biodiversity Framework EU Support (2020). Mobilization of #15 – No business on a dead planet — why adopting an ambitious post-2020 GBF makes economic sense. M. Pelisson, C. Thissen.

33 Jules Chandellier, Marine Malacain. Biodiversity and Re/insurance: An Ecosystem at Risk. [Research Report] National Museum of Natural History 2021. hal-03213905.

34 Hillebrand, H., Donohue, I., Harpole, W.S. et al. Thresholds for ecological responses to global change do not emerge from empirical data. Nat Ecol Evol 4, 1502–1509 (2020).

35 Definition of risks by the TaskForce on Nature-related Financial Disclosures, TNFD 2022-2023. Accessed on 25/06/2023.

36 We use the term «material» in the sense of significant.

Another difficulty lies in the fact that what is deemed «material» in the relationship between a business and the environment depends on the people or entity that assess it. Impacts considered negligible at company level (for example those that do no *significant harm*), and therefore undisclosed in non-financial reporting, can nevertheless substantially impact thousands of local stakeholders.

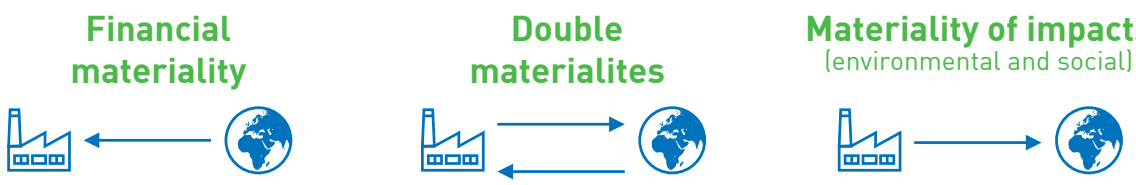


Figure 9 / Graphical representation of different materiality perspectives.
Source: BL Evolution (2022)[37].

Numerous studies and publications have sought to better characterise biodiversity loss-related risks. The insurance and reinsurance sector was one of the pioneers in this field because it was doubly exposed to the new risks through its insurance and investment activities. In 2019, WWF, in partnership with AXA, recommended in the «Into the Wild»[38] report the development of a biodiversity-related risk management framework. Two years later, a study[39] conducted by the French National Museum of Natural History with the support of the SCOR foundation identified and analysed the exposure of the re/insurance industry to these new risks, along with the solutions to control them.

In 2021, a Banque de France[40] study proposed an initial assessment of the financial risks related to biodiversity loss and suggested that 42% of the shares and bonds held by French financial institutions probably relate to companies that are heavily or very heavily dependent on at least one ecosystem service. Shortly thereafter, the NGFS-INSPIRE joint study group on biodiversity and financial stability was formed to identify the approach central banks and supervisory authorities should adopt to deal with this new situation.

On the other hand, vulnerability of this kind does not necessarily lead to action because the risks are diffuse and it is difficult to relate their increase to the activities of a particular company.

3.3 Developing a common language: the TNFD framework

This body of research led to the formation and launch in 2021 of a Taskforce on Nature-related Financial Disclosures (TNFD). Inspired by the TCFD for climate, the TNFD seeks to propose a global management and disclosure framework for nature-related dependencies, impacts, risks and opportunities (also called DIROs) common to all businesses and relevant for financial players.

The first beta version (v0.1) of the framework was based on a mainly financial approach to materiality (risks and opportunities disclosure in monetary terms). Its updates, however, have progressively included impact materiality, probably under the effect of the prevailing outlook in Europe where it is generally accepted. The first version of the framework incorporating these changes was published in September 2023.

37 BL Evolution (2022). Double matérialité : comment appréhender ce nouveau principe et quelles implications pour le reporting extra-financier ?

38 Into the Wild. Factoring nature into business decisions. Recommendations by WWF France and AXA to G7 Environment members, Metz, 5-6 May 2019. WWF, 2019

39 Jules Chandellier, Marine Malacain. Biodiversity and Re/insurance: An Ecosystem at Risk. [Research Report] National Museum of Natural History. 2021. hal-03213905.

40 Banque de France (2021). Svartzman Romain, Espagne Etienne, Gauthey Julien, Hadji-Lazaro Paul, Salin Mathilde, Allen Thomas, Berger Joshua, Calas Julien, Godin Antoine, Vallier Antoine..Working Paper Series no. 826: A "Silent Spring" for the Financial System? Exploring Biodiversity-Related Financial Risks in France.

BNP PARIBAS

Contribution to the operation and work of the TNFD

After having actively contributed to its prefiguration, BNP Paribas has become one of the 40 members of the Taskforce on Nature-related Financial Disclosures (TNFD), launched in 2021 with the mission to define a framework for managing and disclosing nature-related risks. It aims to enable organisations to assess and address the evolution of their impacts, dependencies, risks, and opportunities related to nature, with the ultimate goal of redirecting global financial flows from operations with a negative impact on nature towards those with a positive one. The group's biodiversity experts actively participate in various working groups that led to the publication of the final version in September 2023.

This framework will contribute to the response to the Global Biodiversity Framework (GBF) published following COP 15 in December 2022. Target 15 of the GBF calls for transparency regarding risks, dependencies, and impacts on biodiversity.

«BNP Paribas has been actively involved in the launch and subsequent discussions of the TNFD. Contributing to the development of a common framework to enhance the management of biodiversity risks and reporting through this collective action appears crucial to us.»

Sébastien Soleille
Global head of energy transition and environment.

In France, the Business–Finance Dialogue (DEFI) symposium on solutions and actions for nature, held in 2022, triggered a vibrant exchange between financial institutions and corporates. More than 200 leaders and experts from industry, finance, consulting and services, government, universities, NGOs and scientific institutions identified the conditions for factoring nature better into the discussions and actions of corporates and financial players[41].

The creation of the French TNFD Consultation Group co-facilitated by *Entreprises pour l'Environnement* was one of the responses to the call for further thinking on the development of a common language around nature. For more than a year, it has brought together on a number of occasions a hundred or so representatives of French companies, financial institutions, NGOs and scientific institutions actively contributing to the development of the TNFD framework. Each new beta version has been accompanied by a presentation, discussions based on concrete feedback, and the preparation of comments for the TNFD Secretariat proposing changes to match upcoming versions to the needs and operations of market stakeholders. Several French corporates are closely involved in this initiative. AXA group, for example, has been contributing to it from the outset as a member of the Taskforce and participant in the «Metrics and Targets» working group.

41 DEFi – Dialogue Entreprise – Finance, Solutions et actions pour la Nature. Symposium proceedings. 27/06/2022 Entreprises pour l'Environnement and Institut de la Finance Durable.

Contributions to the work of the TNFD «Metrics and Targets» group

The Taskforce on Nature-Related Financial Disclosures (TNFD), of which AXA is a member, released the latest beta version (v0.4) of its framework for managing and disclosing nature-related risks and opportunities in March 2023. To facilitate the use of the framework, the «Metrics and Targets» working group, of which AXA is a part, proposed an approach based on existing standards. AXA collaborated with other members of the Taskforce and with other actors in finance, businesses from the physical world, scientists, and NGOs, to identify scientifically rigorous indicators that can be easily used by market actors who will document and, if necessary, publish them in their annual reports.

This approach, based on measuring dependencies, impacts, risks, and opportunities, aims to meet the need of financial actors to compare companies within the same sector while providing some flexibility to companies producing these reports, as each sector and business model has a specific relationship with nature.

Finally, the recommended metrics have also been selected to allow companies to describe their contribution to achieving global targets and objectives, such as those defined by the recently obtained Global Biodiversity Framework (GBF). This logic is built in the image of companies' reporting practices on climate: many publish transition trajectories towards a net-zero emissions goal aligned with the objectives of the Paris Agreement.

As part of its Climate and Biodiversity Report, AXA has already begun to respond to the TNFD's reporting recommendations by publishing an initial study of the potential impacts of its activities on biodiversity. To do this, AXA selected an innovative tool for measuring the biodiversity footprint of companies: the Corporate Biodiversity Footprint (CBF), which aims to identify, at the portfolio level, the impact of investment activities on biodiversity.

Core global metrics: Impacts and dependencies	
Climate change	Scopes 1, 2 and 3 - GHG emissions - refer to TCFD
Land/freshwater/ ocean-use change	Extent of land/freshwater/ocean use change, by type of ecosystem» and business activity
	Extent of land/freshwater/ocean use change, by type of ecosystem and business activity, for prioritised ecosystems
Pollution/ pollution removal	Total pollutants released to soil split by type
	Volume of water discharged and concentrations of key pollutants in the wastewater discharged by type
	Total amount of hazardous waste generated by type
	Total non-GHG air pollutants by type
Resource use/ replenishment	Total water withdrawal and consumption from areas of water stress
	Quantity of high-risk natural commodities sourced from land/ocean/freshwater split into types
	Quantity and share of natural commodities sourced from priority ecosystems split into types

Core global metrics: Risks and opportunities	
Nature-related risks	Proportion and total annual revenue exposed to 1) physical risks and 2) transition risks
	Proportion and value of assets exposed to nature-related 1) physical risks and 2) transition risks
	Proportion and value of assets/total annual revenue exposed to risks by risk rating
	Proportion and total annual revenue/value with substantial dependence on ecosystem services or with a high impact on nature
Nature-related opportunities	Value of capital allocated to nature-related opportunities, by type of opportunity, with reference to a jurisdictional green taxonomy

Source: *The TNFD Nature-related Risk and Opportunity Management and Disclosure Framework, Final Draft – Beta v0.4, March 2023.*

Other companies have conducted initial pilot projects and are participating in collective skills development by sharing results with their peers even before the publication of the framework's first final version. This is true of Engie, partnered by the consulting firm ERM, and TotalEnergies.

The first operational version of the TNFD framework, published in September 2023, is the result of a two-year consultative development process and has benefited from insights gathered from more than 200 pilots conducted by companies and financial institutions. A set of 14 disclosure recommendations as well as a series of guides have been published to facilitate the adoption of the framework and accelerate the scaling up of actions by economic actors.

Presentation of the results of a TNFD maturity study

In light of upcoming international and European environmental regulations, the ENGIE Group has initiated an analysis of the gaps between its current practices and the TNFD (v0.4) reporting recommendations. In order to adapt the trajectory defined by the Global Biodiversity Framework to its own scale, ENGIE conducted an analysis of several parameters with the assistance of the consulting firm ERM:

- governance and internal mobilisation processes around biodiversity,
- level of understanding of the impacts and dependencies of activities on nature (direct operations and value chains),
- ability to assess risks and opportunities related to nature to guide actions?
- publication of information related to nature.

ERM applied the LEAP[42] approach recommended by the TNFD framework. For each step, ERM analysed the existing documentation provided by the group (policies, commitments, action plans, tools, etc.) to identify the alignment between data, processes, and TNFD framework recommendations. Interviews were also conducted with ENGIE to gather additional information. The results indicate an overall maturity level that is still «developing,» with some strengths, particularly in site localisation and understanding their issues, as well as participation in various initiatives (TNFD forum, SBTN pilot).

Based on the gaps identified with the TNFD framework, ERM provides group-wide recommendations prioritized by the level of action to implement or improve, along with the recommended timeline to define the roadmap for the coming years: evaluating impacts in the supply chain, better integrating nature into the group's strategy, on par with climate and societal issues, and better considering nature at the site level and in their value chains were identified as priority actions.

This analysis not only prepares the group to respond to TNFD recommendations but also anticipates and aligns with the requirements of new regulations, such as the CSRD. The preparation exercise for responding to TNFD recommendations was seen by the group as an opportunity to improve and better preserve the environment.

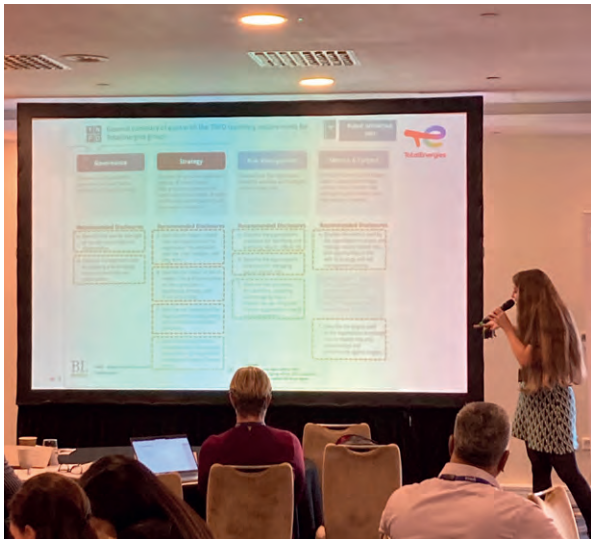
42 Locate, Evaluate, Assess, Prepare.

Steering the TNFD framework at the company level and sharing the results

TotalEnergies is a member of the TNFD forum and has contributed to the evolution of the beta versions of the framework by sharing its feedback within dedicated working groups (WG), such as the French TNFD consultation group (led by EpE and the Institute of Sustainable Finance) and the ipieca WG[43]. A summary of the contributions from members of each WG was sent to the TNFD after analyzing each beta version. TotalEnergies participated in the TNFD pilot for the Energy sector coordinated by the WBCSD (World Business Council on Sustainable Development) and PwC (Pricewaterhouse-Coopers), the results of which will be used by the TNFD to create a sector-specific guide for the energy industry.

The group initiated its own pilot in June 2022 (in parallel with an SBTN pilot) with the aim of identifying any discrepancies with its current reporting. This analysis revealed a partial alignment of the group's current reporting with the «Disclosure Recommendations» and the TNFD's LEAP method, particularly in terms of assessing risks and impacts on nature. A more in-depth assessment of dependencies and opportunities is underway. An alignment plan has been developed, and workshops on Dependencies, Impacts, Risks, and Opportunities (DIRO) have been conducted internally for reporting purposes (including CSRD), as well as for inclusion in the long-term plans of the «Exploration & Production,» «Refining & Chemicals,» «Marketing & Services,» «Gas, Renewables & Power» branches.

TotalEnergies aims to share widely the lessons learned from its TNFD pilot with other companies throughout the process, including during a session organised by TNFD members at COP 15 of the Convention on Biological Diversity in Montreal in December 2022, and at the ipieca Week 2023.



TotalEnergies shared the results of its TNFD pilot during the COP 15 of the Convention on Biological Diversity.

43 The global oil and gas association for advancing environmental and social performance across the energy transition.

4 Gradually establishing a regulatory framework

The international biodiversity policy agenda in recent years increasingly acknowledges the role of business in both solutions and impacts.

In September 2021, the IUCN World Conservation Congress in Marseille stressed how important it was for economic stakeholders to contribute towards a global response to the health crisis, biodiversity erosion and climate change[44]. Two months later at COP26 of the UNFCCC, 137 countries pledged to abate and reverse forest decline and land degradation by 2030[45], and the Glasgow Climate Pact[46] stressed the critical importance of protecting and restoring nature and mobilising the private sector quickly. Only a few weeks after COP27 at Sharm el-Sheikh, COP15 of the Convention on Biological Diversity (CBD) was held in Montreal.

4.1 A stricter global regulatory framework

Initially scheduled for 2020, the regulatory framework's successive postponements as a result of the Covid-19 pandemic far from bringing international negotiations to a standstill actually promoted biodiversity so far up the list of corporate concerns that businesses have had a positive impact on the scope of the agreement.

Thanks to an unprecedented level of mobilisation, businesses have shown a positive attitude throughout the processes leading to the agreement, with nearly 900 corporate representatives attending out of a total of 14,000 accredited participants. More than 400 companies signed up to the 'Make it Mandatory' call prepared by the Business for Nature coalition (of which EpE is a founding member and active partner). This made it possible to include as part of target 15 of the framework the obligation for big business to assess and publicly disclose its impacts and dependencies on nature[47].

At COP15, the presence and action of the corporate world was noted, particularly that of French companies such as Kering, L'Occitane and Mirova who wanted to set an example by announcing ambitious new commitments.

Figure 10 / Géraldine Vallejo, President of the EpE Biodiversity Commission, speaking in plenary at the Business and Biodiversity Forum organised by the Secretariat of the Convention on Biological Diversity at COP15 of the CBD. French companies present at COP15 in Montreal during a meeting with Christophe Béchu, France's Minister for Ecological Transition and Territorial Cohesion.
©Benoît Galaup.

44 UICN (2021) Manifeste de Marseille.
45 COP26: Together for our planet.
46 UNFCCC (2021). The Glasgow Climate Pact – Key Outcomes from COP26.
47 Business for Nature (BfN). Make it Mandatory Campaign.

Launch of the Climate Fund for Nature

Aware that the fashion and beauty industries rely on the good health of natural resources, Kering and L'Occitane have been committed for over a decade to responsible sourcing policies and supporting supply chains to ensure that the production of natural raw materials reconciles local economic development with ecosystem preservation. Examples include shea butter in Burkina Faso and lavender in Provence for L'Occitane, as well as cashmere in Mongolia and wool in Patagonia for Kering. Both companies are on net-zero trajectories and have validated SBTi 1.5°C targets.

In 2022, as COP15 highlighted the need to significantly increase financing for nature protection, Kering and L'Occitane decided to scale up their support for nature-based solutions using an existing mechanism: the voluntary carbon market. In December 2022, they established the Climate Fund for Nature, a 300-million-euro fund over 15 years entirely dedicated to the protection and regeneration of nature. This French-law fund is managed by the Mirova management company, a subsidiary of Natixis Investment Managers dedicated to responsible investment. The fund invests in projects for the preservation of primary forests, mangrove restoration, reforestation, afforestation, and regenerative agriculture. The fund will support 70% of carbon sequestration projects and 30% in avoidance. Projects must also demonstrate a significant contribution to women's empowerment. In this regard, the fund and Mirova collaborate with 2X Global.

The fund provides indispensable long-term financing for nature protection and restoration projects. Investors receive returns from high-quality carbon credits with biodiversity co-benefits[48] from each carbon sequestration and reduction project.

This non-speculative fund will not trade any carbon credits, as these are used to offset investors' unavoidable greenhouse gas emissions. The fund is open to other investors with the same goal of combining local economic value creation, biodiversity protection, and combating climate change

48 Non-exhaustive list of eligible standards : Verified Carbon Standards, Climate, Community & Biodiversity Standards (CCBS), Gold Standard, and French «Label Bas-Carbone».

There has already been a great deal of scrutiny and analysis of the agreement in the French language[49, 50, 51, 52] compared to the previous framework. The real progress made by the Kunming-Montreal agreement is in terms of its inclusion of an operational set of decisions. Complementing the four goals and 23 targets adopted is a resource mobilisation strategy (with milestones) and a mechanism for monitoring implementation by States (complete with a set of indicators).

All the targets more or less directly concern businesses. Among those represented in Table 1, Target 3 ('30 - 30'), which aims to protect at least 30% of terrestrial and freshwater areas and 30% of coastal and marine areas, places new restrictions on economic activities. Target 15 commits States to making mandatory the publication by major international companies and financial institutions of their impacts, risks and dependencies on biodiversity. Targets 7 and 16 call on companies to reduce the pressures they exert on the environment, while Target 19 requires a substantial and gradual increase in the level of financial resources from all sources, including private ones.

Table 1 **Simplified representation of goals and targets (non-exhaustive list) of the Kunming-Montreal agreement**

4 goals		23 targets (non-exhaustive) Numbers denote target numbers
Restoring biodiversity and ecosystem health		Halt extinction of threatened species (4) and the loss of areas of high biodiversity importance (1), protect at least 30% of terrestrial areas and 30% of marine areas (3), restore 30% of degraded ecosystems (2).
Managing and sustainably using biodiversity and ecosystem services		Manage and sustainably use biodiversity: agroecology, fisheries and forestry (10); reduce pollution from all sources (7); reduce the consumption footprint (16).
Sharing benefits equitably		Equitably share benefits, including those arising from the utilisation of genetic resources (13).
Improving the means of implementation	**Financial**	Ensure that companies disclose their impacts and dependencies (15), identify and remove harmful subsidies (18), increase financial resources (19).
	Technical and scientific	Improve international scientific cooperation (20) and access to knowledge (21)

Biodiversity is now incorporated into international environmental discussions, treaties and agreements. For example, following the announcement by several leaders at COP27 of the UNFCCC[53], the One Forest Summit was held in Gabon and the resulting Libreville Plan[54] provides, inter alia, for the introduction of a mechanism to pay for the services rendered by exemplary forest countries, as well as for the launch of the «10by30» initiative to create 10 million jobs in sustainable management of existing forests by 2030.

Significant progress has also been made in protecting the oceans. The publication of the Brest Commitments for the Oceans[55] and the Lisbon Declaration[56] emanating from the One Ocean Summit and the UNOC Lisbon Conference respectively shows strong momentum around the issue and acknowledges the role of business in developing solutions. The acceptance by 193 States of the Treaty for the Conservation and Sustainable Use of Marine Biodiversity in High Seas (BBNJ)[57] is undoubtedly the most symbolic recent step. This treaty mainly

49 CDC Biodiversité (2023), COP15, et après ? Analyse des cibles économiques et recueil de points de vue, Bourcet C., Chesnot Y., Magnier D., Dossier de la MEB N°44, Mission Économie de la Biodiversité, Paris, France, 50p.
50 OREE (2023), Biodiversité et Économie, Une immersion à la COP15. Montréal 2022. S. Gillet.
51 Fondation pour la Recherche sur la Biodiversité (2023). Regard de la FRB sur la COP15 Biodiversité, by H. Soubelet, D. Couvet and R. Goffaux.
52 IDDRI, Replay du webinaire du 4 janvier 2023 : « Quel bilan de la COP15 pour la biodiversité ? ».
53 https://www.vie-publique.fr/discours/287086-presidence-de-la-republique-07112022-evenement-one-planet.
54 Elysée (2023). Libreville Plan.
55 Présidence de la République (2022). Les engagements de Brest pour l'Océan.
56 Nations Unies (2022). Lisbon Declaration, Portugal.
57 Ministère de la Transition écologique et de la Cohésion des territoires, Ministère de la Transition énergétique (2023). Un traité pour protéger la haute mer et la biodiversité marine.

contains commitments to establish marine protected areas and assess environmental impacts, including those caused by the activities of companies from signatory states.

2023 also marked a turning point on the issue of plastic pollution. Following the United Nations resolution adopted in March 2022, the second session of negotiations on an international legally binding instrument to end plastic pollution was held in Paris in early 2023 and marked by a notable mobilisation of the private sector, particularly in connection with the Business Coalition for a Global Plastic Treaty[58].

4.2 Europe and the Green Deal

In 2019, the European Union adopted the Green deal. Initially designed for planning the achievement of carbon neutrality on the European continent by 2050[59], it was later extended to other environmental issues including biodiversity. This plan gave rise to a package of 54 legislative reforms and constitutes a real transformational and systemic shock for companies, forcing them to fully factor in biodiversity.

One of its strategic focuses is protection of the environment and the oceans. In line with the European Biodiversity Strategy for 2030 and the 'farm to fork' strategy, a draft law on nature restoration aims to rehabilitate at least 20% of Europe's degraded ecosystems by 2030 and proposes binding targets to reverse environmental damage caused by human activity.

Finance is another major strategic focus of the Green deal. The European Commission's Sustainable Finance Action Plan published in 2018 has resulted in various regulatory initiatives. For example, the EU Taxonomy for Sustainable Activities establishes a common classification of economic activities having a favourable impact on the environment and obliges European financial and non-financial companies to publish their degree of eligibility and of alignment with the taxonomy. The first climate article, which entered into force in January 2022 (mitigation and adaptation), will soon be supplemented by a regulation defining the criteria for the four other environmental objectives, including biodiversity.

In the financial services sector, the regulation on sustainability reporting in the financial services sector (the SFDR Regulation), which came into effect in March 2021, introduces transparency obligations such as the factoring in of the sustainability risks and negative impacts on environmental (including biodiversity) and social factors of financial products marketed in the European Union.

The CSRD (Corporate Sustainability Reporting Directive) is undoubtedly one of the strongest measures because it will eventually apply to nearly 50,000 companies, including some foreign companies doing business in Europe. This directive is based on the new European Sustainability Reporting Standards (ESRS), drawn up using a double materiality approach. ESRS4 is specifically dedicated to biodiversity.

Other recent regulations seek to regulate business practices. The Corporate Sustainability Due Diligence Directive, adopted in February 2022, obliges companies to identify, stop, prevent, mitigate and account for dverse impacts of their actions on human rights and the environment, including those of their subsidiaries and value chains. The European Zero Deforestation Regulation, which came into force in June 2023, requires companies that export or market palm oil, livestock, soya, coffee, cocoa, wood, rubber or by-products in the EU to demonstrate that they do not contribute to deforestation or forest degradation.

