SUSTAINABLE FINANCE LAB

FROM PARIS TO KUNMING

Enabling a carbon net zero and nature-positive financial sector

In this paper

The financial sector has a big impact biodiversity – positive, but still mostly negative. An integrated approach is needed with climate change, given the existing synergies and trade-offs.

Private and public financial institutions need to recognize the double materiality dynamic and work together towards a more nature-positive and climate-neutral future.

Supervisors, fiscal and monetary policymakers should act now and in accordance with the precautionary principle to avoid the worst effects of climate change and biodiversity loss.

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POLICY PAPER

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The Sustainable Finance Lab (SFL) is an academic think tank whose members are mostly professors from different universities in the Netherlands. The aim of the SFL is a stable and robust financial sector that contributes to the economy that serves humanity without depleting its environment. To this end the SFL develops ideas and provides a platform to discuss them, thus bridging science and practice.

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Policy Paper

Sustainable Finance Lab publishes different types of publications.
This is a Policy Paper. Policy papers are reports produced by SFL members or employees that contain specific proposals and recommendations for the financial sector or policy makers. The views expressed in this publication are those of the authors and do not necessarily reflect those of all members of the Sustainable Finance Lab.

SUMMARY

A global agreement on biodiversity could ramp up much needed action. This year the Global Biodiversity Framework could do for biodiversity what the Paris agreement of 2015 has done for climate change: set a clear objective that galvanizes action globally for all actors — both public and private.

Participation of the finance sector is indispensable for realizing global biodiversity goals. The financial sector performs crucial allocation decisions that help determine whether global biodiversity ambitions are realized.

Biodiversity loss and climate change pose a fundamental threat to financial stability. Both individual financial institutions and the financial system as a whole are at risk. Biodiversity loss and climate change thus need to be on the radar of every financial policy maker, risk manager and supervisor.

The financial sector has potent instruments at its disposal to help remedy the situation. It can effectively reduce risks and seize opportunities in the fields of biodiversity and climate through the companies that it finances.

An integrated approach is needed. There is both a large potential to realize synergies in tackling biodiversity and climate issues, as well as important trade-offs between them.

The financial sector focuses mainly on climate change. Attention for biodiversity is growing but still much less developed.

Regulators have focused primarily on data availability. However, thereby the focus has been mainly on climate data.

Public budgets still contribute to biodiversity loss and climate change. Global targets to reduce harmful subsidies and increase spending on mitigation have not been met in both fields.

Public investment institutions play an important role in climate change mitigation. Biodiversity loss has, however, not been as high on the agenda as has climate.

Financial supervisors have started to consider climate change. They do research, conduct stress tests and declare supervisory expectations. However, so far, little corrective action has been undertaken. And for biodiversity only preliminary research has been done.

Monetary policy is starting to take climate change into account. Several large central banks have introduced policies to decarbonize their monetary policy instruments or have announced that they will do so. For biodiversity there have been no such actions.

The window of opportunity to realize global goals on climate change and biodiversity is closing. The world is expected, soon, to cross thresholds — for both climate and biodiversity — beyond which deterioration will accelerate and become irreversible. The coming years will be decisive.

The financial sector should recognize its role in climate mitigation and biodiversity preservation, and act according to the precautionary principle. To that end we propose:

To private financial institutions

1. **Make biodiversity part of an integrated strategy** with climate change and develop a policy built on a carbon net-zero and nature positive transition pathway.

2. **Develop data** and methodologies to identify and report on biodiversity related risks and opportunities and integrate these with climate change data and methods.

3. **Create awareness** at the executive level on the importance of biodiversity in relation to climate change.

4. **Map** the hotspots in your portfolio to show high risks on biodiversity loss, at a sectoral and geographical level.

5. **Engage** with the most heavily exposed companies.

6. **Refrain** from financing and investing in the most controversial and unresponsive companies.

7. **Translate** biodiversity risks and opportunities into differences in the cost of capital.

8. **Avoid tradeoffs** between climate and biodiversity.

To public policy makers

1. **Make alignment of financial flows** part of the post-2020 Global Biodiversity Framework.

2. **Ensure** that climate mitigation measures do not harm biodiversity.

3. **Improve the business case of nature-positive** business through regulation and pricing.

4. **Lead by example** with the public budget, ending harmful subsidies and increasing public investments.