The dialogue between business leaders and senior policymakers helps to identify areas for improvement and to involve businesses in building a biodiversity-friendly regulatory framework. Holding this discussion on a European-wide scale was the aim of the 2021 European Business and Nature Summit (EBNS), organised by the European Commission's Environment Directorate, in partnership with EpE and two German business associations and with the support of seventeen European organisations. The event brought together nearly 90 European speakers including 18 corporate CEOs. The discussions demonstrated the strong mobilisation of French business leaders. On this occasion, EpE led the drafting of a «European Business Statement»[60] which calls on all European companies to strengthen their ambitions, accelerate their actions and multiply nature-friendly collaborative ventures.

58 Business Coalition for a Global Plastics Treaty.
59 European Green Deal.
60 European Business Statement «Scaling up action for nature»

4.3 France - a long-standing ambition

France took up the issue of biodiversity very early on with an increasing level of ambition. The adoption in 2016 of the Law on the recovery of biodiversity, nature and the countryside[61] marks a turning point as it sets into law a goal of no net loss of biodiversity through various policy instruments: consolidation of legal principles, concrete responses to biodiversity issues, protection of endangered species, sensitive areas and quality environments, and utilisation of biodiversity as a driver of economic development. The publication in 2018 of the government's Biodiversity Plan[62] also demonstrated bolder ambition and confirmed the desire of French public authorities to involve business in biodiversity preservation and restoration efforts.

Other regulations directly target investors. The publication in 2021 of the decree implementing article 29 of the Climate Energy Law[63] has made it mandatory for investors to disclose their biodiversity-related risks, their investment strategies aligned with the Paris Agreement and the Kunming-Montreal Agreement, and the financial impact of the main ESG risks (including biodiversity). In an effort to anticipate regulations of this kind, BNP Paribas decided to support the development of methodologies enabling it to publish an initial assessment.

Lastly, the Climate and Resilience law introduces an array of new measures that apply to businesses. Enacted in August 2021, it directly follows the recommendations of the Citizens' Climate Convention. In terms of biodiversity, it lays down several objectives. In addition to stricter mandatory reporting, greater consideration of ecology in discussions between employers and employees and restrictions on advertising, this law is essentially about no net land use (ZAN)[64] by 2050 and halving the land-use rate by 2030.

The third plank of the French national biodiversity strategy, an updated version of which was published by the government in July 2023, marks a new phase by targeting the abatement of pressures on biodiversity and the protection and restoration of ecosystems[65]. A French variation of the Kunming-Montreal agreement, this strategy directly concerns companies because it introduces a mechanism to identify and expose corporate commitments and best practices.

61 https://www.ecologie.gouv.fr/loi-reconquete-biodiversite-nature-et-des-paysages.
62 Biodiversity Plan.
63 https://www.ecologie.gouv.fr/loi-energie-climat-et-regulation-des-acteurs-financiers-principales-avancees-du-decret-dapplication.
64 https://www.ecologie.gouv.fr/artificialisation-des-sols.
65 https://www.ecologie.gouv.fr/strategie-nationale-biodiversite.

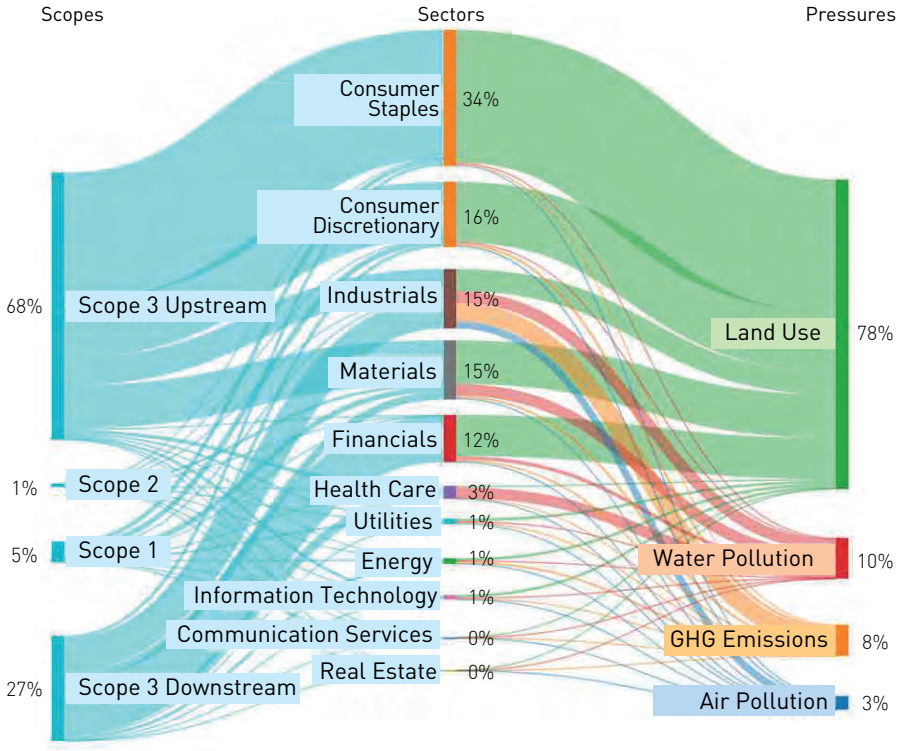
BNP PARIBAS
ASSET MANAGEMENT

Better guide investment decisions with the results of biodiversity footprint measurement of investment portfolios

In June 2022, BNP Paribas Asset Management published its biodiversity footprint for the first time. Calculating this footprint allowed for a test on the assets of companies in its global portfolio to familiarize and understand this methodology, identify cases where its use is most beneficial, and pinpoint the main improvements to be made to the tool.

The methodology used, developed by Iceberg Data Lab and I Care & Consult (Corporate Biodiversity Footprint), quantifies environmental pressures along the entire supply chain of a given company, using input-output environmental modeling data, life cycle assessment data, and real data on company activity when available (e.g., asset-scale data).

This initial assessment of the biodiversity footprint establishes a baseline against which future performance can be tracked. It complements the ESG tools and analyses conducted at the corporate level.



Relative contribution of each scope of the value chain, each sector, and each pressure to the biodiversity footprint of BNPP AM.

5 Better corporate perception and integration of specific difficulties

The previous EpE publication «Biodiversity Solutions for Business: Scaling U» (2019) identified several obstacles to the mainstreaming of solutions. These are now better documented by science and more clearly perceived by companies who are increasingly adapting their modes of action to address them.

5.1 The irreducible complexity of living beings

Biodiversity is a complex, interactive and dynamic whole that is difficult to understand and characterise. Beyond a simple census of species and individuals, biological diversity may be defined as a whole with different levels of organisation (from gene to countryside) and different dimensions (composition, structure, function, etc.) into which all interactions between each of these levels of organisation, the environment and human society, including business, are integrated. It also has an evolutionary dimension in the Darwinian sense[66] (see Figure 11). The size thresholds of living organisms further increase the difficulty in understanding them. For example, in one litre of seawater, we can find 10 billion bacteria and up to 100 billion viruses[67].

Biodiversity is also a whole that is generally poorly understood. The scientific community estimates that only 2 million species are known out of an estimated total of between 8 and 20 million species[68]. There seems to be a consensus that 80% of global biodiversity is not yet known or documented.

This lack of characterisation and the difficulty in identifying and systematising the components of biodiversity, and in assessing its state and the impacts of human activities make it inherently challenging to integrate biodiversity into the ways companies operate and to replicate solutions from one company, sector or location in another.

However, several initiatives attempt to factor this complexity into existing systems and operating processes. For example, ecological accounting seeks to propose methodologies for integrating positive and negative externalities generated by human activities into traditional accounting systems which, to date, include neither the existing interactions between ecosystems and human activities, nor the pressures on the environment and the associated risks[69]. Several initiatives are working towards ensuring that this issue is better taken into account, with some businesses testing the new accounting approaches to include natural capital.

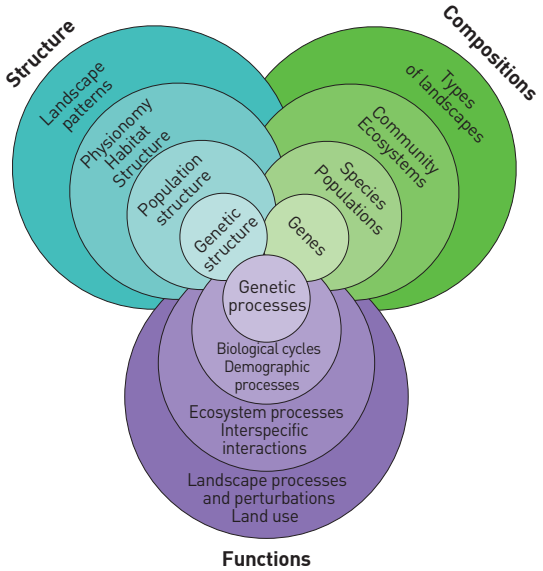


Figure 11 / Composition, structure and functions of biodiversity, presented as interconnected spheres, encompassing several levels of organisation.
Source: FRB (2021).

66 Fondtion pour la Recherche sur la Biodiversité (2021). Aurélie Delavaud, Élodie Milleret, Stanislas Wroza, Hélène Soubelet, Ana Deligny, Jean-François Silvain. Indicateurs et outils de mesure – Évaluer l'impact des activités humaines sur la biodiversité ? Coll. Expertise et synthèse. Paris, France.
67 Bruno David (2021). A l'aube de la 6ème extinction: Comment habiter la Terre. Grasset.
68 Bruno David (2021). A l'aube de la 6ème extinction: Comment habiter la Terre. Grasset.
69 Dossier de la MEB, Comptabilité écologique : intégrer pour transformer, n°43, Mars 2023

An application case of the CARE method

The ecological transformation of businesses requires, among other things, an evolution in accounting systems, languages, organisational architectures, management, performance, and strategies. To address this major challenge, a Research and Development program has been developed for the past 10 years, at the interface of ecological sciences, bioeconomy, and management: the C.A.R.E project (Comprehensive Accounting in Respect of Ecology). Its aim is to integrate new ecological responsibilities into the operation of companies, alongside the traditional responsibilities of protecting financial capital. C.A.R.E is thus a conceptual framework and an accounting methodology that extends the traditional accounting of organizations, known as historical costs, to the protection of new types of capital entities to be preserved, such as ecosystems and human beings.

In practical terms, regarding natural issues, C.A.R.E is based on the integration of the «good ecological states» of ecosystems - a central concept in ecological sciences, which in a way, reflects the idea of planetary boundaries at the ecosystem level - at the core of the enterprise. To achieve this, this accounting model structures:

- a set of biophysical parameters and adapted dashboards, highlighting the organization's impacts on the ecosystems it employs, which in turn contribute to its value creation;
- specific activities for preserving and evolving business models to manage the protection of these good ecological states, in line with the question of the company's sustainability;
- the necessary costs to ensure activities and thus understand the impact on the company's profit of respecting the ecosystems it employs;
- «integrated» performances, which articulate ecological and economic performances.

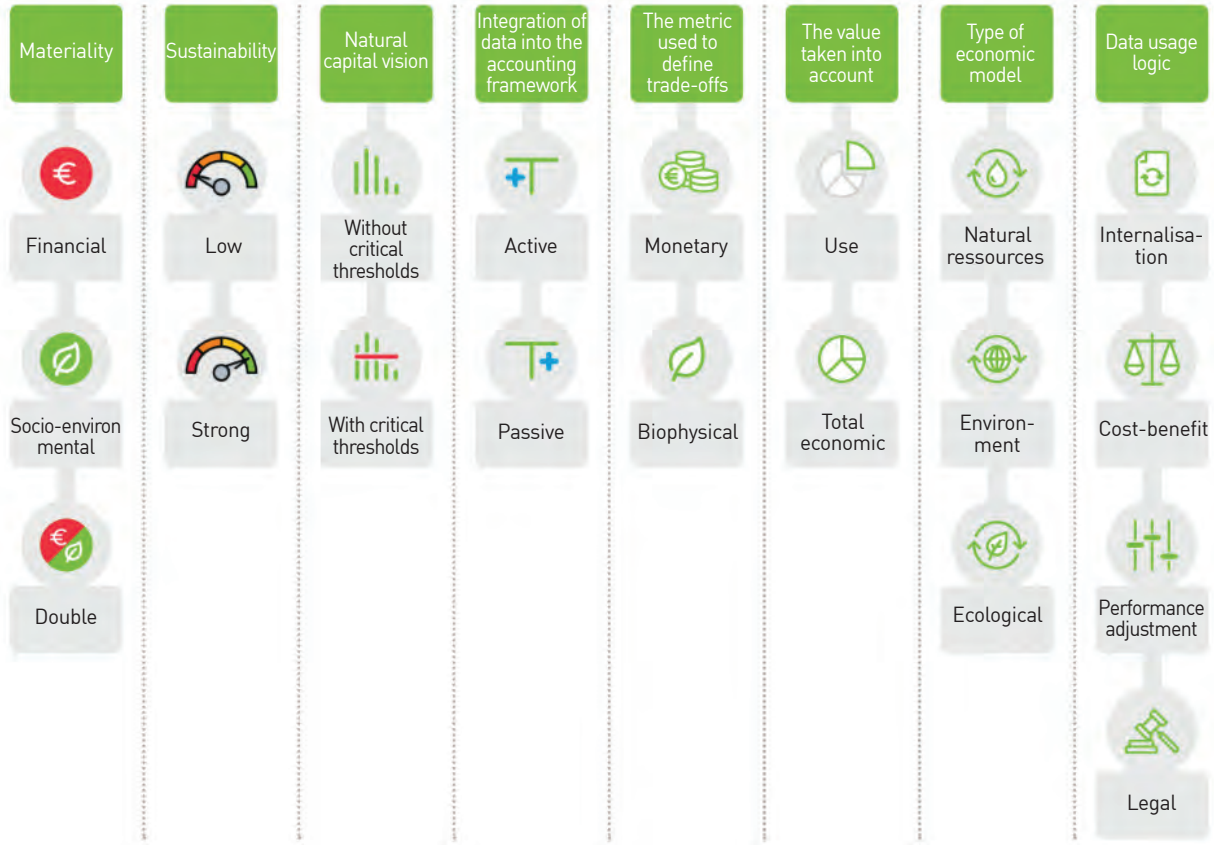
LVMH has committed to this path as a pioneer, since the beginning of this work, by becoming a co-founding partner of the Ecological Accounting Chair (AgroParisTech Foundation), which brings together research on C.A.R.E, and by collaborating with CERCES (Circle of Social & Environmental Accountants), which brings together the community of professionals working on C.A.R.E. In this context, several experiments and developments of C.A.R.E are underway, notably in the wine industry on Veuve Clicquot's estate since 2019. These efforts involving doctoral students, researchers, interns, and experts from affiliated firms have led to significant progress in better understanding the good ecological states of soils in interrelation with viticultural business models and the methods of exploitation and preservation of these same soils in this context. As a result, more tailored management strategies are being discussed and tested, contributing not only to the work of the chair, but also to professional exchanges within the framework of CERCES.

CDC BIODIVERSITÉ

Accounting as the foundation of the ecological transition

Accounting is currently the foundation on which our economic interactions rely. Through this data construction, we are now able to assess the performance of organisations. The main issue is that the current framework does not fully take into account the environmental dimension. As a result, the analysis of an organisation's performance is conducted without integrating the dependencies and impacts of the business model on the environment. To address this, we have seen the development of non-financial reporting. While these tools allow for harmonization in the production and dissemination of data, their effectiveness in achieving environmental objectives remains to be demonstrated.

In parallel with these developments, a new concept has emerged: environmental accounting. The latter can be defined as «the formation of an accounting information system, aimed at reporting on the interactions between the organisation and nature»[70]. The added value of this tool lies in its ability to incorporate the environmental dimension directly within the accounting framework. As a result, the various data will be inherently linked within the informational structure, allowing for the revelation of tensions that may exist between profit-seeking and achieving environmental objectives. We are then witnessing the potential transcending of organizational performance analysis.



Tool for Categorising Environmental Accounting Tools.

70 Antheaume, N. (2013). Le contrôle de gestion environnemental. État des lieux, état de l'art. Comptabilité-Contrôle-Audit, 19(3), 9-34.

On the other hand, some companies such as *Séché Environnement* are developing management tools that first take into account the specificities of nature and its complexity through local and collective approaches that bring together scientific partners and a wide range of stakeholders.

Tailoring the company's strategy to its challenges

Séché Environnement plans its sustainable development in line with the ecological challenges of the region. In order to measure its impacts and standardize its biodiversity monitoring, Séché's ecologists worked with the LPO on the adaptation of a biodiversity indicator. This indicator, based on the Ecological Quality Index (EQI)[71] from the French National Museum of Natural History, provides an overall view of the ecological quality of a site in the form of a radar chart. This mapping takes into account Séché's historical protocols, heritage, species diversity, as well as the functionality of the site, allowing for adjustments in management and development to promote biodiversity.

Understanding our direct and indirect impacts, consolidated by a specific double materiality analysis for biodiversity issues, allows for the development of a tailored action plan for each site. This biodiversity strategy has been renewed for the period 2023-27, and includes site-specific action plans led by «biodiversity ambassadors». These ambassadors are supported by the group's biodiversity service, consisting of six ecologists. In line with the goals of COP15, these ambassadors will work towards safeguarding natural spaces to achieve 30% protected areas within the company's land, similar to the sensitive ecological zones that have historically been implemented by the group. These dedicated biodiversity spaces serve as a haven for biodiversity, providing resilience and contributing to the green and blue networks of the region.

Furthermore, the group will extend its biodiversity approach throughout its value chain, particularly with its clients. Thus, services related to nature protection (pollution control and emergency interventions) are accompanied by biodiversity protection measures upstream, during the construction phase, and at the end of the intervention with tailored rehabilitation and restoration proposals. Finally, the Séché group will contribute to the emergence or strengthening of biodiversity preservation initiatives in its operating areas, relying on its local partners: associations, schools, local authorities...

5.2 Weakened links between humans and nature

Several scientific studies affirm that the deterioration of the link between humans and nature is one of the causes of the biodiversity crisis and limits the scaling up of business solutions.

Several scientific works and studies[72, 73, 74] show that industrialisation, urbanisation and changing lifestyles have led to a decline in the quantity and quality of our nature experiences, especially in Western societies where most of our interactions with nature occur in environments which have been domesticated, landscaped, or maintained by human activities. The absence or decline in our encounters with wilderness can lead us to see it as distant and distinct, thus altering our perceptions of nature and ourselves, while undermining our ability to value and identify with it. In its report on the various values of nature[75], IPBES also notes that the way people perceive, interact with and attach values to nature influences their behaviour. This applies not only to individuals but also to institutions (including businesses) and entire societies. The same trend is reflected in the concept of «environmental generational amnesia», which psychologist Peter Kahn[76] describes as the idea that each ensuing generation gets used to environmental degradation and builds its representation of the well-being of nature by

71 UMS Patrimoine Naturel – Centre d'expertise et de données (OFB-CNRS-Muséum national d'Histoire naturelle, 2020). Delzons O., Cima V., Fournier C., Gourdain P., Hérard K., Lacoeuilhe A., Laignel J., Roquinarc'h O., Thierry C. Indice de Qualité Ecologique (IQE), Indice de Potentialité Ecologique (IPE) - Guide méthodologique – Version 2.0. Paris.

72 Cynthia Fleury et Anne-Caroline Prévot (2017). Le souci de la nature. Apprendre, inventer, gouverner. CNRS. Chapitre 19 : expériences de Natures, investir l'écosomatique.

73 Cynthia Fleury et Anne-Caroline Prévot (2017). Le souci de la nature. Apprendre, inventer, gouverner. CNRS. Chapitre 18 : la nature dans l'apprentissage tout au long de la vie.

74 Soga, M., & Gaston, K. J. (2016). Extinction of experience: the loss of human–nature interactions. Frontiers in Ecology and the Environment, 14(2), 94-101.

75 IPBES (2022). Methodological Assessment Report on the Diverse Values and Valuation of Nature of the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services. Balvanera P., Pascual U., Christie M., Baptiste B., Gonzalez-Jimenez D.(eds.). IPBES secretariat, Bonn, Germany.

76 Kahn Jr, Peter H., Rachel L. Severson, and Jolina H. Ruckert (2009). « The human relation with nature and technological nature. » Current directions in psychological science 18.1, 37-42.

taking as a reference point an objectively impoverished nature compared to what was known by previous generations. The findings of this scientific study are mirrored in the results of a public survey «The French and Nature»[77] conducted in 2020 by the Ministry for Ecological Transition, which point out that not all French people are able to access nature as much as they would like and that their highly varied perceptions of nature are largely determined by the relationship they have with it.

Another consequence of the reduction in the diversity and quantity of interactions with nature is the lack of consideration for biodiversity-related issues in training and teaching. This leads to a variable level of awareness among managers and their teams and companies making decisions with little or no regard for nature.

Training and raising awareness are deemed to be valuable solutions[78] because they make for greater personal and professional involvement on the part of individuals and facilitate the move to action[79]. They are one of the first measures taken by companies wishing to take better account of biodiversity and the linchpin of their commitments to nature[80].

5.3 Business management methods poorly adapted to biodiversity

Action for nature in companies also comes up against their internal organisational constraints. Centralised management methods, widespread in business, are based on the standardisation of products, practices and processes designed to optimise performance and reduce costs. This approach is hardly compatible with biodiversity's inherently local, diverse and spontaneous nature. While the top-down approach has proven its effectiveness in terms of corporate management and coordination, it often leads to local actions deprived of adequate legitimacy and recognition even though they are essential to the preservation and restoration of nature.

However, some companies, such as the chemicals group Solvay are changing their management methods to encourage and value local actions for nature, with the aim of creating the conditions and providing the means for local actions to be implemented spontaneously.

The difference with the situation that applies to emissions reduction is interesting because different indicators lead to different modes of action.

77 SDES (October 2022). Les Français et la nature : fréquentation, représentations et opinions.
78 Jean Jouzel, Luc Abbadie (2022). Sensibiliser et former aux enjeux de la transition écologique dans l'Enseignement supérieur.
79 Cynthia Fleury et Anne-Caroline Prévot (2017). Le souci de la nature. Apprendre, inventer, gouverner. CNRS. Chapitre 3 : intérêt et limites de l'expérience de la biodiversité.
80 Corporate commitments in act4nature international.

Progress beyond

What scale to manage biodiversity?

The biodiversity roadmaps of Solvay's main production sites include projects aimed at conserving or even restoring biodiversity in partnership with environmental associations and local stakeholders. Production sites are encouraged to work together in a network to facilitate the exchange of information, best practices, measurement tools, and methods to identify potential partners to support them in their efforts. The valorization and external recognition of biodiversity conservation and restoration projects are key: for its commitment to species protection, the implementation of multiple facilities, and the improvement of several biodiversity indicators, the Paulinia site is the first Brazilian site to receive a «Gold» certification from the Wildlife Habitat Council[81]. Another site based in Europe submitted a case study to IUCN to test «Nature-based Solutions» standards[82]. Although certification and standardization tools are still imperfect, it is crucial that these protection efforts be recognised and validated by independent organisations.

The local dimension of the roadmaps is also crucial for understanding the specificities of the environments of the production sites (areas of water stress, presence of protected areas, environmental richness, etc.). Thus, although Corporate services play an important support role, each site must take ownership of the issue and define its own objectives with measurable and verifiable ambitions for biodiversity conservation and restoration over time. These local actions contribute to respecting a trajectory of impact neutrality on nature defined at the group level. There are similarities with climate strategies, particularly in defining a neutrality objective. However, biodiversity consideration is more complex due to its local dimension and the difficulty of measuring pressures and making trade-offs between them. It is essential that these protection efforts be recognised by independent organisations as contributing to societal challenges.

5.4 Lack of confidence in the profitability of the solutions

In most sectors, nature conservation and restoration actions are considered unprofitable and additional costs, usually borne by the company to offset impacts or by the state. Each year, more than 80% of global financial flows dedicated to biodiversity are reportedly public[83], and conservation and restoration projects usually exclude economic activities[84, 85].

For companies, integrating biodiversity into separate activities often creates additional costs while benefits are either diffuse or collective. In many cases, businesses find it difficult to understand the return on such investments as these are not always monetary and may take a long time to materialise. The assessment exercise carried out by SNCF group clearly shows that interactions with nature can generate significant costs.

Initial findings show that nature-related economic opportunities are poorly characterised, while related business models are experimental and require design and overall improvements. For example, investing in natural capital can be riskier, with lower and longer-term profitability than investing in industrial business models.

81 https://www.solvay.com/en/press-release/solvays-site-brazil-receives-highest-biodiversity-rating-wildlife-habitat-council.
82 IUCN global standard for Nature-based Solutions, IUCN, Gland, Switzerland, 2020, 21p.
83 BloombergNEF (2023). Biodiversity Finance Factbook. Edition 1H 2023. Victoria Cuming, Hugh Bromley.
84 DEFi, Symposium proceedings, 27 June 2022, Workshop 7: Gouvernance et modèles économiques des Solutions fondées sur la Nature.
85 Defi, Symposium proceedings, 27 June 2022, Workshop 8: L'émergence d'une classe d'actifs « Capital naturel ».

Assessment of costs related to integrating biodiversity into our activities

Assessing costs related to biodiversity is a challenging exercise. First, certain definitions must be clarified: the scope of the activities considered, the economics of biodiversity or the cost (surcharge) of biodiversity, costs for preserving biodiversity, or costs induced by biodiversity? Are these direct or indirect costs?

SNCF's activities and sites interact with biodiversity on multiple levels: projects (new railway lines, network modernisation, new stations, new industrial sites), extensive regeneration operations (1,500 km of track per year), and routine maintenance operations on the same networks and sites. Our assets also offer potential for biodiversity. The interactions are thus of several types:

- risks related to our direct or indirect impacts (safety, service continuity, punctuality, regulatory compliance, project and construction management, image, and reputation) that directly affect our business;
- opportunities (creation and maintenance of ecological corridors, raising awareness among providers and customers at stations and on trains, contribution to the understanding and ecological valuation of the land owned by the group;
- ecosystem services (maintenance of embankments, lower maintenance costs if vegetation stabilizes).

Thus, the costs induced by biodiversity will mainly concern maintenance and operation. For example, the control of vegetation on tracks, runways, and surroundings (to limit falls, fire risks, skidding, etc.) costs €200 million per year, the impact of tree falls (365,000 minutes lost in 2020 due to vegetation), and collisions with large wildlife (average cost of a collision: €100,000).

The cost categories for biodiversity preservation range from local micro-measures to adjustments in the schedule of maintenance or intervention works and measures taken within investment projects or for training. For example, €1 million is invested each year in restoring ecological continuity of watercourses, and measures to reduce and compensate for the Montpellier-Perpignan new railway line (150 km) amount to €240 million.

Tree falls on the tracks. Fish passage, Virdoule Bridge.
©SNCF.

5.5 Lack of benchmarks to guide actions

While the Kunming Montreal Agreement provides a set of global policy objectives that companies can use to target their actions, lack of empirical data remains a major difficulty. High levels of uncertainty, and the difficulty in predicting changes to biodiversity and implementing solutions, therefore, hamper corporate action.

The lack of benchmarks is mainly due to gaps in some of the scientific knowledge needed to guide business decisions. For example, the scientific community has yet to propose global pathways to biodiversity restoration or to the reduction of biodiversity erosion drivers that companies could align themselves with. Corporate practices of setting goals and building pathways to action will be discussed in more detail in Chapter 4 of this publication.

Apart from pathways, the scientific community seems to come up with only partial solutions to the need for robust data to guide business decisions effectively. For example, data on ecological thresholds not to be exceeded for each erosion driver and for each ecosystem or location, as well as equations that translate pressures into impacts on biodiversity, is still relatively scarce and piecemeal. A scientific assessment of several tools and indicators[86] run by FRB recommended strengthening research efforts to gain a better understanding of biodiversity dynamics, and to model interactions, cumulative pressures and potential threshold effects using a spatialised approach and robust data.

To meet these benchmarking needs, IPBES has launched a «methodological assessment of the impact and dependence of business on biodiversity and nature's contributions to people» which involves businesses for the first time. The scoping document[87] adopted in 2022 shows that the report will aim to better characterise the nature of dependencies and the impacts of business activities on biodiversity, to present the results of the scientific assessment of the different methods of measuring impacts and dependencies (including frameworks, metrics, indicators, models, data and tools), and to identify ways in which companies can use the outcomes of these methods to monitor their actions.

Since 2019, EpE member companies that participated in the studies of the Biodiversity Commission have decided to step up and improve practices to overcome these difficulties. First and foremost, this involves monitoring biodiversity with the help of biophysical indicators (chapter 2). It also involves creating economic value or even biodiversity-friendly business models (chapter 3), and setting goals and pathways to action (chapter 4).

86 FRB (2021). Indicateurs et outils de mesure – Évaluer l'impact des activités humaines sur la biodiversité ?

87 Annex I to decision IPBES-9/1. Scoping report for a methodological assessment of the impact and dependence of business on biodiversity and nature's contributions to people.

2

Corporate biodiversity indicators: new developments

Biodiversity indicators, whether biophysical or economic, every so often socio-cultural or expressed in the form of quantitative measures, rankings or qualitative assessments, reflect the growing importance of nature for business and often underpin what considerations are taken into account in a company's decision-making processes and in monitoring the effectiveness of its strategies and actions over time, and what information it chooses to publish.

While the subject of corporate biodiversity measurement and monitoring indicators has already been discussed in numerous publications[88], the work carried out over the last three years by the EpE Biodiversity Commission highlights several advances and new practices.

1 The proliferation of field indicators

In response to the complexity of living beings and the difficulty in identifying and systematising biodiversity components, businesses are developing and using an ever-increasing variety of tools, each partially reflecting the complexity of interactions between business and nature.

The local scale is relevant to understanding biodiversity issues. Monitoring some of those components at local sites is traditionally how businesses factor nature into their decisions and strategies. Some, whose activities directly impact nature, have now fully integrated ecological expertise into their operations and in-house know-how. This is the case, for example, of RTE, which deploys a variety of approaches and tools to monitor the impacts of new vegetation management practices under power lines.

88 Entreprises pour l'Environnement (2013). Measuring and managing biodiversity.
89 IBAT (Integrated Biodiversity Assessment Tool), IUCN, UN-WCMC, BirdLife, Conservation International.

Bat'lignes: studying the effects of high voltage power line corridors on biodiversity

Since 2011, RTE has developed new methods for managing vegetation in forested areas along power lines. These methods, which eliminate the need for mulching vegetation, involve selective cutting, replanting with local species, habitat restoration, game plantings, and opening areas for agropastoral activities. Over 1,700 hectares are managed using these methods twenty years later. Given the development of these new methods, it became important to assess their potential benefits for biodiversity.

The «Bat'lignes» project was designed in collaboration with the CESCO Laboratory of the National Museum of Natural History to find a method for quantifying the effects of vegetation management practices in forested areas on biodiversity. The most commonly used method, known as diachronic, is based on multi-species inventories before and after the change in practice. However, its main weakness lies in its low reproducibility over several years. Therefore, a synchronic approach was proposed, based on a comparison between sites and standardised acoustic measurements taken in the same year in two regions (Landes and Ardennes). These recordings allow for the simultaneous study of variations in the activity of bats and ensiferous orthopterans (crickets, grasshoppers, etc.). The relative abundance of these two taxa is highly sensitive to changes in agricultural practices and habitat structures.

In total, 40 sites (within the power line rights-of-way and in adjacent forests) were studied in Landes, and 29 in the Ardennes Regional Natural Park in 2021, for a total of 117 nights of recordings.

A preliminary analysis seems to confirm that the rights-of-way managed using 'alternative' methods host a greater diversity of grasshoppers. However, bat communities do not appear to be more diverse in these areas. Bats seem to benefit from the edge effect, which promotes movement for foraging. Indeed, their activity is significantly higher there than in the neighboring forested areas.

Other ongoing work focuses on bat activity in electrical substations scheduled to no longer use herbicides. The interest of these interregional studies lies in their comparison to reference points for bat monitoring at the national level.

In Engie's case, the use of diverse indicators provided by the IBAT tool[89] makes it possible to identify priority sites. The value given to biodiversity from time to time leads the company to take different decisions in order to preserve it better.

Other companies such as TotalEnergies and BASF are making progress by leveraging a broad range of biodiversity monitoring devices at site level to obtain a more complete picture.

Define specific action plans for sites located near protected areas or in contact with threatened species

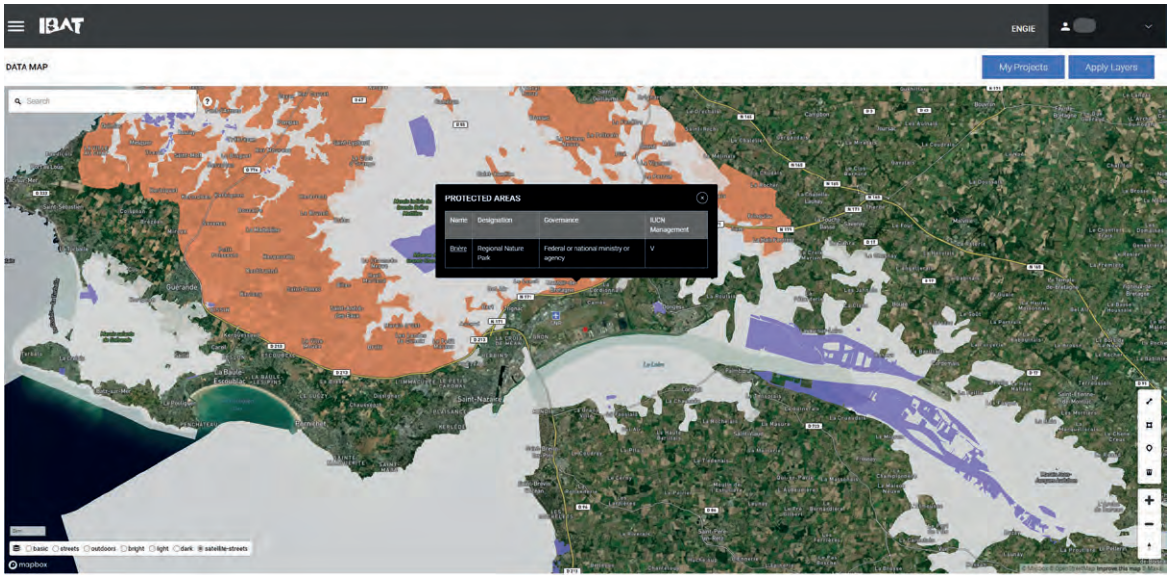
The IBAT tool has now become an essential working tool within the ENGIE group, both for existing sites and future projects.

In order to incorporate all sensitive biodiversity areas and protected areas into its risk analyses, the group uses the IBAT tool, managed by the UNEP-WCMC teams. This allows for the annual measurement of the distance to protected areas with a robust and regularly updated database, identifying biodiversity issues for each site or project, as well as types of species listed in the IUCN Red List near the site.

The group aims to implement biodiversity action plans for its existing industrial sites and projects. A site is deemed a priority when it is located within or near a protected or biodiversity-sensitive area (within a radius of 15 km) and must establish an appropriate action plan in consultation with its stakeholders.

The objective is for 50% of priority biodiversity sites to have established action plans with relevant stakeholders by 2025, and 100% by 2030. In 2022, 60% of action plans were deployed.

For new projects, the group is committed to following the Avoid-Reduce-Compensate sequence in biodiversity matters, as defined within the framework of the international act4nature initiative. The use of various reports provided by the IBAT tool provides an initial overview of the challenges for a future project and allows for their early integration into site selection or technology choices. These preliminary analyses have already led to the abandonment of projects where avoidance and reduction were deemed too costly.



Observe biodiversity in order to assess the environment around French production sites

BASF in France employs more than 3,000 employees spread across over 20 sites and has been working on biodiversity issues since the 2000s. A biodiversity task force was created in 2015, and several projects were initiated. Over 18 partnerships with associations (ornithological, entomological, faunistic, CPIE[90] support the dozen sites engaged in this initiative, which include the installation of beehives, birdhouses, insect houses, natural ponds, flowering fallow lands, biodiversity plots, orchard and tree plantations, as well as fauna and flora inventories.

For example, the Breuil-le-Sec site, which develops, produces, and markets paints for the automotive industry, has implemented:

- **regular monitoring of window swallows by sensitized and trained employees**. This monitoring allows for mapping and counting the population: the results show that the population established on this site remains constant from year to year. Since 2022, initiative partners have advised installing additional facilities (mud bath) to assist swallow populations. This type of monitoring assesses the impact of the site's activities on a given ecosystem,
- **fallow lands and birdhouses** that provide a welcoming environment for fauna and flora on the site. Regular inventories have identified 31 bird species, 286 plant species, and 213 insect species. Furthermore, «biodiversity plots» highlight the presence of 3 species of wild orchids;
- **implementation of a bio-indicator monitoring system on a domestic bee apiary**, which allows for micro-sampling to measure the environmental quality of the site compared to regional reference values (floral biodiversity, nutritional quality of resources, and nutritional biomarkers).

All these projects have been replicated in other BASF industrial sites with the slogan 'Responsible Production, Favored Biodiversity', both in France and throughout Europe.

Map of BASF France production sites with a biodiversity action plan.

90 «Centre permanent d'initiatives pour l'environnement» is a registered trademark, a label recognised by the French State.

Development of tools for risk and impact management on biodiversity

TotalEnergies is leading several R&D programs in biodiversity. The company has developed a decision support tool for projects and acquisitions called BeST (Biodiversity Screening Tool, associated with a Geographic Information System), which allows for the identification of sensitivities of a geographic area to biodiversity by generating a risk assessment score.

Regarding the measurement of impacts, TotalEnergies continued its work in 2022, inspired by the Biodiversity Indicator for Sites Impacts (BISI) methodology from UNEP-WCMC, by developing its own methodology for measuring biodiversity footprint, BFIS (Biodiversity Footprint Indicator for Sites). This methodology will enable a local measurement of biodiversity footprint at the site level and consolidation at the group level.

These efforts are supported by an independent critical review committee. The methodology will be made public once finalised in 2024; it has already been shared with other companies since 2022.

To facilitate the management of impacts on biodiversity, a decision support tool for actions following the Avoid-Reduce/Restore-Compensate sequence, MiHieTo (Mitigation Hierarchy Tool), has been developed, along with an operational catalog of Nature-Based Solutions (NBS).

Finally, tools for bio-monitoring, using environmental DNA, mapping of areas vulnerable to climate change, and opportunities that sites offer in terms of ecological corridors are currently being developed and implemented.

2 Footprint measurement as a valuation tool

For many companies, especially those that do not have an activity directly related to nature, the desire to integrate the values of nature is reflected in attempts to assess their dependencies, impacts, risks and opportunities in a consolidated manner on company-wide scale.

To meet the need to inform decision-making, many are carrying out first pilots to calculate the impacts and theoretical dependencies of their activities on biodiversity. To do so, they use modelling tools to overcome the lack of biodiversity monitoring at operational level or respond to the lack of visibility on the upstream and downstream sides of their value chains in which most of the issues for some sectors are concentrated.

Some companies in direct contact with nature use a variety of tools to calculate the biodiversity footprint of their activities on several scales. The results obtained help to identify the most material impacts and prioritise abatement actions all along the value chain.

Measuring biodiversity footprint at various scales

As a French leader in real estate promotion and services, the comprehensive real estate operator Nexity has a crucial role to play in biodiversity preservation or reintroduction, especially in urban environments. Since «one can only improve what one measures», Nexity wanted to experiment with an exploratory approach to quantitatively measure its biodiversity footprint.

In the real estate sector in general, the main biodiversity indicators primarily focus on measuring biodiversity present on sites, without capturing upstream impacts and only capturing a portion of downstream impacts. A true advancement for the company, this measurement, on the contrary, captures the impacts of the entire value chain, including those related to material procurement or building use (energy consumption, etc.). Reported as a single indicator taking into account the main pressures on biodiversity, this measurement identifies activities and practices with the greatest impact and thus the priority action points.

Nexity used two methodologies to perform this footprint calculation on two scales:

- the group scale (using the «Corporate Biodiversity Footprint» method): quantifying, for each segment of Nexity's activities (development, promotion, services, administrative offices), the pressures exerted on biodiversity (land use change, climate change, etc.) and the associated biodiversity impacts;
- three real estate projects scale (using the «Building Biodiversity Footprint» method): quantifying the impact of three types of projects - collective residential, individual residential, offices - and comparing them to alternative scenarios: what biodiversity gain if wood is used instead of concrete? If the project is a rehabilitation versus a new construction?

The goal was to identify strategic levers - related to activities - but also operational ones that could be integrated into the group's promotion projects (representing ~80% of its turnover).

From these measurements on two scales, two main action levers were identified to reduce the group's impact on biodiversity:

- reduce the impact of materials: by favoring rehabilitation over new construction and by further refining the requirements applied to the procurement of biosourced materials (especially wood) used in our constructions;
- reduce impermeabilization: by identifying already impermeabilized lands and developing greening, especially in open ground.

PSA ZAC Project in Asnières: requalification of a 7-hectare industrial brownfield, originally impermeabilized to over 90%. Restoration of 4 hectares of plain, equivalent to the de-impermeabilization of 57% of the site, with the creation of a 1.5-hectare urban park composed of native plants and a landscaped basin.

Some centralised management methods, where decisions can be taken far from the field, may conflict with biodiversity's intrinsic local characteristics, it being difficult to consolidate various local measures into a small number of simplified indicators that meet the needs of corporate management and governance.

Companies in the financial sector have no choice but to use this type of summary approach since detailed information on assets funded or investments is generally difficult to obtain. Below is an example of how *La Banque Postale* assessed the impacts and dependencies of a real estate loans portfolio on biodiversity.

Assessment of biodiversity impacts and dependencies on ecosystem services for real estate loan portfolios

In 2022, *La Banque Postale*, in collaboration with CDC Biodiversité and its Global Biodiversity Score™ tool, conducted an initial assessment of the biodiversity footprint and dependencies on ecosystem services of its portfolios of individual real estate loans and corporate real estate loans based on its outstanding balances as of the end of 2021.

The results indicate a strong direct dependency (scope 1) on surface waters, which are bodies of water in direct contact with the atmosphere, and a moderate dependency on groundwater, which are water bodies stored underground in aquifers made up of permeable rocks, soil, and sand. These ecosystem services are indeed essential to the real estate sector for the operation of properties.

In the upstream value chain (scope 3), the strongest dependency arises from soil stabilisation and erosion control, an ecosystem service that is crucial for construction activities.

In 2021, the portfolios had a terrestrial static impact (cumulative impact before 2021) of 24 MSA.km^2 (Mean Species Abundance per square kilometer), equivalent to the destruction of 24 km^2 of undisturbed ecosystem, nearly three times the surface area of the Bois de Vincennes. The dynamic impact (impact of the year 2021) on land was 1.7 MSA.km^2.

The results show that at *La Banque Postale*, the low proportion of loans directed towards new constructions leads to a predominance of impacts related to building operation in the portfolio, particularly land occupancy and greenhouse gas emissions. These results serve as an initial foundation for La Banque Postale to set biodiversity impact reduction targets in the years to come.

The tools for modelling the impacts and dependencies of economic activities are, on the whole, fairly recent and still under development. While they have real potential to make information accessible, raise awareness and guide businesses in defining and implementing strategies and action plans for the preservation and restoration of biodiversity, many are currently based on a number of generic and mid-range (sectoral or national) assumptions that can be outdated and lead not only to a significant information gap but also information loss out of touch with reality.

As a result, the institutionalisation of a single cumulative indicator could be harmful as it could lead to decisions being based on a defective representation of the different levels and facets of living beings. For example, in LCA models, the aggregation into a single indicator of impacts related to each driver of biodiversity loss, introduces weighting and substitutability between pressures that could prove misleading for decision-making purposes.

Although standardisation and aggregation tools can be useful in reaching some decisions, the widespread use of modelling data, which is essentially simplified, can have counter-productive effects and misrepresent operational or financial flow re-direction strategies. This is partly the conclusion reached by EDF Group and SNCF after having tested several of these tools since 2020.

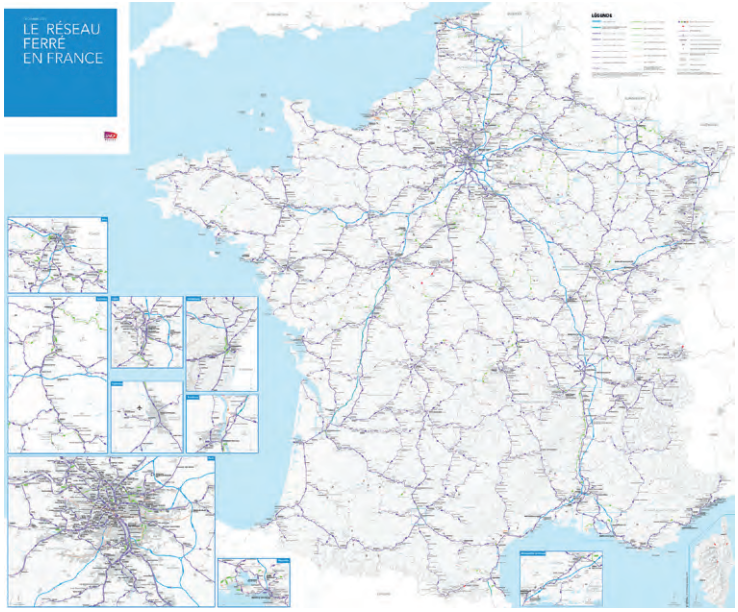
Developing a biodiversity footprint indicator to support its strategy and reporting

As part of act4nature international 2021, SNCF committed to developing a tool in collaboration with the scientific community to assess its biodiversity footprint by 2025. This effort aligns with the objectives of COP15 and the third component of the National Biodiversity Strategy.

In 2021, SNCF conducted a benchmark of existing tools, indicators, and corporate practices to determine the most suitable ones for assessing its biodiversity footprint in France within the scope of its five railway companies. Drawing inspiration from the Science-Based Targets for Nature methodology, SNCF began by identifying its interactions with nature related to its assets and activities, both positive and negative. It then prioritized the pressures and impacts it exerts.

With its 32,000 kilometers of tracks, 100,000 hectares of land holdings, 3,000 stations, and numerous railway sites, the railway network forms a vast web woven over time that spans the entire territory and continuously interacts with nature in various ways. As many tools were not capable of accounting for the specificities of linear transport infrastructures, it quickly became apparent that multiple indicators would be needed to cover SNCF's main effects on biodiversity: ecological potential of green spaces, functionality of ecological corridors (fragmentation & ecological continuities), indirect impacts related to the entire value chain, and greenhouse gas emissions linked to energy consumption. For the assessment of its indirect impacts, the Global Biodiversity Score is currently being tested.

Saint-Fargeau Station.



National Rail Network Map 2022.

Feedback on various biodiversity footprint measurement methods

The accelerated emergence of biodiversity footprint calculation tools and the growing demands from various stakeholders to produce a biodiversity footprint led EDF to start experiments in 2020 with the support of its R&D department and developers of these footprint methods.

It's neither 'quick' nor 'easy'!

These works require:

- mobilizing various skills within the company: economists, ecologists, hydrologists, biodiversity experts;
- a long and laborious data collection phase: economic, environmental data, etc.;
- an essential time for skill development;
- training or even certification because these tools are complex and cannot be used independently.

In total, a minimum of 6 to 12 months is required to conduct an initial test.

Each tool is specific, and none can meet all of the following objectives:

- monitor or compare the footprint at the site level to assess the effectiveness of implementation of management plans;
- provide a vision of dependencies and impacts of an activity to investors;
- choose between several technical options for a new project.

The two tools tested by EDF (GBS[91] and PBF/SBF[92]) are still in development.

An interesting but not yet robust approach

These exercises have the advantage of providing an overall view of impacts and dependencies typically assessed at the project level. In the long run, this will be very useful for better understanding the value of nature and preserving it better. However, there are still too many approximations and default values based on outdated or insufficient scientific data.

These methods have many biases, and the quality of the results depends heavily on the quality and nature of the input data. Some results are erroneous due to methodological shortcuts. The international databases that underlie these models are not always suitable for the French case. For all these reasons, the obtained results are highly debatable and reveal both underestimations and overestimations of certain pressures compared to consolidated studies already available on the sites (LCA and impact studies).

Biodiversity data		2013	2019	2024
Hydrobiological studies		Yes	Yes	
Inventory	Fauna/Flora	Yes	Yes	
	Beaver	No	Yes	
Practices	Wetland restoration status	Deteriorated state	Initial status of the management plan	Targets of the management plan (creation of ponds, establishment of eco-pastures)
	Eco-grazing	No	Yes	Yes
	Zero-phyto	Intensive management of green spaces in the industrial site	(-50%) use of phytosanitary products	Target (-100%) in 2024
	Differentiated site management	No	Start of the management plan	Achievement of management plan targets
	Invasive species management			
	Beaver management	No specific management	Improvement of management practices	Management similar to 2019
	Hives / Insect hotels	Absence	Two insect hotels	(++)
	«Local plant» seeds	Absence	Absence	Target 2024

Example of input data for calculating the biodiversity footprint of a site.

91 Global Biodiversity Score.
92 Product-Based Footprint et Site-Based Footprint.

Nevertheless, solutions exist to reduce risks and maximise the benefits associated with the use of calculation tools. They include a clear understanding of their limits and conditions of use; the adoption of a «dashboard» approach where pressure indicators remain separate; and in accordance with IPBES recommendations[93] the diversification of assessment tools, and the involvement wherever possible of a wide range of stakeholders in the valuation exercise, decision-making and impact monitoring of management measures resulting from the use of this data.

3 Consolidating different geographical scales in value monitoring

A new challenge for companies is how to coordinate local and global approaches, both of which are essential and complementary in biodiversity management. Aware of the importance of acquiring an overview, several businesses are developing new approaches to consolidate the different geographical scales for biodiversity monitoring purposes.

The solution adopted by Vinci Autoroutes consists in using ecological data as input data for two methods of assessing the biodiversity footprint at site and group level.

Integrating local and specific biodiversity challenges into VINCI Autoroutes' overall strategy

As a concession holder, VINCI Autoroutes plays a significant role in territorial development in France. Its biodiversity preservation policy historically aims to mitigate infrastructure impacts through the approach of avoid, reduce, compensate, the creation of wildlife crossings (1,100 structures, including 18 state-of-the-art wildlife bridges), or the ecological restoration of natural habitats (regenerating 500 hectares by 2030, in partnership with the National Forestry Office).

VINCI Autoroutes now seeks to comprehensively understand the impacts its activities may have on biodiversity, and thus manage its policy in favour of natural environments by prioritizing action plans and measuring their positive impact on ecosystems. An evaluation of biodiversity footprint has been launched, using the Corporate Biodiversity Footprint and Site Biodiversity Footprint tools developed by I Care. This evaluation combines Life Cycle Assessment (LCA), scientific literature, and on-site ecological studies. The biodiversity footprint has the advantage of aggregating impacts on biodiversity into one indicator (MSA.km^2), providing an overview of the diversity of challenges.

Although it is a less mature indicator than carbon footprint - which is also measured and monitored - biodiversity footprint also allows the company to structure its actions. The impact of VINCI Autoroutes' activities has been analyzed based on the five pressures defined by IPBES, across the entire value chain: land (land use), service production (traffic and customer services at rest areas), and upstream supply (construction sites).

A first approach highlighted the non-intuitive fact that habitat fragmentation due to infrastructure, direct impacts of highway traffic (noise, contribution to climate change, and pollution), as well as the agri-food model of rest areas, all have a roughly equivalent impact on biodiversity.

This calculation allows for proportioning the efforts needed to limit the identified impacts. Moreover, from a strategic perspective, it ensures that all necessary measures have been taken to reduce impacts on biodiversity and implement renaturation solutions.

Ecopasture on the Urrugne area (A63) in the Basque Country.

93 IPBES (2022). Methodological Assessment Report on the Diverse Values and Valuation of Nature of the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services. Balvanera P., Pascual U., Christie M., Baptiste B., Gonzalez-Jimenez D.(eds.). IPBES secretariat, Bonn, Germany.

Another approach, as adopted by Veolia, is to design a proprietary footprint measurement tool in collaboration with a broad range of stakeholders, specific to the company's activities and combining modelling and local assessments.

Identifying priority sites in terms of biodiversity, measuring their footprint, and implementing action plans

While Veolia's environmental services activities contribute to biodiversity protection, the operation of sites can also have a local impact. As part of its Plural Performance approach initiated in 2019, Veolia chose to measure biodiversity footprints and implement action plans on 123 sites considered «sensitive» out of the 1,400 main sites managed worldwide. These sites present the most significant challenges in terms of their own ecological value (IUCN criteria) or the nature of their activities.

A Tool Tailored to Veolia's Activities

A biodiversity footprint measurement tool was developed in collaboration with Ecosphère and IUCN. Covering all of the company's activities (water, waste, energy), it assesses the challenges of each site and semi-automatically develops an action plan for each one.

Combined LCA and Ecological Approaches

Eleven indicators were chosen to measure the direct and indirect impacts of the site's activities, categorized according to the five pressure categories defined by IPBES.
Two methods were used to assess these impacts:

1. Life Cycle Assessment (LCA) approach to evaluate the indirect impacts related to the upstream value chain of the site (energy, reagents);
2. local evaluation methods (ecology, ecotoxicology) to assess direct impacts (discharges, etc.).

An Approach Adopted by All Business Units

An average target of 75% deployment of action plans across all sites was set for the end of 2023; it was 66% at the end of 2022. Beyond these 123 sites, various Veolia entities, now trained in this approach, use it on other sites in connection with their clients.

A Multi-local Approach, Complementing the Ongoing Development of Global Reference Frameworks for Assessing Companies' Biodiversity Impacts

In addition to this approach, Veolia closely monitors the development of biodiversity footprint frameworks developed as part of European (EU Business & Biodiversity Platform) or international (SBTn) initiatives and engages in dialogue with those involved in their creation. A major concern is that beyond the necessary reduction of impacts on biodiversity by the sites, the avoided impacts on the natural environment, inherent to Veolia's activities, can also be fully appreciated.

At Solvay, global analysis is carried out with a variety of tools, but the effectiveness of action plan implementation is monitored with local indicators by field teams who know best how ecosystems function.

Progress beyond

Comprehensive and local analyses, additional information for managing a biodiversity conservation and restoration plan

Every year, the chemical group Solvay calculates a theoretical impact related to its production chain, including the sourcing of raw materials. This comprehensive analysis, carried out using a Life Cycle Assessment (LCA) method (ReCipe), identifies the main pressures for each product portfolio. In addition, biodiversity analyses around the sites have been conducted for two years using the IBAT[94] tools and the «Biodiversity Risk Filter»[95] for aquatic compartments. These analyses have identified sensitive sites located near protected areas and species, as well as key areas for biodiversity. A second prioritisation then identifies sites located in water-stressed areas. This analysis effectively complements the initial comprehensive assessment and enables each site to identify and implement actions to reduce impact and restore nature.

Several sites have key information about the surrounding biodiversity even before using these tools. Various studies are conducted as part of permit revisions or applications, or on a voluntary basis: characterizing the biological diversity of watercourses with faunal inventories, calculating biotic indices to monitor changes over time. The Standardised Biological Index (IBGN)[96] characterises the diversity and abundance of benthic macroinvertebrates or the diatom biological index (IBD)[97]. However, these inventories require ecological expertise. Others are accessible to non-specialists: for example, the participatory science tool QUBS[98] allows Solvay employees to monitor the biological quality of soils.

While the theoretical impact of industrial activity can be calculated comprehensively, the means of action and projects for the conservation and restoration of surrounding species and habitats can only be carried out by integrating a crucial local dimension into the development of effective and sustainable strategies.

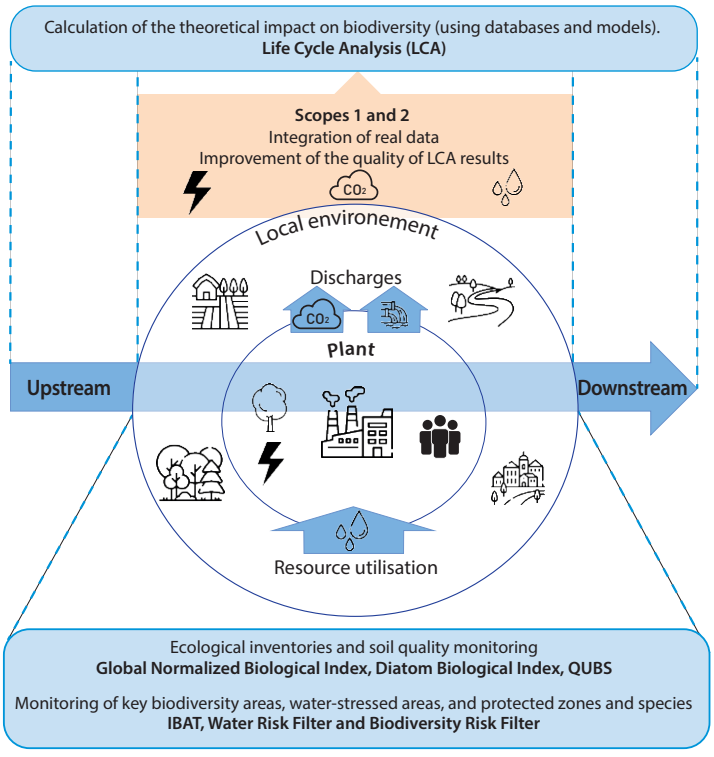


Illustration of the diversity of methods used by Solvay to manage biodiversity.

94 IBAT (Integrated Biodiversity Assessment Tool), IUCN, UN-WCMC, BirdLife, Conservation International.
95 WWF. Risk Filter Suite.
96 AFNOR (2004), NF T90-350 - Water quality - Determination of the standardized global biological index.
97 Unicellular algae with siliceous external skeleton.
98 AFNOR (2007), NF T90-354 - Water quality - Sampling, treatement and analysis of benthic diatoms from streams and canals.
99 Developed in partnership with the National Museum of Natural History, the Universities of Lorraine, Sorbonne, Montpellier 3, INRAE and Plante & Cité.

Acknowledging the importance of consolidating scales and making maximum use of local information in wider assessments, Imerys group has set out to test different approaches in collaboration with multiple stakeholders.

Tools for measuring biodiversity at different scales

Imerys specializes in the extraction and valorisation of mineral products. Mining, a key stage in the group's activity, directly impacts biodiversity. The question of measuring these impacts is naturally central to the work the group is conducting in collaboration with its partner Patrinat (OFB, MNHN, CNRS).

Various tests have been conducted on state and footprint indicators. The first state indicator tested is the Ecological Quality Index (IQE). Developed by MNHN, this tool evaluates various criteria of ecological functionality at a site scale, with a view to temporal monitoring to obtain an action plan tailored to the site. Applicable in metropolitan France and conducted by experts in the field, this tool, however, does not provide a consolidated metric at the company level.

In parallel, Imerys tested the Biodiversity Indicator and Reporting System (BIRS), developed by IUCN with Holcim. It is usable internationally and specific to the minerals industry. On-site analysis can be carried out by non-experts and provides a score per site, which can then be consolidated at other scales.

However, none of these tools currently address the challenge of measuring a «no net loss» of biodiversity. This is the goal of the ECOVAL framework, currently in R&D and developed by EDF, INRAE, and MNHN. This tool, applicable in France, measures, at a site scale, whether or not ecological equivalence is achieved between the losses on a site impacted by a project and the gains from compensatory measures, using a battery of indicators calculated in the short and long term.

To complement these field tool tests, the group conducted tests of footprint indicators with iCare, such as the Corporate Biodiversity Footprint and the Site Biodiversity Footprint. Footprints are calculated based on life cycle analyses and modeling using the group's environmental data, site ecological data, and scientific literature.

In conclusion, each of these indicators addresses a specific issue. State indicators allow for local measurement, with on-site analysis and a case-by-case response. In contrast, biodiversity footprinting, using the company's environmental data, provides a comprehensive measurement of impacts. These two types of tools complement each other, offering, on the one hand, local analysis, which is essential for understanding biodiversity, and on the other hand, a global vision that helps improve knowledge of impacts at the group level. It is by integrating several tools adapted to various scales and components, in a holistic approach, that the complexity of the biodiversity issue must be addressed.

Biodiversity management also occurs at different levels in the banking sector. In the case of Société Générale, this monitoring takes place at the level of financed projects, clients, and credit portfolios. It is this complementarity that gradually structures the group's biodiversity approach.

From individual projects to credit portfolios: how to approach biodiversity issues at different levels of analysis?

Société Générale's commitment to biodiversity conservation, which has been recognized within the framework of act4nature international, involves an evolution of its processes at all levels: from project financing, to the assessment and support of its clients, to the management of its credit portfolio. This diversity of analytical perspectives calls for banks to equip themselves with a variety of specific tools.

For example, at the project level, the group has been applying the Equator Principles since 2007, a framework for managing risks related to project financing that incorporates risks related to biodiversity erosion. In addition, the bank has strengthened its sectoral policies to exclude project financings located in the main international protected areas. The IBAT tool has been instrumental in implementing this measure.

The evaluation of the nature impacts of corporate clients has also been enhanced. In efforts to combat deforestation, particular attention is paid to clients active upstream in the supply chains of soy and livestock from South America, as well as palm oil. The bank has also joined the SBTN Corporate program to co-develop with its clients strategies and financial tools to consistently and ambitiously address their environmental challenges and accelerate the transformation of their value chains.

Lastly, in the context of the TNFD and the CSRD, the evaluation and management of the credit portfolio is an important area of focus and a significant challenge. Based on the ENCORE methodology, Société Générale has established an initial mapping of funded sectors according to their impacts and dependencies. In parallel, an indicator of financial sector vulnerability, based on the assessment of physical and transition risks related to biodiversity, has been developed.

These tools help structure the group's approach, continually improve its understanding of the issues, and progressively strengthen internal policies related to biodiversity.

All these testimonies confirm that biodiversity assessment is more comprehensive, less misleading and leads to better decisions when it is based on several complementary methods and involves a broad range of stakeholders, from the assessment stage to monitoring the implementation of actions.

Each method addresses a specific issue and need and no single tool or indicator can capture the full complexity of living beings. We should, however, remember that each of these approaches has its limitations and conditions of use.

Just as it is impossible to drive a car on the basis of a single indicator, so biodiversity monitoring calls for a «dashboard» approach, which, at the very least, delivers information on multiple facets and dimensions on different geographical scales.

According to the FRB[100], the «essential variables of biodiversity»[101], initially developed by the Global Biodiversity Observation Network of the Earth Observation Group (GEO BON), would be a good reference for a dashboard companies could use to select an array of tools that best represent the different scales and facets of biodiversity. Proposed for the purposes of consensus and simplification, the 21 measures proposed would be essential to capture the main dimensions of biodiversity change while complementing each other.

100 FRB (2021). Indicateurs et outils de mesure – Évaluer l'impact des activités humaines sur la biodiversité ?

101 Pereira H.M., Ferrier S., Walters M., Geller G.N., Jongman R.H.G., Scholes R.J., et al. (2013). Essential biodiversity variables. Science, 339, 277–278.

Table 2	Essential biodiversity variables		
Class	**Essential variable**	**Class**	**Essential variable**
Genetic composition	Intraspecific genetic diversity	**Community composition**	Abundance of organisms in an ecological assemblage
	Genetic differentiation in populations		Taxonomic/phylogenetic diversity in an ecological assemblage
Species populations	Effective population size		Trait diversity of organisms in communities
	Consanguinity		Interaction diversity and structures between organisms in communities
Species traits	Species distribution	**Ecosystem function**	Primary productivity
	Species abundance		Phenology observed at ecosystem scale
	Morphology		Ecosystem disturbances
	Physiology	**Ecosystem structure**	Live cover fraction
	Phenology		Ecosystem horizontal distribution
	Movements		Biomass distribution vertical profile
	Reproduction		

Source: GEO GOOD[102].

This thinking on how to represent a company's impacts, dependencies and risks should facilitate materiality analyses and the selection of metrics it chooses to disclose. As the dialogue between financial and non-financial companies improves, it will eventually become possible to build collective knowledge on the subject.

102 https://geobon.org/ebvs/what-are-ebvs/.

3

Biodiversity in business models

While significant progress has been made in recent years on better understanding business impacts and dependencies on nature and related risks, a lack of perception of the economic opportunities related to nature preservation and restoration hampers the scaling up of solutions because it contributes to the view held by most companies that they boil down to an additional cost.

Reducing pressures, respecting wilderness areas, welcoming biodiversity in productive areas and rewilding built-up areas are well-known corporate biodiversity solutions. The challenge for businesses, however, is to characterise their economic models and then scale up their implementation.

In December 2022, the Kunming-Montreal Global Biodiversity Framework adopted by 196 states measured the funding needs to implement this scaling up and embraced the goal of gradually mobilising the $700 billion per year that would be needed to preserve and restore biodiversity. This goal is defined in target 18, which calls for the elimination or re-engineering of subsidies that are harmful to biodiversity, and in target 19, which calls for a substantial and progressive increase in the level of financial resources from all sources, including private ones, together with the mobilisation of at least $200 billion per year by 2030 in public and private funding. The mobilisation of finance from private sources seems all the more important as the funding needs to achieve the goals of the Kunming-Montreal Agreement are much greater than the current volume of what are mostly public funds. In 2021, a study[103] by the Paulson Institute, The Nature Conservancy and the Cornell Atkinson Center for Sustainability, estimated the annual funding gap to be between $598 and $824 billion.

The Kunming-Montreal Framework refers to several innovative schemes that companies can use, including payments for environmental services, green bonds, biodiversity offsets and credits, and profit-sharing mechanisms. Other options for promoting private sector participation are also studied in the resource mobilisation strategy, which is another cornerstone of the agreement. For example, the Global Biodiversity Framework Fund is now open, under certain conditions, to companies that wish to make voluntary contributions to it. IDDRI participated in the Global Environment Facility Council meeting that led to the creation of this fund in June 2023.

103 Paulson Institute, The Nature Conservancy & Cornell Atkinson Center for Sustainability (2020) «Financing Nature: Bridging the Global Biodiversity Financing Gap».

IDDRI

International mechanisms: The global environment facility and the new Global Biodiversity Framework Fund

Within the architecture of international financing dedicated to developing countries, certain mechanisms will need to contribute to mobilizing the private sector where investments are lacking due to the risks they pose. Target 19 of the Kunming-Montreal global biodiversity framework calls for an increase in financial resources from all sources, including private ones, while Decision 15/7 of COP15 on resource mobilization calls for the establishment of innovative instruments and approaches to mobilize private investments, for example, through blended finance, in order to move away from a predominantly subsidy-based approach.

The new Global Biodiversity Framework Fund, born out of a compromise at COP15 and established in June 2023 during the 64th Council of the Global Environment Facility (GEF), will involve the private sector, which is invited as:

- a contributor to the fund (as a donor) if they meet the due diligence policies of the World Bank (the fund's administrator);
- a co-financier of projects and programs funded by the new fund, notably through projects implemented by multilateral development banks, which are significant investors in blended finance;
- an observer at future Council meetings of the fund to broaden representation and stakeholder dialogue.

To truly engage the private sector, the role of multilateral banks and their potential to mobilize and support the reorientation of economic sectors and private investments towards trajectories compatible with biodiversity protection goals will be crucial. Furthermore, as the financial sector is expected to focus on sustainable investments that require mitigating certain major risks, specific interventions will need to be planned to support the commercial sector in achieving its own objectives related to its value chains.

Some of the modalities of the GBFF adopted by the GEF Council are more suitable for private sector operations, such as a faster approval and disbursement cycle. Finally, Action Area 4 foresees support provided for a Blended Finance Global Program. This program is expected to offer a range of instruments dedicated to private investors.

The results of another more recent study by BloombergNEF show that more than 80% of global biodiversity-related financing in 2021 was public and only 17% came from the private sector. The study identified several private sector financing mechanisms for the preservation and restoration of biodiversity (Figure 12), pointing to four major drivers that companies have at their disposal: integrating biodiversity into existing activities by reducing pressures or directly participating in nature restoration; carrying out impactful funding or investment projects; implementing Payments for Ecosystem Services (PES) schemes, and using offsets and credits.

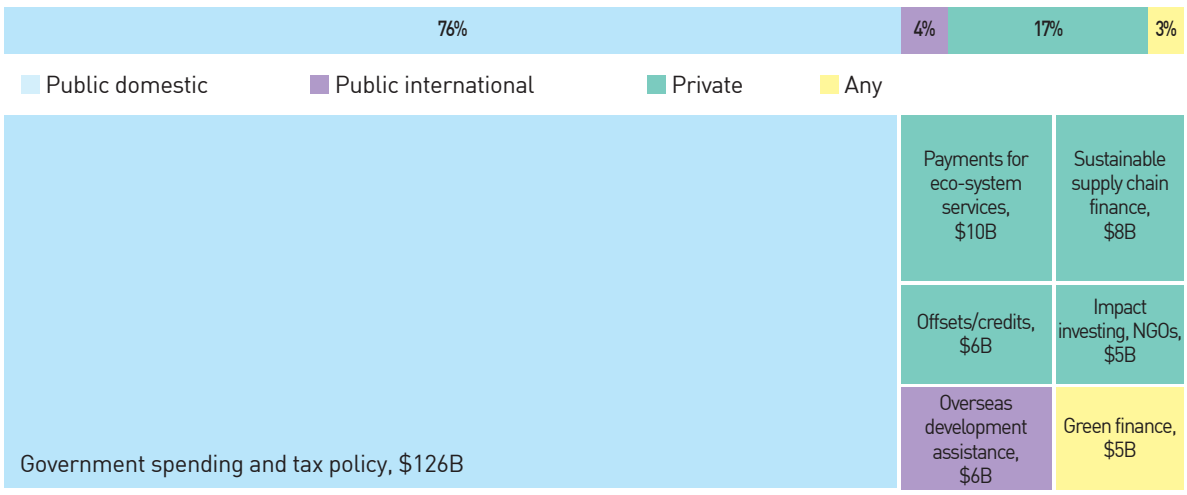


Figure 12 / Annual global biodiversity financial flows .
Source: BlommbergNEF, Taskforce on Nature Markets, Global Nature Markets Landscaping Study, 2022; UN Environment Programme, State of Finance for Nature 2022; The Paulson Institute, The Nature Conservancy, and the Cornell Atkinson Center for Sustainability, Fincancing Nature: Closing the Global Biodiversity Financing Gap, 2020[104].

1 Integrating biodiversity into existing activities

For business, selling products from production systems based on, and beneficial to, nature (farm products, energy, bio-based materials, etc.) is the most common form of improving biodiversity and creating economic value. A cost-effective way to increase biodiversity is to adopt practices that are more beneficial to it in the production processes of goods already having a market and a price. Models will work if more sustainable practices result in a higher price for products that are sometimes labelled or certified because they are of better quality, or because the producer has been able to benefit from easier or cheaper access to capital.

This model is most often found in sectors in direct contact with nature and ecosystems managed by humans where the drivers of action are extremely powerful, such as agriculture and forestry. Both sectors are the biggest contributors to biodiversity erosion but, subject to a massive shift to more sustainable practices, also have significant potential to preserve and restore it. Other examples are the energy and luxury sectors.

1.1 Biodiversity-friendly agriculture

The adoption of sustainable agricultural practices is a common solution to generate income while improving biodiversity. Agroecology, regenerative and conservation agriculture, organic farming, biodynamics, permaculture, agroforestry, etc. - each of these agricultural systems, farming methods or sets of practices denotes types of agriculture that seek to better accommodate biodiversity and to enhance its contribution to the smooth running and resilience of production processes.

This is the approach followed by BASF Beauty Care Solutions when it decided to source active plant ingredients for cosmetics in Vietnam, where regulations for the protection of biodiversity are more restrictive and require the value derived from the use of local genetic resources to be shared with local players.

104 BloombergNEF (2023). Biodiversity Finance Factbook. Edition 1H 2023. Victoria Cuming, Hugh Bromley.

The sustainable valorisation of rambutan in Vietnam

BASF Beauty Care Solutions is the cosmetic actives business of BASF, specializing in the development, production, and marketing of innovative actives and encapsulation systems for skincare. With a strong focus on botanical sourcing for its portfolio of cosmetic actives, BASF has launched a comprehensive sustainable development program. It is based on three pillars: innovative products that protect natural resources, respecting communities along the plant value chain, and reducing the climate impact and environmental footprint of final product production.

As part of the development of new cosmetic actives inspired by nature, derived from rambutan (Nephelium lappaceum) and the upcycling of unutilized parts (kernel and pericarp of the fruit), BASF voluntarily chose to source from Vietnam in collaboration with a local partner. This involved initiating the access request procedures in accordance with Vietnamese Biodiversity Law and the Nagoya Protocol required to conduct R&D activities on Rambutan derivatives.

The steps to ensure compliance with its access led to a collaboration with the Center for Rural Economy Development (CRED), a non-governmental organization, to conduct a socio-environmental study of the envisaged value chain and establish a benefit-sharing agreement for the use of genetic resources of rambutan, resulting in a 1% revenue sharing from sales of cosmetic actives.

The project materialized with the issuance of the Access and Benefit-sharing license for the use of rambutan granted by Vietnamese authorities, the development of a traceable supply chain that is environmentally friendly and ensures fair compensation for collectors, and the commercialization of three new cosmetic ingredients in 2019.

The sharing will contribute to biodiversity conservation through a national fund and, starting in 2024, will finance initiatives for collectors to improve their working and living conditions.

In the case of Seppic, a subsidiary of the Air Liquide group, the integration of biodiversity into business models is primarily achieved through reducing pressures related to the sourcing of agricultural commodities and wild plants.

Reducing the pressures of supply chains on biodiversity

In 2022, Air Liquide completed an assessment of the impact of its value chain on biodiversity with the help of an independent third party. The results confirm that the group's impacts are primarily indirect and related to climate change, water, and specific activities (specialty ingredients and biomethane) such as those of Seppic.

This subsidiary manufactures and markets specialty ingredients for health and cosmetics. To reduce its impacts, it has developed a procurement strategy that fully integrates biodiversity: control of its supply chains and improvement of the traceability of supplies, verification of the sustainability of the cultivation and harvesting conditions of the ingredients to ensure a sustainable supply. Thus, Seppic is committed to having all its palm oil derivative supplies certified as sustainable according to RSPO criteria[105]. In addition, Seppic participates in funding a satellite mapping verification approach for each mill, in the period after 2020. Cases of deforestation and human rights violations lead to the activation of an infringement procedure. Seppic voluntarily engages other certifying bodies to verify the sustainability of its supplies. For example, the production sites in Lons and Pontrieux have been members of UEBT[106] since 2008 and 2021, respectively, and commit to «Sourcing with respect®», which means preserving biodiversity, using it sustainably, and equitably sharing the benefits. For example, for its needs in shoreline algae, the Pontrieux site employs harvesting techniques that help preserve the resource; the sourcing practices of the Lons site, which specializes in producing plant actives harvested in Madagascar, align with targets 4, 5, 13, and 20 of the Global Biodiversity Framework (CMB) obtained at COP15 as they promote benefit sharing and support for local partners.

By 2025, 100% of Seppic's new cosmetic, pharmaceutical, and nutraceutical ingredients manufactured at the Lons and Pontrieux plants will be sourced according to its Ethical Sourcing System[107].

1.2 Sustainable forest management

Responsible forest management, a nature-based solution, is also well known for its potential to generate revenue from wood sales and carbon credits, while improving biodiversity through certain management practices. This is the strategy CNP Assurances, the leading corporate owner of forests in France, is throwing its full weight behind. Its partnership with Société Forestière enables the sustainable management of forests based on an operating model that combines biodiversity and economic viability.

105 Roundtable for Sustainable Palm oil.
106 The Union for Ethical Biotrade is an association that supports and verifies companies' commitments to responsible sourcing.
107 A set of policies and procedures aimed at promoting Ethical Biotrade practices.

To manage the forest heritage through responsible forestry practices

Owning a forest heritage of nearly 58,000 hectares in France and Europe, CNP Assurances aligns its management within the framework of its responsible investment strategy. In 2021, it adopted a charter for sustainable and multifunctional forest management. The forestry practices implemented aim to guarantee the constantly renewed supply of wood resources - meeting the needs of the industry and a growing demand - to contribute to France's climate goals, and also to preserve the ecosystem services provided by forests.

In this context, special attention is given to biodiversity, for example through the diversification of species planted during reforestation, the conservation of dead trees that provide micro-habitats, and the development of partnerships with nature conservation associations. To monitor its impact, CNP Assurances assesses the biodiversity of its forest heritage using a recognized method: the Potential Biodiversity Inventory (IBP). This indicator allows the study of 7 indicators related to forest populations and 3 indicators related to the environment in order to indirectly assess a population's capacity to host faunal and floral biodiversity.

CNP Assurances has committed to measuring biodiversity across its entire French heritage by the end of 2025 in order to maintain or improve the measured level of biodiversity. This objective is embedded in the purpose of CNP Assurances and its progress rate is published annually. Thus, after two years of inventory conducted by the Forest Company, nearly 42% of the area of CNP Assurances' forested areas was inventoried by the end of 2022, through 3,945 surveys over more than 1,750 kilometers covered.

Solutions based on responsible forest management also exist in the energy sector. RTE has begun to adopt sustainable forestry practices to reduce the costs of maintaining vegetation under power lines, better preserve biodiversity and climate, and generate revenue from selling timber locally.

Promoting the use of cut trees for maintaining power lines

The Elec'tronc program aims to secure the power lines network while enhancing biodiversity by minimizing the use of mulching for vegetation maintenance under the lines. In this context, RTE regularly needs to cut down trees under and around the power lines to maintain safe distances between the vegetation and the live cables. The trees cut down by RTE belong to the owners of the affected plots; historically, they were left on site after cutting, at the disposal of the owners, who often could not utilize them.

The Elec'tronc program, which allows for the valorisation of cut wood under the power lines, has already been described in the publication by EpE titled «Partnerships, cornerstone of the circular economy»[108]. Since 2021, RTE has continued to deploy this program and carried out 54 projects to valorise the wood cut under the power lines, allowing for an initial economic assessment.

RTE now collaborates with 7 forest managers to implement these valorisation projects, and the cost of their services amounted to 400,000 euros in 2021 and 2022, averaging 7,500 euros per project. However, the unit cost of the service can vary from 1 to 10 depending on the size and complexity of the project, particularly based on the number of affected owners, which ranged from 1 to 130 in the completed projects. The projected cost for cutting without valorisation for these projects was 480,000 euros, making these projects profitable from the first year. If we include the safety cuts that need to be carried out within the next 10 years and were included in the valorisation projects, the cost would have been 1 million euros. The economic gain over 10 years therefore amounts to 600,000 euros.

Beyond the economic aspect, this program provides satisfaction to the owners who receive compensation even though the trees are cut for safety reasons. This allows them to have their cleared plot back after the work. Elec'tronc also promotes economic development and employment in the regions and contributes to the ecological transition and the reduction of carbon impact.

Valorisation of wood cut under RTE cables in the municipality of Nevoy (45).

108 Partnerships: cornerstone of the circular economy. EpE, ESCP Business School, 2021.

1.3 Responsible electricity production

In addition to agriculture and forest management, electricity production zones can also, in specific cases, improve biodiversity and generate income.

Photovoltaic solar energy, for example, is expected to play a major role in France's and the world's energy transition because of its low CO_2 emissions, its rapid deployment and its continually decreasing costs. Nevertheless, studies carried out by FRB[109] and ADEME[110] conclude that ground-based photovoltaic installations harm biodiversity in different ways and across their value chain. Habitat loss or alteration due to land-use change accounts for the bulk of the impacts.

As well as complying with the strict regulatory framework in France, several best practices nevertheless help to limit the impacts related to the installation of photovoltaic panels, and even improve biodiversity. The ARO sequence offers a strategic framework for action. Setting up photovoltaic farms in areas of high biodiversity value should be avoided and installations in environments that are already built (car parks or roofs) or used for farming (agricultural land) should be favoured. During the operational phase, revegetation and the introduction of a diversity of flowering plant species would improve biodiversity, in particular pollinators[111], depending on the density of the panels in the field.

Crédit Agricole Group has supported REDEN Solar in the development of ground-based photovoltaic power plant projects on degraded or poorly reclaimed land (polluted sites, non-hazardous waste storage centres, rehabilitation quarries or industrial wastelands) to enable their rehabilitation. The use of an innovative financing mechanism allows the company to engage with biodiversity in new projects.

Implementation of a Revolving Credit Facility (RCF) linked to a biodiversity indicator to support the development of renewable energies

To support the development of REDEN Solar, Crédit Agricole CIB and Crédit Agricole d'Aquitaine have established an inaugural Revolving Credit Facility (RCF) incorporating ESG criteria, including an innovative biodiversity impact indicator.

REDEN Solar, a major player in the energy transition and an independent producer of photovoltaic renewable energy, has set up a €200 million Revolving Credit Facility over a period of three years. Renewable and syndicated by the company's banking pool, this credit is linked to three ESG criteria targeting the implementation of actions to promote biodiversity on photovoltaic fields, employee training, health, and safety.

The biodiversity component includes the implementation of preservation and restoration actions in photovoltaic fields, as well as the realisation of an ex-post impact measurement. This will be provided by REDEN Solar and will describe the evolution of the number of specific species observed as well as the ecological richness of the power plants by 2025. These monitoring efforts will provide information on the state of the fauna and flora of the sites, as well as the vegetation habitats. The interest rate will be adjusted based on the achievement of the targets defined during the structuring of the RCF according to a bonus-malus principle.

CACIB and CA d'Aquitaine have been mandated as lead arranger and bookrunner for this financing, to which CA du Languedoc, CA Nord Midi-Pyrénées, CA Pyrénées Gascogne, and LCL are contributing. This operation allows for the pre-financing of renewable energy production projects that contribute to the energy transition while also contributing to the protection and restoration of biodiversity.

109 Fondation pour la Recherche sur la Biodiversité (2021). Prospective scientifique sur les impacts des installations de production d'énergie renouvelables sur la biodiversité et lacunes de connaissances.
110 ADEME (2023). Photovoltaïque, sol et biodiversité : enjeux et bonnes pratiques.
111 Adam G Dolezal and others, Can Solar Energy Fuel Pollinator Conservation ?, Environmental Entomology, Volume 50, Issue 4, August 2021, p. 757–761,
112 https://reden.solar/nos-expertises/les-centrales-photovoltaiques-au-sol/.

1.4 Circular economy models

The design and marketing of service offerings that directly contribute to curtailing the drivers of biodiversity loss is one of the best-known solutions for generating revenue while participating in biodiversity preservation and restoration. Some of the most prominent business models relate to the circular economy, and several among them were presented back in 2021 in the publication «Partnerships: cornerstone of the circular economy».[113], which shows that partnerships are instrumental in overcoming constraints on the development of the circular economy and creating new value chains.

Well-known examples include waste management and collection to prevent pollution, and repair and recycling to avoid pressures arising from the extraction of new resources and the manufacture of new equipment. While industrial and territorial ecology reduces costs through collaboration between manufacturers on a regional scale – the waste of some becoming the resources of others – the functionality economy is based on the sale of a service rather than the sale of a product, as exemplified by rental business models.

Financial stakeholders can encourage the scaling up of circular economy business models through the implementation of thematic engagement policies. Investors can open a dialogue with companies in which they invest and use their influence to encourage them to improve their biodiversity practices. Engagement actions may take several forms (letter, speech or vote at the general meeting of shareholders), including divestment if the company does not seek continuous improvement. For example, the Macif Group has appointed its management company, OFI invest AM, to implement an engagement strategy targeting plastic waste reduction and ocean protection.

MACIF

Essentiel pour moi

Commitment as a driver of action in the fight against Plastic waste and for ocean protection

Material associated with modern life, plastic is present everywhere in our daily lives, despite its deleterious impacts on ecosystems: 100,000 mammals and 1 million seabirds die each year, trapped, suffocated, or poisoned by plastic waste[114]. According to the WWF, nearly 700 marine species are threatened by plastic, of which 17% are classified as endangered or critically endangered.

In this context, engaging with issuers allows the investor to assess their level of mastery of the plastic pollution issue and also to encourage them to take concrete action. In March 2020, Macif mandated its asset management company, OFI AM[115], to conduct a dialogue with 20 companies from sectors that contribute significantly to ocean pollution through their use of plastic. By the end of 2020, with the support of Surfrider Foundation Europe, a partner of Macif, OFI Invest AM surveyed these issuers on their objectives, management systems, and results in mitigating plastic pollution. Nineteen of them responded and committed to intensifying their efforts to combat these pollutions.

The analysis shows that the environmental impacts associated with plastic use are still insufficiently taken into account by the surveyed companies: while a majority of actors identify plastic pollution as a significant risk, only a minority set absolute reduction targets for plastic use. However, only a drastic reduction in plastic use will curb pollution. The study concludes on the need to evolve our consumption patterns.

113 «Partnerships: cornerstone of the circular economy». ESCP Business School (2021).
114 Marine Pollution, « The Ocean Conference United Nations », New-York, 5-9 june 2017.
115 OFI AM became OFI Invest AM on January 1, 2023.

1.5 Land rehabilitation

The implementation of a new regulatory framework can help make some biodiversity-friendly operations profitable. Séché Environnement's brownfield rehabilitation activity has become a growth driver following the adoption of the no net land take goal under the Climate and Resilience law. In this case, it is the prospect of land scarcity created by legislation that enables the remediation service to be profitable.

Preserving biodiversity as a growth accelerator

Due to its industrial history, France has over 9,000 polluted sites and soils (ADEME, 2021). In addition to fighting pollution, rehabilitating these sites contributes to reclaiming abandoned land for economic activities, thus also reducing the consumption of agricultural and natural lands.

Through its subsidiary Séché Eco Services (SES), specializing in environmental services, the Séché Group offers solutions for the decontamination and rehabilitation of industrial brownfields. Their technical expertise, particularly in managing hazardous materials, allows them to best support companies, developers, and local authorities in the management of these sites in need of rehabilitation.

This ambition to densify land use through the reuse of unused brownfields was recently elevated to a government priority, with the objective of achieving Net Zero Artificialization (ZAN) set for 2050. Setting this objective has accelerated decontamination efforts across the country.

Over the past four years, the subsidiary Séché Eco Services has carried out about a hundred soil decontamination projects as part of the redevelopment for new uses. In four years, Séché Eco Services has thus rehabilitated around 2,000,000 square meters of land, making the equivalent of about 270 football fields available for new uses.

These decontamination and rehabilitation services for industrial sites help avoid the artificialization of new land for urban and peri-urban sprawl. The activities of Séché Eco Services, and the observed dynamic in recent years to rehabilitate former industrial lands, illustrate that economic development and biodiversity preservation are compatible and open up new paths for sustainable growth.

Through its underwriting activities, insurance can also play an important role in developing innovative insurance solutions and educating its clients about the physical and transition risks associated with biodiversity degradation by encouraging them to adopt more virtuous practices and business models... This is the approach adopted by Marsh to develop an insurance product that gives companies seeking to recycle rehabilitated brownfield sites better cover.

The ten-year environmental insurance to limit soil artificialisation

The Marsh Group analyses physical risks, proposes prevention measures to reduce their frequency and impact, and develops transfer solutions based on these analyses.

While land artificialisation progresses and continues to contribute to biodiversity erosion, the European Environment Agency estimates that the reuse of industrial brownfields, which are numerous in Europe, only concerns 13% of the surface used by current urban developments. To encourage companies and public decision-makers to better exploit this potential, Marsh has been offering the «Environmental Ten-Year Insurance» for several years: this insurance product allows stakeholders to have better coverage over time when reusing old polluted industrial or commercial sites. To monitor the implementation of its commitments made within the framework of act4nature international, Marsh has tracked the performance of this insurance product by measuring the reuse of these brownfields with the indicator «square meter of secured soil» and a reference base of 40,000 square meters secured in 2020. The initial objective of securing a total of 380,000 square meters by the end of 2023 has since been largely exceeded, as 500,000 square meters were already secured by the end of 2021. A second assessment seems to indicate that clients using this product recycle more polluted old sites: on average, over 40% of the surfaces used by beneficiaries for new developments come from brownfield rehabilitation.

The insurance is accessible based on the presentation of an inspection report that certifies the proper restoration of the soil and groundwater of the brownfield that will host the new construction. It covers both damage to the insured's property and that of third parties once the remediation is completed and the new land use begins. These damages can come from residual pollution that is unidentified or underestimated and are also covered in the event of a regulatory change. The insurance will compensate third-party claims for bodily and property damage, lost rents, relocation expenses for users and site residents, demolition and reconstruction of buildings, as well as claims for off-site losses.

1.6 Water purification

Water purification services contribute to pollution reduction. The costs associated with the reduction of phosphorus and nitrogen residues in water are lower than those of a conventional solution in the event that the purification service is provided by grey and green infrastructure containing a natural discharge area. As the solution implemented by Veolia shows, the benefits brought to biodiversity are also greater.

The vegetated discharge area of Thionville

Contributing to the sustainable development goals of the urban area

In 2015, during the renewal of the sewage treatment plant operation contract, the intermunicipal union responsible for providing sanitation services to the Portes de France Thionville Agglomeration Community wanted to promote biodiversity around the site and create an educational space, while minimizing the impact of these actions on water prices. To achieve this, Veolia, with the assistance of the SINBIO engineering firm and the LPO, designed and implemented a vegetated discharge area of 1.9 hectares downstream from the station. One-third of the treated wastewater is discharged into this landscaped area located between the treatment plant and the Moselle River.

Benefits of the gray Infrastructure - green Infrastructure combination

The project's benefits are outlined along three axes:

- water cycle security

The solution allows for the reduction of residual phosphorus and nitrogen, at costs lower than those of an industrial solution, thanks to the natural oxygenation and phyto-purifying qualities of the wetland. The area also serves as a buffer zone in case of floods;

- improvement of local biodiversity

The creation of the artificial wetland as well as its environmentally-friendly management and low human activity make it a shelter, feeding, and breeding ground for a variety of insect, worm, mollusk, amphibian, fish, and bird species;

- quality of life for users

An educational trail has been created to allow the public to observe the surrounding fauna and flora. Explanatory panels help to better understand the larger water cycle and the functioning of the sewage treatment plant.

These evident benefits are still difficult to quantify as the methodologies for quantitatively evaluating the externalities of artificial wetlands are still under development. These areas may include other co-benefits, such as carbon dioxide storage.

High replicability potential

After 6 years of feedback, the high satisfaction level of the organising authorities and local residents, along with the low operating costs, indicate that the solution appears to be widely replicable. The context is particularly favorable in France since the establishment of vegetated discharge areas is eligible for financial assistance from the Water Agencies (covering 30% of the total amount for the Rhin Meuse Agency).

The vegetated discharge area of Thionville.
©Veolia.

1.7 Maintainance of green spaces

Other business models combine economy and biodiversity through the sale of services. In landscaping, the maintenance of green spaces, sports fields and tourism-related activities, the aesthetic values of biodiversity form the basis of market value and the willingness to pay (cultural ecosystem services). New vocations, such as ecological engineering and ecological site management, are seeing the emergence of major players.

Several other sectors are beginning to value nature protection in product sales. Sustainable aquaculture and more respectful seabed fishing reduce the pressures on biodiversity compared to conventional fishing methods. Selling sustainably produced bio-sourced materials and bio-energy can also help make improving biodiversity profitable by hosting it on production sites and providing substitutes for more conventional products with a significant impact. In other sectors, the use of sold products can contribute to improving biodiversity. For example, utilising pervious concrete in urban areas helps to prevent waterproofing of the soil, preserve the water cycle and participate in adapting cities to climate change.

Other service providers have indirect beneficial effects on biodiversity. For example, some business advisory services or the sale of data and decision support tools in the IT sector can improve decision-making aimed at promoting biodiversity.

An analysis of the body of evidence suggests that the application of ecosystem operating principles - as models for the production of multiple integrated and highly efficient products and services - to the development of business models beneficial to biodiversity can be a key factor of success. For example, the superposition of sustainable uses on the same plot of land seems to be good practice to avoid pressures elsewhere and to consolidate business models based on diversified income streams. The emerging practice of agrivoltaism is an interesting example. In wine growing, it allows vines to adapt to climate change while supporting biodiversity. For example in the South of France, mobile agrivoltaic panels placed above the crops are controlled in accordance with the light needs of the plants[116]. Ecological monitoring has confirmed an increase in specific richness, while agronomic monitoring has shown that the panels protect the vines against high temperatures and spring frost as well as reduce irrigation needs and help maintain yield levels.

Agriculture can also be diversified to sustainably produce biomass energy as a substitute for fossil fuels. However, several studies suggest that the capacity for substitution is limited and that this use could on the contrary encourage an intensification of production systems to the detriment of biodiversity. To limit tensions and control these risks, a recent CESE[117] opinion recommended encouraging restraint as a priority in all biomass uses, strengthening governance methods, and using the economic leeway provided by energy uses to improve biodiversity. Contributing significant energy income makes it possible to support lower productivity cropping systems with high environmental value (HVE 3).

116 ADEME (2023). Photovoltaïque, sol et biodiversité : enjeux et bonnes pratiques.

117 CESE (2023). Quels besoins de gouvernance pour les différents usages de la biomasse ? Avis du Conseil économique, social et environnemental sur proposition de la commission Environnement. Claire Tutenuit, Pascal Férey.

Ecological management: an economic opportunity?

As a leader in landscaping across Europe, the Idverde Group has set the objective of preserving and restoring biodiversity by increasing the proportion of green spaces it maintains through ecological management. This now exceeds 5,000 hectares. In addition to the creation and maintenance of green spaces, the implementation of nature-based solutions is at the core of Idverde's development strategy and service offerings, including ecosystem restoration, rewilding of brownfield sites, and advice on tree heritage management, among others.

Traditional landscaping maintenance practices are evolving, with a growing emphasis on natural and bioclimatic approaches that better accommodate biodiversity, including weeds. Nature-based solutions are increasingly providing benefits to urban residents, such as carbon sequestration and storage, improved air quality, reduced runoff and flood risk, energy savings, and temperature regulation, among others.

Idverde implements ecological management based on six principles: zero-pesticide use, responsible water usage, reduced mowing frequencies (late mowing, eco-grazing), prudent pruning based on tree species and nesting periods, organic material reuse (e.g., mulching, no bare soil), and control of invasive exotic species.

Contrary to common belief, ecological management does not always lead to increased costs compared to conventional maintenance methods; it often results in cost reductions. It involves less frequent interventions but requires different resources and expertise. In one example of ecological management at a logistics company, cost reductions ranging from 22% to 36% compared to standard management were observed.

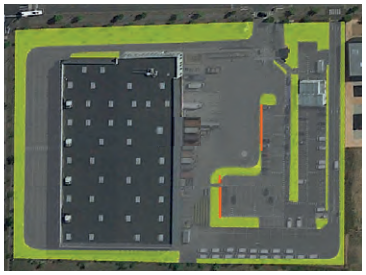
Transitioning to ecological management of green spaces is one way to increase biodiversity, although it alone may not achieve overall biodiversity goals. While biodiversity-friendly maintenance practices may sometimes lead to cost reductions, significant funding is needed elsewhere to restore biodiversity, especially through the creation of new green spaces and the implementation of nature-based solutions.

Today: standard management of green spaces with lawn mowing 8 times per year for cleanliness and safety reasons.

- Lawn - maintenance 8 times per year
- Hedges - standard maintenance
- Hard surfaces - 4 times per year

Total annual maintenance cost: **6050 €**

Option 1: Extensive management will reduce costs by -36%, with a risk to the 'cleanliness' aspect and site safety.



- Meadow - maintenance 4 times per year
- Hedges - standard maintenance
- Hard surfaces - 4 times per year

Total annual maintenance cost: **3880 €**

Option 2: Differentiated management allows for maintaining cleanliness around the surroundings and pathways while increasing the ecological value of the site (-22% on costs).

- Lawn - maintenance 7 times per year
- Meadow - maintenance 2 times per year
- Hedges - standard maintenance
- Hard surfaces - 4 times per year

Total annual maintenance cost: **4 727 €**

Example of maintenance cost reduction at a logistics company: differentiated management as a compromise solution between ecology, usage, and cleanliness. ©Idverde.

2 Sustainability-linked investment and financing

Financial stakeholders also play a role in the development and scaling up of business models. Several examples from the financial sector show that on the whole confidence in biodiversity business models is beginning to improve to the point where investors and savers are willing to get involved through innovative financial products and specialised funds.

2.1 Sustainability-linked lending

Better consideration of biodiversity can allow companies to access capital more easily and at lower cost thanks to innovative financial products. For example, Sustainability-Linked Loans (SLLs) are financing schemes linked to sustainability criteria. Funding is allocated to corporates as a whole (as opposed to project-specific green bonds) and based on a contractual commitment to meeting sustainability targets and the indexation of the debt service cost to their attainment. The borrower may have their rate adjusted upward (malus) or downward (bonus) depending on whether or not the sustainability targets (sometimes called SPTs for Sustainable Performance Targets) defined between the borrower and the financial partner have been met. For the borrowing company, the use of this type of financing is particularly compelling since failure to achieve its sustainability objectives exposes it not only to reputational risk but also to additional costs that can be significant depending on the amount borrowed. Moreover, the information used to demonstrate achievement of the sustainability objectives is audited by an independent third party[118]. For example, InVivo group decided to finance the acquisition of Soufflet group, Europe's leading privately-owned grain collector, by taking out a SLL that commits it to meeting certain objectives, including some which are biodiversity related.

Créateur d'Intelligence Alimentaire

Accelerating agricultural transition with green financing

The Purpose of the InVivo Group is to promote agricultural and food transition towards a resilient agroecosystem, by deploying innovative and responsible solutions and products, in line with the principles of regenerative agriculture, for the benefit of farmers and consumers. These principles are achieved through five strategic objectives: contributing to carbon neutrality, soil regeneration, biodiversity promotion, optimising input management, and improving farmers' income. These five objectives underlie the positive impact that InVivo cultivates with its stakeholders, through its positive impact offering and within its operations.

Catalysing the transition depends on a critical size and the ability to scale up deployment. In 2021, the opportunity arose for InVivo to acquire the Soufflet Group, another major player in agriculture. This acquisition allows InVivo to strengthen its position as an engine to address economic, societal, and ecological challenges, throughout the entire chain, from farm to fork.

A first in France, the acquisition was financed with financial partners based on the principles of a «Sustainability-Linked» loan linked to non-financial performance, beyond financial performance. Three non-financial performance indicators were selected: reduction of GHG emissions in line with the objectives of the Paris Agreement, improvement of employee safety, and increase in revenue from positive impact offerings. Biodiversity is one of the cornerstone criteria of positive impact offerings, either through the product or service's value of use and its ability to promote biodiversity in agriculture, viticulture, or gardening; or through the product's components (product eco-design, packaging, recipe quality, etc.). With this approach, from the outset, all activities of the new entity are required to contribute to this positive impact on biodiversity, and thus a maximum number of employees. By linking financial and sustainable development commitments, the Sustainability Linked Loan is clearly a lever for the company to take biodiversity into account in its performance.

118 France Invest (2022). Guide de bonnes pratiques pour les financements de dette privée indexés à des critères de durabilité.

2.2 Sustainability-linked investment funds

Another widespread practice in the financial sector is the development of investment strategies for companies that operate these models.

For example, an emerging asset class called «natural capital»[119] allows investors to support sustainable agricultural and forestry practices and offers reasonable returns on investment based on a combination of several drivers of economic value.

In the case of the Natural Capital Fund launched by Climate Asset Management[120], direct investments are made in human-managed ecosystems that generate income. The fund manager supports the scaling up of solutions by investing in biodiversity-friendly projects and acting as an aggregator of small-scale projects that would otherwise not have had access to those investments.

An alliance between several investors often boosts support for the development of business models that promote biodiversity. The alliance between AXA, Unilever and Tikehau Capital, for example, served as the launchpad for an investment fund targeting unlisted companies that support the transition to ecological agriculture.

Alternatively, the fund targets a wide range of sectors where the investment strategy is based on selecting and prioritising investment in companies that, through their products or services, contribute to the preservation or restoration of biodiversity. While these strategies all rely on a strict process of stock (or securities) selection, differences appear in terms of the geography, sector or type of market targeted. For instance, the strategy of the Ecosystem Restoration Fund was designed by BNP Paribas AM to target only internationally listed companies.

The Tocqueville Biodiversity ISR fund includes companies whose activities contribute to reducing pressures on biodiversity from other players as well as companies that have embarked on a pathway to reduce their own impact. The fund also links the selection of listed companies to the implementation of a policy commitment.

119 Finance for Tomorrow (2018). L'émergence de la classe d'actifs du capital naturel et de la biodiversité. Cartographie des acteurs français.
120 Climate Asset Management est une joint-venture entre HSBC Asset Management et le groupe Pollination.

Climate Asset® Management

A partnership of HSBC | POLLINATION

The Natural Capital Fund: creating value through regenerative asset management

In 2021, Climate Asset Management launched its Natural Capital Fund (NCF), investing in sustainable agriculture, forestry, and other environmental assets. Given that agriculture and forestry represent approximately 40% and 30% of the Earth's land area, investing in their ecological transition has the potential to:

- contribute to the fight against climate change and biodiversity loss;
- generate attractive risk-adjusted financial returns;
- meet the needs of a growing global population.

The NCF targets large-scale natural capital projects, providing professional investors with access to sustainably managed assets that diversify their portfolios while generating impactful financial returns. The fund complies with Article 9 of the SFDR regulation and has the overarching goal of contributing to achieving net-zero carbon neutrality by 2030 and the objectives of the Kunming-Montreal Agreement.

Investment in natural capital still faces several obstacles, such as the small size of projects, market fragmentation, and a lack of essential diversification for institutional investors. The fund offers various solutions to overcome these barriers and accelerate the flow of private capital towards natural capital. For example, aggregating small-scale projects to achieve critical asset sizes that make investment attractive for more substantial amounts.

The fund's first investment involves transforming degraded conventional farmland (corn crops and pastures) into a sustainably managed almond orchard of a local variety, certified Global GAP. In line with a growing European almond market, this project offers a gross internal rate of return on invested capital of 10%, while guaranteeing other measurable benefits, including a net-negative carbon footprint, with 10% of the farm's area exclusively dedicated to biodiversity, a 30% reduction in water consumption compared to the initial situation, and local communities being able to access employment and training opportunities in regenerative agriculture.

A total of USD$395 million has already been raised from 10 institutional investors, and to date, the NCF portfolio consists of cultivated land in Spain and Portugal. New sustainable agricultural and forestry projects are in development in Australia and New Zealand. At the end of the investment period, this 15-year fund's portfolio is expected to encompass approximately ten projects across the three verticals of agriculture, forestry, and environmental assets, covering three major developed regions of the world.

The Climate Asset Management teams discussing biodiversity opportunities around a wetland area in Holguera, July 2022.

Accelerating the transition to regenerative agriculture through an impact strategy

Land use and land-use change for agriculture (including deforestation) constitute the primary factor in biodiversity loss and the second-largest source of global greenhouse gas emissions. Regenerative agriculture practices such as soil cover, crop rotations, and no-till farming help restore the health of agricultural soils; their large-scale implementation could position agriculture as a key contributor to biodiversity preservation and restoration, as well as climate change mitigation.

AXA, Unilever, and Tikehau Capital have established an impact investment fund dedicated to accelerating the transition to regenerative agriculture. The three partners intend to each invest 100 million euros and bring together various expertise in industry, risk, and finance. The fund targets a size of one billion euros and its strategy will revolve around three main axes:

- protecting soil health to strengthen biodiversity, preserve water resources, and combat climate change;
- contributing to future supplies of regenerative ingredients (ingredients that help regenerate soils, such as rye or hemp) to meet the needs of the growing global population and consumer demand for more sustainable products;
- advancing technological solutions that aim to accelerate the transition to regenerative agriculture.

The fund aspires to operate on a global scale and can draw on the international networks of AXA, Unilever, and Tikehau Capital for this purpose. Impact objectives and measurement are central to its operational approach and fully integrated into its investment strategy.

As a pioneer in environmental themes, AXA Climate is actively involved in the launch and deployment of this fund, providing expertise in climate, environmental, and agricultural risks, impact monitoring, and leveraging its knowledge of agricultural sectors.

The «Ecosystem restoration» strategy

In June 2021, BNP Paribas Asset Management announced the launch of BNP Paribas Ecosystem Restoration, a thematic fund providing exposure to companies committed to the restoration and preservation of global ecosystems and natural capital. This marks a new step in its biodiversity-focused roadmap announced in May 2021.

This fund invests in internationally listed companies of all market capitalisations, offering environmental solutions that contribute to ecosystem restoration through their products, services, or processes in three main themes: aquatic ecosystems, terrestrial ecosystems, and urban ecosystems.

It comprises a portfolio of 40 to 60 securities selected from an investment universe of 1,000 global companies and provides diversification in terms of geography, size, and sector. A sharp expertise in securities analysis and selection, combined with the integration of ESG criteria, enables the identification of the highest-ranked companies.

The Tocqueville Biodiversity ISR Fund

The Tocqueville Biodiversity ISR Fund is an international equity investment fund focused on companies that contribute to biodiversity conservation through their products or services, or companies in high-impact sectors that have begun transitioning towards more sustainable processes.

The strategy is based on a materiality study conducted using the ENCORE tool, which highlights sectors with the highest dependencies and impacts on nature, as well as an internal taxonomic matrix listing investable solutions (products and services). External supplier data is used to access the revenue breakdown of companies within the investment universe, and is coupled with qualitative analysis.

For transitioning companies, a specification sheet has been created to validate the company's approach, containing points to be addressed: has the company mapped its risks, impacts, and dependencies? Does it set objectives? Does it have an action plan?

Investing in these companies will be accompanied by a shareholder engagement process to address any areas where the analysis may reveal lower maturity. The fund excludes sectors less directly related to biodiversity, such as telecommunications, and certain activities that are inherently misaligned with the theme, like fossil fuels.

The Global Biodiversity Score, a measure of biodiversity footprint, is used to adjust the weights of issuers in the portfolio: a significant GBS will be subject to an exposure cap on the issuer.

This fund is part of an investment dynamic that emphasizes more responsible practices towards living organisms.

Although these profitable business models contribute to the preservation and restoration of nature in part, they would not appear to be sufficient to achieve global goals on their own, even if they were more widely adopted by economic stakeholders. Given the current state of public opinion and global development needs, nature restoration requires the mobilisation of funding far above that provided by existing biodiversity-friendly businesses and sustainability-linked finance and investments.

This observation has impelled members of the EpE Biodiversity Commission to study other means of financing biodiversity restoration, such as Environmental Services Payment schemes.

3 Formalising contracts with payment schemes for environmental services

The economic assessment of nature and ecosystem services as a whole has been the focus of a significant number of studies and reports. Historically, many of them have sought to give a direct monetary value to biodiversity, ecosystems and ecosystem services[121], or to estimate the costs associated with biodiversity loss[122]. The relevance of these action-oriented approaches has since been called into questioned particularly by the Chevassus-au-Louis[123] report, which found that many of the studies cannot be directly used to develop reference values, that their preparation is marked by multiple biases and that their results are rather tricky to use for building global values.

Businesses, however, seem to favour approaches that link actions to payments for environmental services rather than for biodiversity and ecosystem services. The economist Alain Karsenty discusses the defining characteristics of the two approaches and sheds light on the different uses of Payments for Environmental Services (PES) and their underlying rationales.

121 Costanza, R., d'Arge, R., de Groot, R. et al. The value of the world's ecosystem services and natural capital. Nature 387, 253–260 (1997).
122 TEEB (2010) – The Economics of Ecosystems and Biodiversity – Business Report – Executive Summary 2010.
123 Bernard Chevassus-au-Louis et al (2009). Approche économique de la biodiversité et des services liés aux écosystèmes, Centre d'analyse stratégique.

Brief overview of Payment for Environmental Services

Alain Karsenty, *economist at Cirad*

There is often a common confusion between ecosystem services (benefits that humans derive from nature) and environmental services (human actions), and consequently, between remuneration for ecosystem services and payments for environmental services (PES). In the first case, we seek to calculate the «value» of ecosystem services in order to remunerate them. In contrast, payments for environmental services aim to remunerate practices (at the scale of, for example, a farmer), management approaches (at the scale of a company), or public policies (at the scale of a state) that are favourable to the maintenance or improvement of ecosystem services. However, the two logics are very different: in one, rents are paid, in the other, incentives are given for changes or for maintaining virtuous practices.

The nature of these PES is a subject of debate. Are they intended to compensate actors for the costs associated with adopting more ecological practices (or for the loss of revenue from abandoning certain activities), or are they meant to reward actors with already ecologically virtuous behaviour? The first option is related to a logic of efficiency, while the second involves considerations of justice. While the reward logic can generate windfall effects, always seeking to ensure efficiency entails considerable transaction costs. A geographical and social targeting of PES beneficiaries seems to be a better compromise.

PES contracts pertain to the adherence to a specific land use (in the broad sense) agreed upon by the actors. With restrictive usage rights PES, the emphasis is placed on the willingly suspended real rights in exchange for recurring but conditional remuneration. Investment PES typically involve remunerating rural actors for planting trees, hedges, or restoring degraded areas on the lands they own or directly control. The issue of property rights is crucial, as the ability to fulfill the contract implies that the provider of the environmental service has management and exclusion rights over the lands or natural resources concerned.

Agricultural landscape in Madagascar. Photo © A. Karsenty.

The services valued under PES are human actions to maintain or improve the value and volume of ecosystem services that involve respecting certain land use methods[124]: agroecology, urban nature-based solutions, fighting plastic pollution, or preservation of water quality[125]. The schemes generally seek to reward more biodiversity-friendly practices for their ability to improve the provision of regulating services (climate regulation, water purification, etc.), and exclude services supplying goods provided by biodiversity (food, energy, materials) which, unlike regulating services, have their own market.

PES contracts are not standardised and generally involve a stronger territorial dimension and a more direct relationship between stakeholders who have land rights and directly influence the condition of ecosystems and those who are willing to pay for the service from which they benefit[126]. Such PES contracts involve a voluntary agreement between a limited number of stakeholders, with the environmental service that is paid for being clearly defined beforehand.

The paying party may be public or private. As long as the environmental service benefits the community, it is understandable that it is paid for by a public body. In France, water boards often finance the purification of water discharged by agricultural soils through the reduction of inputs in catchment basins. The purpose of the contract in this case is to develop agricultural activities conducive to the preservation of water quality and the biodiversity of associated environments.

Private-private PES contracts are the main instrument used worldwide by the private sector to contribute to biodiversity financing ($9.8 billion in 2021, see Figure 12). Most of them concern payments for conservation practices to improve water quality (57%). For instance, the PES scheme implemented by Vittel in the north-east of France is often cited as a good example of PES because payments to farmers in the 5,100-hectare catchment area surrounding its source compensate them for reducing livestock numbers, ditching maize cultivation, and suffering lower yields, and allow them to invest in the transition to farming practices compatible with maintaining water quality.

In another field, Kering has a PES contract in place that directly targets biodiversity, and not only contributes to the implementation of a nature restoration project defined by its biodiversity strategy, but also invests in the transition of its supply chains to regenerative agriculture.

124 Alain Karsenty (2019). Les PSE dans les pays en développement : compenser ou récompenser ?. L'agriculture et les Paiements pour Services Environnementaux – Quels questionnements juridiques ? 978-2-7535-7601-8. ffhal-02080034f.

125 Banque des Territoires (2022). Comment mettre en œuvre un dispositif de paiement pour services environnementaux ?

126 Alain Karsenty (2019). Les PSE dans les pays en développement : compenser ou récompenser ? L'agriculture et les Paiements pour Services Environnementaux – Quels questionnements juridiques ? 978-2-7535-7601-8. ffhal-02080034f.

Win-win contracts for biodiversity and breeders: Epiterre and contracts for environmental services in the Regenerative Fund for Nature

In 2020, Kering launched the Regenerative Fund for Nature in collaboration with Conservation International, to support farmers and breeders in transitioning to regenerative agriculture in the supply chains of the group's Houses. The first seven projects of the Fund focus on the materials with the highest environmental impacts according to Kering's Environmental Profit and Loss (EP&L) account: leather, cotton, cashmere, and wool.

One of these seven projects is located in the Southwest of France and relies on an innovative mechanism to contribute to biodiversity conservation: Contracts for Payments for Environmental Services (PES). As part of this project in 2022, the association Epiterre concluded 28 PES contracts with 28 breeders belonging to the GEOC cooperative (Caussenard Ovine Breeders Group) of sheep breeders in the Lot region.

The primary aim of this project is to support the reintroduction of sainfoin on 200 hectares of pastures. Sainfoin is a robust local legume species particularly appreciated by pollinators. It is also beneficial for the soil, as it fixes atmospheric nitrogen in the soil and makes it available to other plants. The deep and dense root system of sainfoin improves soil structure and helps combat erosion. In addition to its benefits for biodiversity and soil quality, sainfoin is a source of high-quality forage for the sheep, reducing dependence on concentrated feed and improving the health of the sheep and the quality of their wool.

By signing the PES contract, breeders also commit to installing beehives on their land to promote pollination; those with cereal crops also commit to transitioning to a more diversified crop rotation. The contract also includes monitoring and impact measurement measures on the soil, biodiversity, and climate associated with the project activities.

Breeders are financially rewarded for the environmental services provided, based on the effective implementation of practices and results achieved, which form the basis for their remuneration calculation.

Epiterre Project - Livestock in the Lot.

4 Credit and offset markets

The voluntary market for carbon credits and environmental offsets is another mechanism used by businesses to participate in the financing of nature conservation and restoration and to strengthen their business models. The voluntary carbon market is gradually adapting as it links the biodiversity benefits of projects to the selling price of carbon credits and incorporates other emerging concepts such as biodiversity credits and positive biodiversity impact certifications.

4.1 Improved carbon credits

In the voluntary carbon market, credits enable buyers to offset their carbon footprint or voluntarily contribute to climate change mitigation. Long dominated by renewable energy projects, this market is gradually shifting towards projects focused on ecosystem function. An analysis of the typology of carbon credits placed on the market in 2021 published in the 2022 Global Climate Action Review[127] shows that credit issuance associated with ecosystem absorption projects rose almost 170% between 2020 and 2021, with 46 % of credits placed on the market in 2021 relating to forestry and land use. Credits guaranteeing environmental and social co-benefits are better priced (in 2022, to the tune of $6/tCO2eq against $3/TCO2eq O2eq for the others), while fresh attention is being paid to carbon credits with biodiversity co-benefits: the volume of Climate Community Biodiversity Standards (CCB) credits certified by Vera soared 277% in 2021.

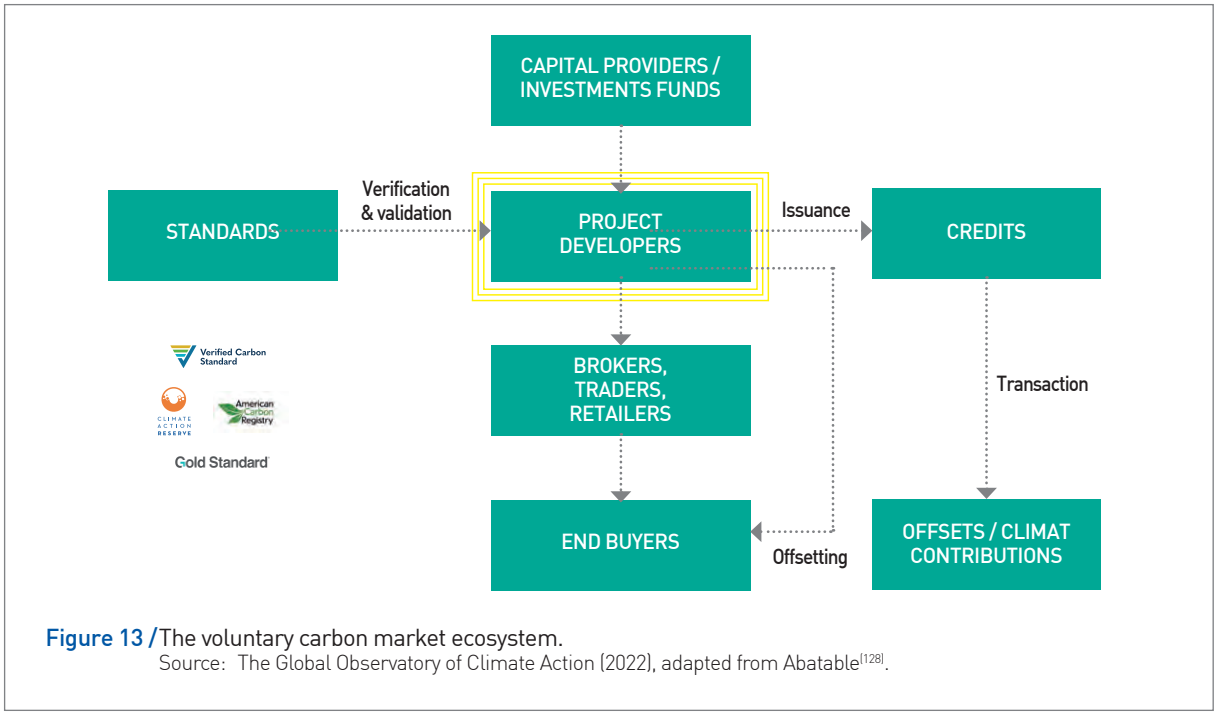


Figure 13 / The voluntary carbon market ecosystem.
Source: The Global Observatory of Climate Action (2022), adapted from Abatable[128].

Many other voluntary climate certification frameworks take co-benefits into account, including the Low Carbon Label which certifies emission reduction projects based on an approved methodology that progressively incorporates biodiversity criteria.

Some companies, such as EDF, are contributing to the development of new low carbon certification (Label Bas Carbone) methodologies and using carbon offsetting business models to finance and implement NbS that provide a number of co-benefits for soil, water and biodiversity.

127 Global Climate Action Observatory (2022). Global Climate Action Review by sector. Climate Chance.
128 The State of the Carbon Developer Ecosystem 2021, Abatable.

Understand and enhance the carbon sequestration capacity of ecosystems to contribute to achieving neutrality

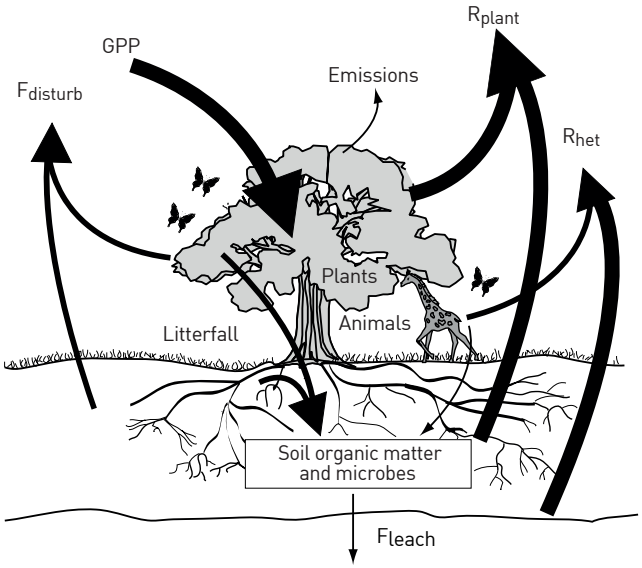
In 2018, the EDF Group set the goal of contributing to achieving carbon neutrality by 2050. To do so, various commitments were adopted, including the implementation of carbon offset and climate change adaptation solutions, some of which are nature-based.

The Research and Development department of the EDF Group initiated a research program dedicated to carbon sequestration in ecosystems with pilot sites. Its objective is to enhance knowledge and support the development of new Low Carbon Label methods. These experiments are conducted in partnership with scientific and operational actors and target ecosystems such as grasslands, peat bogs, and forests.

As part of the reinforced mobilization of its peak thermal production capacity during the winter of 2022-2023 in mainland France, EDF established a carbon offset fund to comply with new regulatory provisions. The goal of this fund is to finance carbon sequestration projects in French territory by using nature-based solutions[129], and by accounting for and valuing the associated emission reductions.

The selected projects are labeled with the Low Carbon Label and are integrated into the growing French carbon offset market. The label's methodology incorporates co-benefits, particularly regarding soil, water, biodiversity, and socio-economic aspects, which EDF aims to maximize in the project selection process. Ultimately, the ambition is to design these projects in a way that also contributes to the adaptation to climate change in the territories where the electricity production facilities are located. The network of pilot sites selected by EDF's R&D will support the development of these activities: they will serve as experimental areas for instrumentation, the definition of protocols to monitor carbon sequestration over time, and the co-benefits provided by restoration operations.

The EDF Group is also affected by the overall degradation of services provided by nature: this approach thus strengthens the resilience of its activities, meets certain regulatory obligations, and organizes the company's contribution to achieving the targets and objectives of the global framework for biodiversity.



Schematic representation of the main carbon flows in an ecosystem.
Source: Principles of terrestrial ecosystem ecology[130].

129 Forest regeneration, afforestation, agroforestry, agrosylvopastoralism, or agricultural practices reducing greenhouse gas emissions.
130 Chapin, F. S., Matson, P. A., Mooney, H. A., & Vitousek, P. M. (2002). Principles of terrestrial ecosystem ecology.

In the agricultural sector, an arable crops low carbon certification methodology has already been validated. It has since been used by Agrosolutions, the agri-environment consultancy firm of InVivo group, to support agricultural project developers to implement practices that can obtain this certification.

The Frensh «Label-Bas Carbone» drives biodiversity in agricultural projects

The Low Carbon Label translates the climate benefit of practice changes that reduce emissions and store carbon into carbon credits. These quantified measures are associated with indicators of environmental co-benefits.

The Low Carbon Label's «Grandes Cultures» (Large Crops) method, validated in August 2021, has already been used to label 22 projects, each involving one or several farms, covering a total of approximately 6,000 hectares, committed for a renewable five-year cycle. Their estimated climate balance for the first cycle is 57 kteq CO_2 avoided or stored, equivalent to as many carbon credits[131].

The economic models vary from one project to another, both in terms of the price of the credits sold, which generally ranges from 30 to 70 euros, and in terms of their level of pre-financing. Cost is the main limitation to the agricultural low-carbon transition. In the numerous regenerative agriculture projects that Agrosolutions designs and supports, the cost for the farmer ranges from €60 to 120 per teq CO_2 removed. Therefore, the economic model can hardly rely solely on carbon credit financing, or requires a high credit price.

The interest of the low-carbon transition in large crops is that it also has positive effects on ecosystem services related to water and biodiversity. In the «Grandes Cultures» method of the Low Carbon Label, eight biodiversity indicators organized into four categories[132] allow for measurement and can justify a higher carbon credit price. The use of this set of indicators is optional[133], but it allows the project promoter to demonstrate the environmental impact of their project beyond climate and negotiate a higher credit sale price. On projects supported by Agrosolutions, farmers have been encouraged by the funder to maximize the levers that stimulate biodiversity the most.

The process of bringing climate and biodiversity closer can also be observed in other low carbon certification applications. There is a gradual shift towards monetising practices that promote biodiversity and also absorb carbon. Accordingly, a premium is added to the price of a carbon credit to promote the co-benefits of biodiversity projects. This is the approach adopted by Société Forestière to develop several voluntary climate certification methods that take into account the contribution of projects to biodiversity restoration.

131 After deducting a flat rate to account for uncertainty risks.

132 Category 1, Landscape composition: diversity of crops and temporary meadows, % of multispecies temporary meadows, % of cultivated areas with cover crops, % of covers favorable to insects; Category 2, Landscape configuration: proportion of large plots; Category 3, Absence of disturbance: % of semi-natural areas (or agroecological infrastructures), % of untreated areas, energy expended for soil tillage.

133 Each indicator is to be calculated individually; a positive impact on biodiversity is recognised if at least one indicator is improved and none are degraded. Improving one indicator per category is preferable to improving all indicators within an isolated category.

Carbon credits with co-benefits for biodiversity

Starting in 2019, the Société Forestière committed to promoting the ecosystem services provided by forests through its Forest-Based Solutions Department.

This initiative began by developing forestry projects under the «Label Bas-Carbone» program of the French Ministry of Ecological Transition. This program allows private actors to contribute to afforestation or the restoration of degraded forests to generate carbon credits. The robust framework, guarantees, and integrity of this label make it a valuable methodological foundation that aligns with the growing financing needs of the forestry sector.

Building on this experience, the Société Forestière applied a similar approach to develop biodiversity restoration projects in forests. The methodology involves identifying, within the same forested area, plots eligible for the Label Bas-Carbone and others suitable for activities aimed at restoring and protecting biodiversity.

The selection of these plots allows for projects where a private actor can finance both carbon sequestration and explicit biodiversity benefits. In anticipation of a consensus-based method for certifying biodiversity gains, these projects may generate biodiversity certificates separately from carbon credits, all while adhering to a rigorous evaluation framework.

This framework served as a reference when the Société Forestière sought funding for other types of projects, including urban renaturation. To maximize the environmental co-benefits of trees in urban areas, such as carbon sequestration, biodiversity support, health benefits, and mitigation of heat islands, a methodology was developed. This methodology incorporates the value of these co-benefits into the price of a carbon ton, transforming it from a mere carbon credit into a more comprehensive credit. Filed at the end of 2022, this 'treed city' methodology is currently undergoing validation by the French Ministry of Ecological Transition (MTE).

All these examples show that more account is being taken of biodiversity in various voluntary climate certification methodologies. Although optional to obtain certification in some cases, taking biodiversity criteria into account often leads to higher carbon credit prices.

4.2 The biodiversity offset market

In France, regulation provides a framework for allocating economic value to biodiversity in various ways. For example, the mandatory offsetting obligation can encourage an additional voluntary effort formalised by a PES contract. The investments needed to comply with the offsetting obligation provide a basis for the implementation of voluntary actions that generate additional environmental and social benefits. Using this approach, Boralex has benefited from Agrosolutions support for the development of a PES scheme to financially support the agricultural transition while offsetting its impacts.

Ecological compensation through payments for agricultural environmental services

Ecological compensation becomes necessary for land developers when they have not succeeded in avoiding or significantly reducing the negative impacts of infrastructure on biodiversity. The developer is then forced to participate in the compensation program to recreate environments that are favorable for the species affected by the project.

Agrosolutions supported the wind power operator Boralex in implementing compensation measures in agricultural areas following the construction of wind farms in Allier and Deux-Sèvres. These compensatory measures are integrated into a system of payments for environmental services (PSE) with a tripartite agreement spanning 20 years between the farmers, landowners, and Boralex. Leveraging their knowledge of agricultural territories, Agrosolutions assessed the feasibility of the measures and calculated the remuneration to be paid to farmers to compensate for their lost earnings (opportunity costs) and finance the environmental services provided through an additional incentive payment.

The Agrosolutions teams then conducted land prospecting among farmers in different areas, leading to the following measures:

- planting 6.78 hectares of permanent grasslands to promote plain-dwelling bird species (Little Bustard, Eurasian Thick-knee, Northern Harrier, etc.). The relevant plots are managed extensively with a ban on mowing and/or grazing from May 20 to July 31 to limit the impact on bird nests;
- planting 257 linear meters of hedges and digging 50 square meters of ponds for bats, helping to improve connectivity between roosts of various species and their hunting areas.

In compliance with various specifications, farmers are remunerated annually at a rate of €840 per hectare of permanent grassland and €102 per 100 linear meters of planted hedges.

Ecological monitoring is conducted by specialized consulting firms to characterise the reference situation as well as the evolution of the environments in order to assess the ecological added value provided by the measures (the principle of additionality of PSE).

Excavation of a 25 m^2 pond providing food resources for bats while ensuring access to water for the sheep herd.

The offsets market uses other tools to price biodiversity. Since the enactment in 2016 of the law on the recovery of biodiversity, nature and the countryside, the nature offset tool allows companies to offset their impacts on biodiversity or buy offset units on a voluntary basis. CDC Biodiversité, for example, has deployed the first nature offset in France.

CDC BIODIVERSITÉ | Caisse des Dépôts GROUPE

Cossure natural site, the first Natural Compensation Site (NCS)

The law for the reconquest of biodiversity, nature, and landscapes of August 8, 2016, created a new tool for the implementation of compensation, the final step in the Avoid, Reduce, Compensate (ARC) sequence: the Natural Compensation Site (NCS). Based on an experiment conducted by CDC Biodiversity since 2008 in the Crau plain (Cossure operation), this system complements the range of tools available to project owners to fulfill their compensation obligation. An NCS is an approved operation for the restoration or development of biodiversity elements that anticipates compensation needs in a territory within the framework of projects, plans, and programs. A natural compensation site corresponds to a compensation known as «by offer». This means triggering a positive action of natural habitat restoration in advance. It involves an investment by a compensation operator, including land securing, carrying out restoration work, and managing and monitoring the commitment over a period (at least 30 years). After ministerial approval, the operator of an NCS is authorised to sell compensation units to developers within the NCS service area to compensate for impacted, ecologically equivalent environments.

In 2008, CDC Biodiversity acquired 357 hectares of former industrial orchards on the Cossure site in Saint-Martin-de-Crau (13) in order to rehabilitate a space conducive to sheep farming and biodiversity in the Crau plain. The restored natural space will complement and strengthen the ecological coherence of the Coussouls de Crau natural reserve. CDC Biodiversity's action on the Cossure site consists of:

- restoring a low steppe vegetation favorable to the development and sustainability of heritage animal species in the dry Crau;
- facilitating the reconstitution of plant communities;
- managing the restored vegetation through grazing for 30 years and maintaining the natural and pastoral vocation of the site beyond this time;
- carrying out regular scientific monitoring in relation to the Coussouls de Crau Natural Reserve.

The funding of the Cossure operation, provided by CDC Biodiversity with the approval of the public authorities, is passed on to project owners subject to a compensation obligation. The cost of the Cossure Compensation Unit (CU) is currently € 52,000 excluding taxes. The Cossure operation can also be used, outside the framework of compensation, by economic, public, or private actors wishing to voluntarily engage in a remarkable action for biodiversity.

The status of NCS is evolving as part of the Green Industry Bill project. The joint committee meeting scheduled for mid-October is expected to finalize the creation of a new system: the NCSRR for natural compensation, restoration, and renaturation sites.

Photograph of the Cossure site. © P Fabre.

Beyond France, the UK's «Biodiversity Net Gain» regulation requires property developers to achieve a biodiversity gain for any new development, thereby accelerating the growth of the environmental offsetting and nature offsets markets. This legislation differs from French regulations in that it proposes a standard government-approved biodiversity metric.

The establishment of a natural compensation site within the BNG mechanism in England

The new environmental regulation in England, the Environmental Act of November 9, 2021, which will come into effect in November 2023, requires property developers to ensure a 'net gain in biodiversity' (BNG) of at least 10% compared to the initial state of the land.

Beyond actions related to the real estate project, it is now possible for landowners or land managers to produce «biodiversity units» that are allocated to any rewilding or development project that has generated a sustainable biodiversity gain since January 2020. This is on the condition that this project is maintained in its state for at least 30 years. England is thus encouraging the creation of a supply-driven compensation market.

While France has implemented a similar compensation mechanism, English public authorities have innovated by establishing a standardized methodology for measuring «ordinary» biodiversity losses and gains, based on an assessment of the state of the land and its ecosystem. This state is evaluated before and after development using Biodiversity Metric 4.0 - the official tool of the British Department for Environment, Food & Rural Affairs (DEFRA). Having undergone several iterations, this methodology is based on a point allocation system for each ecosystem («habitat»): the assessment is carried out by an ecologist based on predefined criteria, specifically focusing on the type and rarity of the habitat, its condition (compared to other lands of the same type), its size, and the location of the land.

Thanks to this new mechanism, Idverde helps landowners proactively and voluntarily generate biodiversity units. For example, Idverde has implemented ecological management on a large, seldom-visited site in one of London's largest municipalities, with the aim of creating a natural meadow of over 2 hectares. The ecological assessment, conducted in 2022 by an independent third-party auditor, certified a net biodiversity gain of 3.37 units under the BNG mechanism. With the current unit price being around £25,000, their sale on this over-the-counter market will generate a gain of £85,000 for the public actor, which will help finance the maintenance of the meadow for at least 30 years.

4.3 Towards positive impact certificates for biodiversity?

In addition to offsetting, a growing number of players are working on developing a dedicated market mechanism for voluntary contributions to nature restoration actions. Biodiversity credits are seen as a potential new way of arranging and scaling up biodiversity-related private finance and strengthening biodiversity business models. These credit markets are of growing interest and the subject of many characterisation studies. In 2022, the World Economic Forum studied in a first report the possibility of building voluntary biodiversity credit markets and then, in 2023, shortly before the One Forest Summit, the GEF published a series of recommendations prepared by a high-level[134] panel of experts to unlock new financial resources for biodiversity that focused on two emerging instruments: biodiversity impact carbon credits and nature certification. Strong interest in these credit markets is emerging in France where the Organisation for Biodiversity Certificates is seeking to develop a 'biodiversity certification' methodology to certify a company's financial contribution to the positive effects of field actions.

organization for biodiversity certificates

Suggestion for a biodiversity certificate mechanism and its financing

Arthur Pivin, *Carbone4*
Romain Julliard, *French national Musuem for natural History*

There is a strong demand for a standardized method to assess the positive effects of field actions considered beneficial to biodiversity, from economic actors wishing to certify their actions or the impact of funding dedicated to these actions.

A year of methodological reflection led by the Organization for Biodiversity Certificates (obiocert.com) has led to the following proposal for the establishment of a certificate mechanism and associated financing («market»):

- in a given context (e.g., temperate climate arable lands), establish, with the actors of the context (e.g., agricultural advisors), the taxonomy of biodiversity-friendly actions, as well as the verification criteria for their implementation. A biodiversity-friendly project should be decomposable into a sum of actions;
- associate with each action the expected biodiversity gain, established by expert consensus (trained in scientific ecology);
- use this reference grid (actions - biodiversity gains) for an ex-ante evaluation (investment phase - expected biodiversity gain) and ex-post certification (verification that the action has been implemented and the voluntary and additional nature of the contribution) of a project;
- if necessary, use this certification mechanism to finance a territorial or global biodiversity strategy. The governance associated with this strategy selects the contributing actions, eligible for funding by economic actors consistent with the strategy.

At this stage, this proposal stands out with a streamlined «evaluation» part allowing for smoother funding, while offering a method suitable for projects in the 'ordinary nature' and for small, effective projects that are difficult to finance. The proposal relies on the participation of a large number of stakeholders, the feasibility of which remains to be demonstrated.

Many companies that run business models beneficial to biodiversity are actively contributing to studies to create these new markets, and intend to use this new instrument to further diversify their income streams and improve their business models. Printemps des Terres has clearly identified an opportunity and already launched a pilot fund to acquire the first biodiversity certificates and mature the market.

134 Global Environnement Facility (2023). Innovative finance for nature and people: opportunities and challenges for biodiversity-positive carbon credits and nature certificates.

Toward the creation of biodiversity assets

Adapting forests and agricultural systems to climate change, transitioning agriculture toward ecological practices, restoring degraded land and forests... The financial needs to address these challenges are substantial, and additional funding sources must be found to meet them.

Le Printemps des Terres was founded in early 2020 to be a tool serving of this transition, following an original approach: it acquires land, carries out all necessary ecological investments on these lands, and offers companies that want to contribute to the ecological transition of these areas the opportunity to co-finance these actions. In the case of agricultural lands, it shares the gains equitably with its agricultural operating partners and grants them the irrevocable right to repurchase the relevant land.

This mode of intervention, based on land acquisition, gives the Spring of the Lands control over the action and the ability to make long-term commitments, which often correspond to the lengthy implementation of projects. Indeed, it takes several years and often decades to restore a forest or wetland, establish a functional hedgerow, or regenerate soil.

After three years of activity, the approach seems relevant: The Spring of the Lands has acquired nearly 25 sites, representing almost 1,000 hectares. On each of these spaces, it implements, in partnership with local stakeholders, the actions necessary to improve biodiversity, sequester carbon, and transform farming systems. The quality of the projects has allowed to mobilise the necessary funding for its action and to offer an attractive opportunity to companies wishing to contribute to ecological neutrality (such as carbon credits or biodiversity units).

Regarding biodiversity, a major challenge, market tools connecting funders and project leaders are emerging. The Spring of the Lands has taken two major initiatives:

- it is a co-founder of the Organization for Biodiversity Certificates (OBC), which aims to create a scientifically validated system for evaluating and certifying actions favorable to biodiversity.
- it has just launched a «Biodiversity Prototype Fund» aimed at financing certified projects (particularly those certified by OBC) and offering companies wishing to embrace ecological neutrality the opportunity to acquire shares in the fund. The fund will play a pioneering role in the development and standardization of these market instruments: acquisition and sale contracts for certificates, transferability, legal nature, accounting aspects, etc.

To avoid reputational risks which the voluntary carbon market is regularly criticised for, moves are afoot to define principles and precautions. Initially known as biodiversity credits, then biodiversity or nature certificates, some stakeholders now speak of «biodiversity-positive certificates» to establish a difference between the new market for positive impact certificates and the market for environmental offsets, to be traded at local level as close as possible to the damaged ecosystems[135].

Biodiversity certificates raise a number of questions. Many stakeholders agree about their non-fungibility because restoring a bog in one place is not the same as restoring a forest in another. But in the absence of fungibility, what is the value of these assets? Can they be transferred and to whom? The only answer today seems to be land value, which can be linked to the richness of biodiversity on the land. In future, as accounting rules and principles evolve, answers to this question will emerge.

The importance of local offsetting and the non-fungibility of biodiversity certificates therefore, make the creation of an international market for environmental offsets irrelevant or even risky for biodiversity. Accordingly, an increasing number of stakeholders propose to reserve certificate access to businesses that already comply with environmental regulations, including implementation of each of the three stages of the ARO sequence. In a report[136] published in 2022, The Biodiversity Consultancy produced an illustration for a clear understanding of the differences between environmental offsetting and the purchase of biodiversity credits or certificates (Figure 13).

135 Entreprises pour l'Environnement et Institut de la Finance Durable (2022). Actes du colloque DEFi – Dialogue Entreprise – Finance, Solutions et actions pour la Nature.

136 The Biodiversity Consultancy (2022). Exploring design principles for high integrity and scalable voluntary biodiversity crédits. A technical working paper.

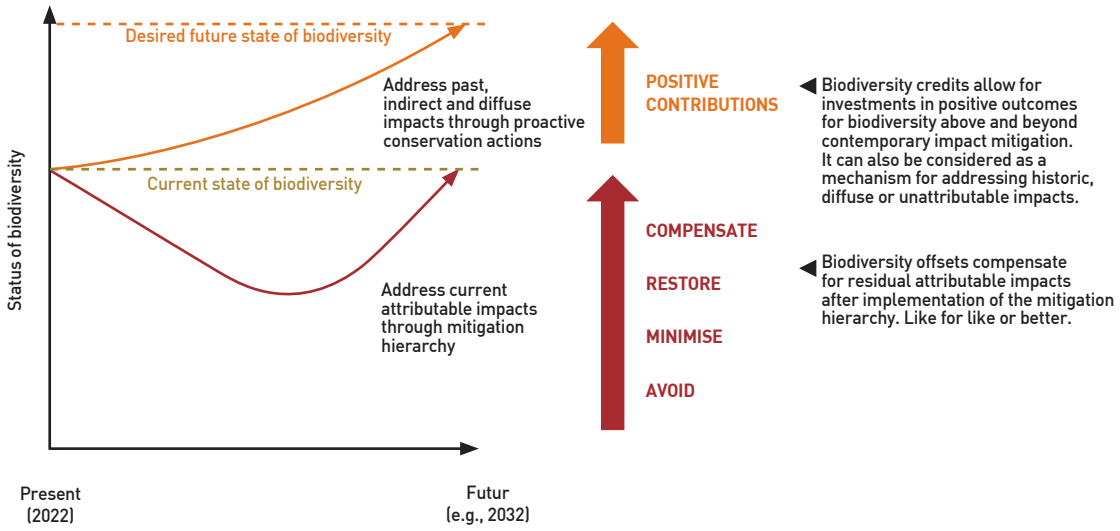


Figure 14 / Illustration of the distinct roles that environmental offsets and biodiversity credits can play in the contribution of business to meeting biodiversity conservation and restoration objectives.
Source: *The Biodiversity Consultancy.*[137]

Research is ongoing in this subject. To ensure consistency of the actions financed by these certificates with other ongoing efforts, IDDRI and SciencesPo[138], together with the Organization for Biodiversity Certificates, propose to include them as part of a co-investment approach to sustainable development and use them as a vehicle for contributing to the funding of national or local biodiversity strategies with co-benefits for communities.

Despite multiple open questions, biodiversity-positive certificates seem to hold great potential for companies based on their principles of use. For those wishing to acquire them, the certificates will be a way of supporting a variety of field actions ranging from conservation (financing of protected areas) to nature restoration. Their positive impacts will be verified by scientifically sound methodologies and probably by stakeholder groups, and their relevance for the regions appraised.

Despite their potential, only weak financial flows towards biodiversity are expected from these certificates in the near future as uncertainties prevail. Because the approaches are voluntary, mounting public pressure can influence their growth and value, as was the case with voluntary carbon market credits.

A review of all the examples presented in this chapter suggests that biodiversity business models are increasingly numerous and diversified. Multiple income streams and burden sharing help to make them viable and efficient, especially if financial stakeholders support them. They are, however, often less profitable[139], can have longer operational cycles than conventional business models, and their risk levels still appear to be poorly controlled.

As well as taking better account of biodiversity in existing value chains that have their own market, many stakeholders are coming up with new schemes or adjusting existing ones to reward practices in favour of biodiversity. PES, improved carbon credits, new environmental offsetting methods and biodiversity-positive certificates aim to create new profitability drivers and encourage the scaling up of business models that contribute to nature preservation and restoration.

137 The Biodiversity Consultancy (2022). Exploring design principles for high integrity and scalable voluntary biodiversity crédits. A technical working paper.
138 Treyer, S., Karsenty, A., Mushiete, O. (2023). Financement international de la biodiversité : remettre les paiements pour services écosystémiques dans le cadre d'une approche de co-investissement pour le développement durable, Décryptage N°01/23
139 Entreprises pour l'Environnement et Institut de la Finance Durable (2022). Actes du colloque DEFi – Dialogue Entreprises – Finance, Solutions et actions pour la Nature.

4

Building action trajectories

This review of existing practices and business models asks how businesses can set action goals to reduce their impact on nature. That notwithstanding, there is strong pressure from external and internal stakeholders to set ambitious targets, as they have done for various components of their business from sales to greenhouse gas emissions.

Those who embark on this path are immediately faced with difficult choices due to the complexity of issues, as the following questions illustrate:

- **Is additional land use, i.e. for a solar power plant, factory or infrastructure project, justified by the emissions reduction or other social and environmental benefits it delivers? The answer obviously depends on the location and type of project and therefore varies widely.**

- **How does one appraise the materiality of indirect, diffuse and delayed pollution created by the company and its products authorised by law, such as plastics, drug residues or crop inputs, and set reduction pathways?**

- **How does one build action pathways aligned with the Kunming-Montreal agreement, or size the impact offsets that the company allows itself?**

Science has yet to provide answers to those questions. Public authorities do so by authorising business activities and infrastructure, but have no answer to the question of pathways. The ideas that follow thus arise from the experience and thinking of the companies which participated in the work of the EpE Biodiversity Commission.

The lack of reference pathways for corporate action is primarily explained by the fact that some of the scientific knowledge that could be useful for guiding decisions is not available. For example, unlike climate where there are many reference pathways linking emissions and warming applicable at sector or company level, there are to date no scientific pathways for biodiversity - or even for its erosion drivers - that businesses could use to prove their contribution to biodiversity recovery measured on the basis of scientifically sound data.

In its 2016 assessment report[140], IPBES analysed several models and scenarios of change in certain pressures, and in the state of biodiversity and ecosystem services, designed to guide public policy at global, national or regional levels, on often long timescales (up to 2090) and targeting only some biodiversity pressures and components. In addition to their complexity for non-specialists, their characteristics make them unsuitable for the specific local management needs of businesses. Moreover, according to IPBES, while the scenarios and models can effectively support policies, it is important to use a variety of carefully chosen complementary tools since existing models often provide uncertain and unpredictable forecasts. Some researchers even recommend not to use them. As Bruno David, Chairman of the MNHN, says «living beings do not model themselves». On the other hand, the «good ecological condition» of some ecosystems, water bodies and soils is appreciated by the various stakeholders, each with their own criteria.

140 IPBES. (2016). Summary for policymakers of the methodological assessment of scénarios and models of biodiversity and ecosystem services of the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services.

The development in the short term of reference pathways for biodiversity or related pressures to guide corporate actions even seems questionable given the uncertainties in the behaviour of living beings, the many knowledge gaps in how ecological interactions will work, how biodiversity will react and how the risks associated with its degradation will materialise. Businesses that have tried to give themselves and to follow such pathways have found strong interdependence between pressures. Reducing land use can lead to additional CO_2 emissions or to an increase in pollution through intensive use. It is very difficult to reduce all pressures at the same time and maintain a business's economic model.

Nevertheless, companies need tools, and several are under development.

1 The SBTN initiative

At COP14 in Sharm-el-Sheikh, the idea was announced of incorporating the SBTI initiative to reduce emissions after the Paris Agreement into the field of biodiversity. The Science-based Target Network (SBTN) is a key element of the Global Common Alliance[141], supported by some 50 scientific, philanthropic and business networks. It comprises the same and other entities, and has set itself the goal of producing science-based reference pathways to guide businesses in their nature action (Science-based Targets for nature or SBTn).

In the absence of an IPBES definition of pathways for recovering good environmental status for the planet, there is a generic methodology (see below) as well as two preliminary methods of water use and land use. However, the scheme still appears to lack a science-based method of setting targets for different pressures or ecosystems.

Several EpE companies have conducted pilots to test the methods described in the graph below.

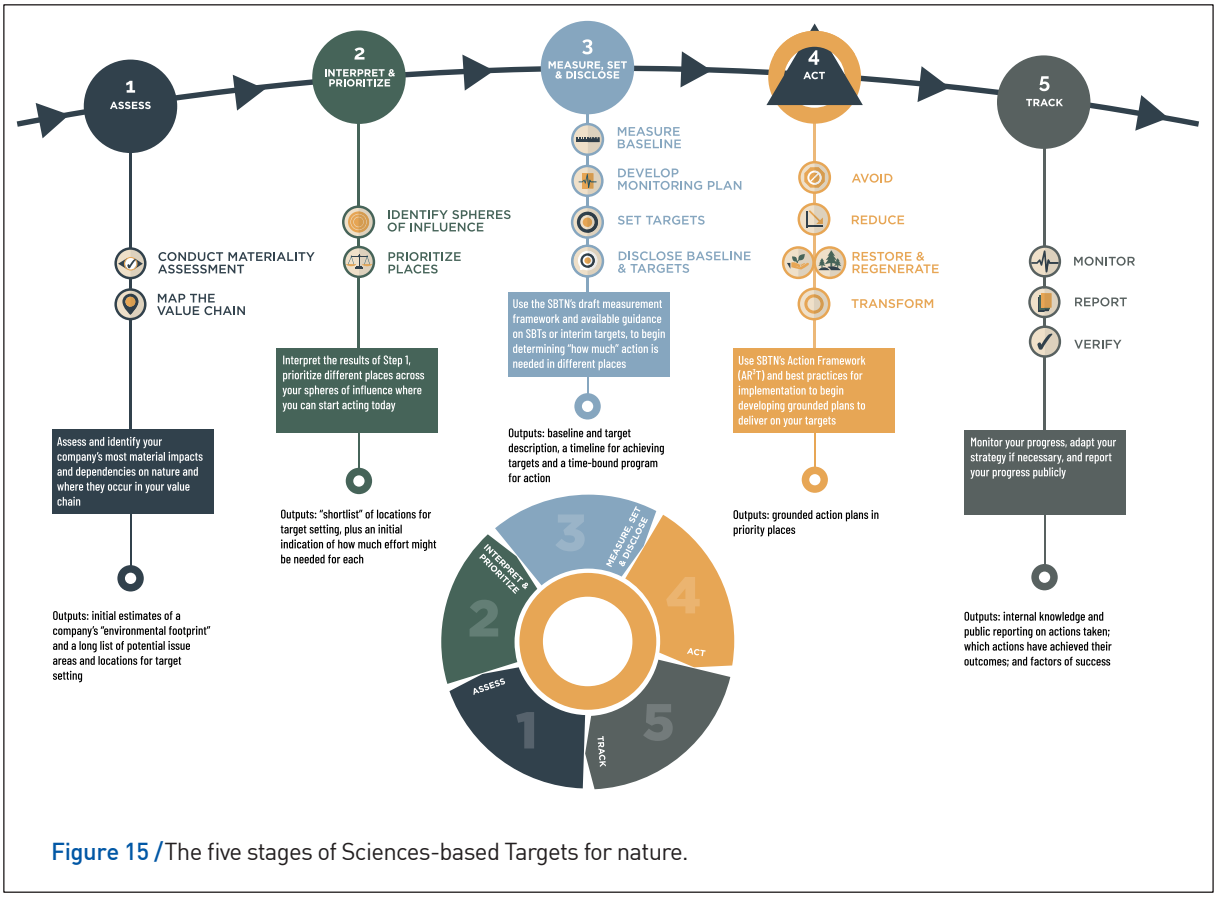


Figure 15 / The five stages of Sciences-based Targets for nature.

141 https://www.globalcommonsalliance.org/.

Generally speaking, they found it useful to analyse materiality, including value chain impacts. This is an essential step in the definition of priorities and management plans, even though the very exhaustive data collection task may seem cumbersome.

They noted that many choices had to be made at various stages of the method with respect to scopes, work scales, and timescales for each pressure. This bears out the observation that science does not provide answers based on subjective corporate decisions and raises the question of what criteria are used in making judgements.

They went on to note that the proposed default values provided by databases such as ENCORE did not always match the scales given by other methods, and can be called into question because they do not depend on local contexts, as in the case of water.

Kering's use of the conceptual framework proposed by the Science-based Targets Network (SBTN) allows it to achieve the group's nature ambition and adopt as well as implement the commitments to avoid, reduce, offset and restore nature well beyond the offsetting of residual impacts.

KERING

Net-positive ambition on biodiversity and use of the SBTN methodology

Kering's activities are closely linked to the health and proper functioning of natural ecosystems. In order to place biodiversity at the heart of its operations and strategy, Kering has developed an ambitious Biodiversity Strategy based on the «conservation hierarchy», which underpins the recommendations of the Science-Based Targets Network (SBTN): «avoid, reduce, restore & regenerate, and transform».

Firstly, the group seeks to avoid negative impacts associated with its activities, for example, by avoiding sourcing linked to deforestation or the conversion of natural ecosystems. Next, it minimizes impacts that cannot be completely avoided, for instance, by striving to ensure that 100% of raw material sourcing is sustainable, in line with Kering Standards. Additionally, the group also aims to have a positive impact on nature, climate, communities, and animal welfare through the practices used to produce its raw materials, supporting the implementation of regenerative practices on one million hectares of farms and pastures within its supply chains by 2025. This is done through the Regenerative Fund for Nature, launched with Conservation International in 2020, focusing on materials with the highest environmental impacts according to the EP&L[142]: leather, cotton, cashmere, and wool. By 2025, Kering is also committed to protecting an additional one million hectares of critical and «irreplaceable» habitats outside of its supply chains through nature-based solutions. This target of protecting, restoring, or regenerating 2 million hectares by 2025 is approximately six times larger than the footprint of the group's activities and sourcing as estimated by Kering's Environmental Profit and Loss (EP&L) account.

Finally, it is essential to drive a systemic transformation of the sector; therefore, Kering is committed to coalitions and collective initiatives such as the Fashion Pact, the Watch & Jewellery Initiative 2030, or One Planet Business for Biodiversity, with the aim of collectively acting on climate, biodiversity, and ocean preservation.

Through these various fields of action, Kering has committed to having a net positive impact on nature by 2025 and publishes an annual report on the implementation of these commitments.

142 *Environmental Profit and Loss Account*.

2 Towards «nature-positive» activities

In the absence of scientifically established pathways for setting action objectives, the recently coined and fast-spreading term «nature-positive» is used to describe a global pathway aimed at halting and reversing nature loss by 2030, and restoring it entirely by 2050 (compared to 2020). The term sums up the will of a growing number of stakeholders to initially follow global nature-neutral pathways (stop degradation), before returning to the prosperous biodiversity some businesses henceforth define on their scale when developing and managing their biodiversity strategies.

The term «nature-positive», originally coined by WWF[143] in 2020, has seen several attempts to define it from a corporate perspective by the WBCSD, the Business for Nature Coalition and the European Business and Biodiversity Platform. Its aim is to bring together and mobilise, and to facilitate awareness and support across the business world.

In practice, it raises a number of questions since the achievement of the goal of 'neutrality' followed by «full restoration» relies on scaling up offsetting projects, ecological rehabilitation, and rewilding, and therefore on accepting many equivalences between ecosystems and their characteristics. On the other hand, the absence of a single integrated indicator for measuring impacts and positive contributions raises the question of how a company can justify the alignment of its individual pathway with a global «nature-positive» pathway. Moreover, widespread offsetting raises the issue of land availability, which is already proving to be an obstacle locally.

The study of corporate practices and how they appropriate and use the term nature-positive helps to clarify the debate. In applying this concept, VINCI's approach is to build pathways for reducing the most material pressures at first and to initiate restoration actions simultaneously.

Engie's ambition to align itself with a global «nature-positive» pathway has led it to adopt a set of principles and implement them into operational actions with the support of a broad range of stakeholders.

143 *WWF (2020). Nature-Positive by 2030 for us and for nature.*

Define and implement actions to reduce pressures on biodiversity and restore natural habitats by 2030

Because construction projects and infrastructures managed by VINCI have direct or indirect impacts on natural environments, their preservation is an integral part of the group's design, construction, and operation processes. Thus, throughout the life cycle of the projects, VINCI's priority is to minimise their impact on natural environments while adapting its businesses to ecological and climate challenges.

To achieve this, the group has committed to the following goals by 2030:

- achieve zero pesticide use (excluding contractual measures);
- achieve a net zero land take (ZAN) for VINCI Immobilier in France;
- work towards zero net loss of biodiversity.

In order to measure the biodiversity footprint of its activities and implement proportionate and context-specific actions, a variety of indicators are deployed. These indicators track the long-term evolution of biodiversity within highway or quarry operation companies, allowing for necessary adjustments to be made to actions. They also integrate the challenges related to the value chain. The Ecological Quality Index (IQE) from the National Museum of Natural History has been deployed for over 10 years on quarries with significant biodiversity interests managed by VINCI Construction. By 2030, 100% of operating sites must have implemented voluntary actions in favour of natural environments.

In 2022, VINCI Autoroutes developed a biodiversity footprint indicator that integrates the value chain. By 2030, the company plans to restore 200 sites within its network's rights-of-way in partnership with the National Forestry Office.

As a developer, VINCI Immobilier has chosen to focus its strategy on protecting natural environments, with the goal of achieving net zero land take (ZAN) by 2030. This involves measuring, using a calculation method defined based on existing work, the evolution of land take and renaturation before and after projects. This land take rate is systematically reviewed during project acceptance committees. VINCI Immobilier primarily focuses on the rehabilitation of urban brownfield sites.

Finally, similar to VINCI's ecological engineering offering (Equo Vivo), understanding and mastering biodiversity issues are a differentiating factor that ensures a better response to clients. Developed by VINCI and AgroParisTech and operated by Urbalia, Biodi(V)strict® is the first predictive tool that allows for the assessment of the biodiversity potential of construction projects. It evaluates the services provided by nature and informs urban project designers about biodiversity preservation.

Universeine, the athletes' village in Saint-Denis, is a redevelopment project of a former industrial brownfield spanning 6.4 hectares, which was developed by VINCI Immobilier.

Reflections on defining a nature-positive ambition and trajectory

In December 2022, states and civil society contributed to the adoption of the new Global Biodiversity Framework, whose main objective is to halt and reverse biodiversity loss by 2030 and achieve a «nature-positive» state by 2050. How can an economic actor like ENGIE effectively and concretely align itself with this new framework?

Since the end of 2021, the group has been involved in the pilot phase of the SBTN methodology. This pilot allowed for the selection of tools to assess impacts and dependencies, and to estimate the work needed to define trajectories that contribute to reversing biodiversity erosion. The ENCORE tool is notably used in addition to the results of LCA analyses conducted by ENGIE.

The assessment of direct impacts and dependencies for each site, as well as indirect ones in the supply chain, proves to be particularly complex due to the spatial dimension adding difficulty to data collection.

Beyond corporate-scale actions, the group's entities are also conducting several pilots to choose the most suitable tools for monitoring the implementation of actions targeting biodiversity or its erosion factors (water, land use, or pollution): the Global Biodiversity Score, LCA, and an avoidance measurement methodology are currently being tested.

Although, to date, the group has not finalized a «nature-positive» trajectory, several commitments already made, particularly in the international act4nature scheme, are moving in this direction:

- application, in consultation with stakeholders, of the «Avoid-Reduce-Compensate» sequence for all development projects, whether mandatory or not;
- reduction of freshwater consumption;
- reduction of waste volumes and atmospheric pollutants;
- deployment of ecological management on all sites and action plans for all sites located near a sensitive biodiversity area;
- implementation of Nature-Based Solutions in compliance with the IUCN standard.

To implement these actions, the group has relied on the expertise of its partners for over 10 years: the French Committee of the IUCN and France Nature Environnement. In 2022, ENGIE also entered into a partnership with UNEP-WCMC through the Proteus program.

Mangrove plantation. ©Engie.

Dans le cas de Schneider Electric, les enseignements apportés par la mise en œuvre d'une diversité de méthodes a permis de construire une ambition globale d'atteindre l'objectif de zéro perte nette de biodiversité dans les opérations directes d'ici 2030.

Consistency of challenges, complementarity of tools!

In 2020, Schneider Electric measured and published the overall biodiversity footprint of its activities using the Global Biodiversity Score tool. This exercise helped identify priority actions:

1) reduce greenhouse gas emissions, which contribute to 70% of the measured biodiversity footprint;
2) reduce land occupation, responsible for 30% of the measured biodiversity footprint, mainly linked to wood and metal ore sourcing.

The use of the TNFD framework confirms these conclusions and encourages assessing the level of maturity in relation to reporting recommendations. While quantifying dependencies on ecosystem services remains a challenge, several existing internal processes (such as the Quarterly Quantitative Sustainable Development Steering through the Schneider Sustainability Impact, governance, risk management, etc.) facilitate the adoption of the framework. For instance, biodiversity-related risks are already integrated into the group's risk taxonomy. The exercise confirms that robust governance, capable of finely adapting to different territories, is necessary to make biodiversity consideration more systematic.

Circular economy and the establishment of local plans at the site level represent the main opportunities to reduce impacts on biodiversity. Having experimented with the SBTN method reveals that in the future, procedures will need to be simplified in order to, much like carbon accounting, broaden its deployment. However, it is important to accept this contribution to evolution. It is also an engagement approach.

These experiences have led Schneider Electric to adopt a pragmatic approach that aligns with the group's overall ambition to achieve the goal of zero net loss of biodiversity in direct operations by 2030. This ambition has inspired the construction of action commitments recognized by the international act4nature initiative and based on five pillars: regularly update and publish the biodiversity footprint, reduce impacts and commit to scientifically based objectives, develop solutions and technologies contributing to biodiversity preservation, engage and transform the value chain, and act locally by engaging employees and stakeholders.

The lack of a clear definition of what contribution business can make to the global «nature- positive» goal can lead to risk of misuse and, in some cases, accusations of greenwashing by certain environmental NGOs[145], some of which have already been published in the press[146]. Pending a clear and universally accepted definition and principles of use, implementing strategies that contribute to the goals of the Global Biodiversity Framework might be preferable to using the still evolving term «nature-positive».

Regardless of the wording, a reading of the above testimonies suggests that the credibility, seriousness and effectiveness of an implementation strategy that contributes to the global goal of halting and reversing global biodiversity loss by 2030 relies on many conditions and adherence to several principles.

It seems essential to apply the avoid-reduce-offset sequence in that order to all corporate activities and to implement additional restoration actions deemed relevant by trusted third parties.

Acting on these principles across the company's value chain and within its sphere of influence would already be a very ambitious exercise.

144 Program established in 2004 with objectives revised every 5 years.
145 What is wrong with «Nature Positive»? Greenpeace. 9 décembre 2022.
146 Le Monde, Tribune du 16 décembre 2022. COP15 : « La participation des entreprises aux discussions sur la biodiversité fait obstacle à tout progrès ».

3 Act4nature: submitting goals to collective judgement

As we have seen, assessing the impacts of business activities and decisions on nature and biodiversity is complex even in local contexts. Public players and businesses most often do so with consultants and experts, and implicitly allocate values to different metrics via the decisions they make to promote a particular action or neglect a particular metric.

IPBES affirms that the values given to nature depend directly on how, why and by whom the assessment processes are designed and implemented. The assessment of nature's values is therefore specific to each individual, stakeholder and interest group, and the inclusion of a variety of viewpoints is essential for a company's assessment exercise and ensures the most reliable representation possible.

An IPBES analysis of more than 1,000 nature value assessment studies carried out by private and public players, however, shows that only 2% of players consulted stakeholders on the nature valuation outcomes obtained by the study, and only 1% of studies involved stakeholders at every stage of the valuation process[147].

Following these findings, one of the solutions recommended by IPBES to integrate a fuller representation of nature's values into decision-making is to collectively form or express its values through deliberative processes that bring together different types of values which are difficult to aggregate.

A company makes commitments on its impacts to anticipate or meet the various expectations of its stakeholders, shareholders, employees, neighbours, and customers, as well as of environmental associations and public opinion. Some rely on science, but each has its own criteria. In the absence of an indisputable scientific reference, it is reasonable for businesses to rely on a relevant collective judgement or even an ambition that includes or represents the ambition of stakeholders expressing those expectations.

Such a collective view is at the heart of the structure and operation of voluntary commitment schemes of action carried out by act4nature International, Entreprises Engagées pour la Nature, Transport4nature and act4nature Portugal.

The schemes contain two types of commitment:

- ten common commitments (Table 3) to take biodiversity into account in all corporate processes, including methodological commitments (not level or pathway commitments), and a commitment to transparency on commitments and the outcomes of their implementation, ideally audited by an independent third party;
- company-specific action or outcome commitments that must be SMART (specific, measurable, additional, relevant and time-bound). The assessment of SMARTness is made by a group of stakeholders that includes scientists and NGOs, and allows a collective judgement to be drawn of the relevance of commitments, the level of objectives and the pace of progress the company assigns itself.

In the absence of a predefined long-term pathway, successive recommitments by businesses will eventually outline a pathway to progress that is properly understood and managed. When the scientific community is able to identify global or local objectives for the restoration of some metrics or ecosystems, businesses engaged in schemes on the basis of act4nature principles should be able to adjust the ambition of their actions and define for themselves appropriate pathways towards those objectives.

147 IPBES (2022). Methodological Assessment Report on the Diverse Values and Valuation of Nature of the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services. Balvanera P., Pascual U., Christie M., Baptiste B., Gonzalez-Jimenez D.(eds.). IPBES secretariat, Bonn, Germany.

act4nature international

Submit action commitments for stakeholder review

Launched in July 2018, act4nature international is a voluntary commitment initiative aimed at protecting, enhancing, and restoring biodiversity by encouraging concrete action from the private sector. Open to international corporations, this initiative has recognized and published the commitments of 67 companies from various economic sectors.

The engagement methodology is based on ten common commitments aimed at incorporating biodiversity into all decisions of a company in response to the local, diffuse, and multidimensional nature of biodiversity. To account for the specific relationships that each company has with nature, and in response to the absence of universal indicators, the initiative encourages each company to adopt ten common principles and translate them into individual commitments; their SMART character is validated by a steering committee composed of participating companies, environmental NGOs, scientific actors, and representatives from business networks.

This «collective judgment» assesses the SMART nature of individual commitments and their consistency with, at a minimum, a trajectory towards zero net loss of biodiversity in new projects. The steering committee also verifies that the commitments pertain to the most tangible activities of the companies. The publication of the common and individual commitments signed by the company's CEO lends real credibility to the approach and helps mobilize internal teams and foster dialogue with external stakeholders (investors, financial partners, NGOs, etc.). Every two years, companies are invited to evaluate the implementation of their commitments, which is then published online and freely accessible.

Associating a biodiversity gain with each action for companies regardless of their level of maturity, this initiative is part of an iterative and continuous improvement process, and regularly encourages companies to renew and strengthen their voluntary commitments. The first overall assessment published for the period 2018-2020 confirmed the effectiveness of the initiative and the proactive efforts of the engaged companies: 96% of the commitments made during this period were completed or had shown progress. The second assessment, for the period 2020-2022, also demonstrates a strong commitment from the companies.

SMART COMMITTMENTS

S **SPECIFIC** to biodiversity

M **MEASURABLE** implementation of key KPIs

A **ADDITIONAL** to current legislation or regulation

R **RELEVANT** material issues and achievable targets

T **TIME-BOUND** explicit implementation dates

KEY FIGURES

5 years of experience

13 partners

67 committed companies

3.5 m employees

57 PUBLIC REPORTS

486 INDIVIDUAL COMMITTMENTS

The French Program «Entreprises Engagées pour la Nature»

The French Biodiversity Agency (OFB) leads the «Committed Enterprises for Nature» program, which aims to **identify**, **recognize**, and **promote** voluntary action plans by companies in favor of biodiversity.

It is open to French companies of **all sizes** and from **all sectors** of activity, whether they are experienced or just starting out in biodiversity matters, and who want to commit through concrete actions aimed at transforming their core business throughout the value chain.

To date, **more than 200 companies** are members, and nearly 120 of them have submitted their action plans, demonstrating their commitment to biodiversity

These companies join a **community of actors and practices** that facilitate peer-to-peer exchange, provide access to tools and resources, and highlight their actions at events such as the Biodiversity and Economy Forum, organized every two years by the OFB.

The program consists of three steps:

1. the company's membership in the program is based on the signing of 10 common principles by its management;
2. the company's commitment is then based on the submission, within one year, of a voluntary action plan, based on a prior assessment of its dependencies and impacts on biodiversity. The company thus commits to act directly on its core business and throughout its value chain;
3. the evaluation and recognition of the action plan, carried out by the OFB and other external reviewers, takes place every two years and at the end of the implementation of the action plan. In a perspective of continuous improvement, the company is encouraged to renew its commitment, taking into account the recommendations made during the evaluation.

Sunny departmental road. ©Arnaud BOUISSOU / TERRA.

Table 3	The ten common commitments adopted by the commitment schemes of act4nature international, Entreprises engagées pour la Nature, Transport4nature and act4nature Portugal

N°	Topic	Description
1	Strategy	Factor biodiversity into our business strategy based on available scientific knowledge.
2	Stakeholder dialogue	Discuss with all our stakeholders their expectations, and our impacts, actions and progress.
3	Valuation	Value the various components of biodiversity that concern us using direct and indirect indicators of impacts, risks and progress and, where relevant for decision-making, make an economic appraisal of our impacts and dependencies on the proper functioning of ecosystems.
4	Value chain	Promote the gradual integration of biodiversity into decisions along our value chains, from the production of natural raw materials to end-of-life products after their use by consumers.
5	No net loss	First and foremost avoid, then reduce and ultimately offset our impacts, aiming on a case-by-case basis for at least no biodiversity net loss and even biodiversity net gain in our business activities and geographical areas of influence, after taking into account the need for ecosystems to adapt to climate change.
6	Nature-based solutions	Develop nature-based solutions as a priority, ensuring their implementation is conducted in a scientifically based and beneficial way for biodiversity, including promoting variety in the solutions.
7	Dialogue with public authorities	Integrate biodiversity into our discussions with public authorities in order to support the inclusion of this issue in public policies. When invited, contribute to national biodiversity strategies in countries where we operate.
8	Awareness-raising and training	Raise awareness and train our employees in biodiversity and its relationship with their business. Promote and encourage their initiatives in favour of nature and give recognition to those actions and practices.
9	Partnerships	Mobilise resources and establish appropriate partnerships to support and monitor our tangible actions.
10	Reporting	Publicly report on the implementation of these commitments and our individual commitments set out below.

CONCLUSION

The scientific community acknowledges that the degradation of nature continues to accelerate under the impact of human activities to the point where it is fully justified to call it the sixth mass extinction. Biodiversity loss is already causing disruptions that directly affect society, the functioning and sustainability of the activities of human societies, and businesses. Several institutions in fact recognise that the decline in ecosystem services on which society at large depends is threatening the financial system's stability.

The improvement of scientific knowledge about the relationships between biodiversity, climate and health has reinforced awareness of the fact that the environmental crisis is systemic in nature and driven businesses to find ways of implementing an integrated ecological transition which encompasses biodiversity, climate and social issues, rather than separating them, and so increasing the risk of working at cross-purposes. Public opinion pressure and the development of regulatory and normative frameworks in France, Europe and the world are accelerating the adoption of these practices.

Factoring these issues into the business models of players is of course the most effective way of scaling up action, underpinned by standards and regulations or various incentives in as much as a spontaneous culture change is not forthcoming. Based on some sixty testimonials from businesses, financial institutions, academics and NGOs, this publication highlights many success stories. Our assessment of practices has enabled us to identify and better understand corporate methods involving a specific value being awarded to nature according to which action can be taken to preserve, restore or even enrich it in ways that deliver benefits to businesses, reduce greenhouse gas emissions and induce climate change adaptation.

Several examples suggest that locally-defined actions take better account of the multiple dimensions of living beings, because they both leverage a wide range of indicators and a broad community of stakeholders and produce the best outcomes. In other words, the tendency of economic players to simplify and hence optimise a small number of metrics is doomed to fail because of the sheer number of dimensions to be taken into account. In short, under this approach, every player has their own appreciation of what constitutes thriving nature.

The development of new business models, as we have amply shown, logically helps to expand thinking on the relevant indicators. The cost of actions with biodiversity-positive effects can sometimes be borne by profits from the sale of a major product or service. Above all, as new instruments are developed it becomes possible to progressively incorporate the economic value of environmental services into existing business models, or even create new models. Payments for Environmental Services (PES), environmental offset schemes, and forthcoming biodiversity certification should help increase the contribution of the private sector to the achievement of the global goals of the Kunming-Montreal Framework adopted in December 2022 by 196 countries at COP16 of the Convention on Biological Diversity. However, as the examples in this publication show, the successful business models often relate to activities whose link to nature is quite direct, as in the case of agriculture, forestry, real estate, environmental services, energy and transport infrastructure.

The examples in this report also show that the returns on ecosystem investments are often lower than those for more conventional models, with longer lead times reflecting the pace of nature and biological cycles. Benefits for nature and society are generally more diffuse and their enhancement cannot be clearly linked to the activities of a particular company. Concerted action by stakeholders, public authorities and economic players, therefore, appears to increase the appetite for biodiversity-friendly investments, often by integrating certain environmental externalities into business models.

Even where individual corporate practices improve, the problem of scale remains. The occupation of spaces by human activities, no matter how well managed, hinders the free growth of ecosystems - a precondition for stopping extinction. Kunming's objectives include some very ambitious goals for protecting natural spaces from human activities. Steadfast restraint will therefore be required to halt biodiversity loss and reduce the collective footprint of economic activities. The concept of a climate budget and French policy of restricting land use are examples of this approach.

Provided restraint is organised jointly through a voluntary and regulatory collective framework, it will produce viable and profitable biodiversity-friendly business models. For example, the scarcity of land resulting from the goal of no net land use (ZAN) set by the Climate and Resilience Law is already causing usable land prices to rise and some decontamination and insurance services to turn a profit. But not all businesses have identified those models and acceptance of this modus operandi by society as a whole largely remains a goal rather than a reality.

As far as biodiversity is concerned, it appears the business community must accept, as Tatiana Giraud, professor at the Collège de France puts it, that it has to «operate in the manner not of an engineer, but of a handyman» [148]. Using nature's own processes is undoubtedly the best way for it to recover the functions which have ensured its success since the beginning of life on Earth. Indeed this calls for a paradigm shift in the operations of businesses, accustomed as they are to setting global development pathways and continuously optimising the benefits derived from the systems they build.

As with the international act4nature scheme, the method of collectively and progressively developing goals and hands-on approaches at grassroots level has shown that it closely matches the functioning of ecosystems, our understanding of which is growing by leaps and bounds. We have observed that stakeholders are able to learn collectively as and when an action is implemented. IPBES holds that these deliberative methods of collectively assessing values ensure the integration of a more reliable representation of nature into business decisions. The forthcoming report on the relationship between the economic world and biodiversity should shed light on these findings.

The swift and successful implementation of an integrated biodiversity-friendly ecological transition will involve restoring or creating new, stronger and more balanced connections between human and natural ecosystems and challenging the old control-based and domination-centred approach on which the development of Western society has long relied.

148 Quote by François Jacob (1981) used by Tatiana Giraud during her inaugural lecture at the Collège de France (2022): « Dynamique de la biodiversité et évolution : formation des espèces, domestication et adaptation ».

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Founded in 1992, Entreprises pour l'Environnement (EpE) is gathers of some sixty French and international companies that exchange their best practices and work together to better factor the environment into their strategies and operations. Its purpose, **a single planet and a thriving world**, sums up the determination of its members to drive their own ecological transition as well as that of society, and to achieve economic development compatible with planetary boundaries and with what is socially accepted, or even desired. EpE is the French partner of the World Business Council for Sustainable Development (WBCSD).

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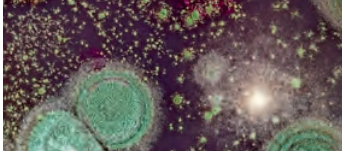

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