5. **Supervision: act now**, confronting financial institutions which have high climate and/or biodiversity risks with higher capital requirements or measures to limit their exposure.

6. **Monetary policy: decarbonize** monetary policy portfolios and include biodiversity considerations.

7. **Enable** climate mitigation and nature-positive investments also in the poorest countries through the use of innovative instruments and multilateral development banks.

CONTENT

LIST OF ABBREVIATIONS

ABP	Algemeen Burgerlijk Pensioenfonds (National Civil Pension Fund)
AFD	Agence française de développement (French Agency for Development)
AUM	Assets under management
BACEN	Banco Central do Brasil (Central bank of Brasil)
BFFI	Biodiversity Footprint Financial Institutions
BIOFIN	Biodiversity Finance Initiative
CAP	Common Agricultural Policy
CBD	Convention on Biological Diversity
CBF	Corporate Biodiversity Footprint
CBPS	Corporate Bond Purchase Scheme
COP	Conference of the Parties
CSPP	Common Sector Purchasing Programme
CSRD	Corporate Sustainability Reporting Directive
DFC	Debt for Climate
DNB	De Nederlandsche Bank (Dutch central bank)
ECA	Export Credit Agency
ECB	European Central Bank
EIB	European Investment Bank
ENCORE	Exploring Natural Capital Opportunities, Risks, and Exposure
ESG	Environmental, Social, and Governance
EUR	Euro
GBF	Global Biodiversity Framework
GBS	Global Biodiversity Score
GBSFI	Global Biodiversity Score for Financial Institutions
GCF	Green Climate Fund
GDP	Gross Domestic Product
GHG	Greenhouse Gas
GSI	Greenness of Stimulus Index

ICAAP	Internal Capital Adequacy Assessment Process
IDFC	International Development Finance Club
IFRS	International Financial Reporting Standards
IMF	International Monetary Fund
IMVO	Internationaal Maatschappelijk Verantwoord Ondernemen (International Responsible Business Conduct)
ISSB	International Sustainabilty Standards Board
LTV	Loan to Value
MPA	Macro-prudential Assessment
NBFP	National Biodiversity Finance Plans
NBSAP	National Biodiversity Strategies and Plans
NDC	Nationally Determined Contributions
NGFS	Network for Greening the Financial System
NGO	Non-Governmental Organization
NRRP	National Recovery and Resilience Plan
OBI	Open Bodem Index (Open Soil Index)
OECD	Organisation for Economic Co-operation and Development
PAI	Principle Adverse Impact
PBL	Planbureau voor de Leefomgeving (Netherlands Environmental Assessment Agency)
PBoC	People's Bank of China
PDB	Public Development Bank
RST	Resilience and Sustainability Trust
SDG	Sustainable Development Goals
SDR	Special Drawing Rights
SFDR	Sustainable Finance Disclosure Regulation
STAR	Species Threat Abatement and Restoration
TCFD	Taskforce for Climate Related Disclosures
TLTRO	Targeted Long-Term Refinancing Operations
TNFD	Taskforce on Nature-related Financial Disclosures
UNDP	United Nations Development Programme
UNEP	United Nations Environment Programme
UNFCCC	United Nations Framework Convention on Climate Change
USD	United States Dollar
WACI	Weighted Average Carbon Intensity
WWF	World Wildlife Fund

1. INTRODUCTION

This year the 196 nations of the Convention on Biological Diversity (CBD) will try to agree on common goals and an implementation framework for biodiversity protection and restoration for 2030 and beyond. The 15th Conference of the Parties of the CBD in Kunming China should do for biodiversity what the Paris agreement of 2015 has done for the global fight against climate change: set a clear objective that galvanizes a coordinated effort for biodiversity from all actors in society, both public and private.

The financial sector is an important actor in all societies. It is finance that takes crucial allocation decisions. Based on expectations about the future, financiers decide which corporations get the funding to realize their plans. Bringing biodiversity into the financial equation can change where this money is flowing. A business case that looks profitable right now may no longer be so when taking into account a future where externalities are priced or regulated in order to reach stated biodiversity goals. Taking biodiversity-related risks and opportunities into account will affect the return on nature-positive investments. It is as much about risks, as it is about opportunities – they are two sides of the same coin.

In recent years climate has risen to the top of the financial agenda. Physical and transition risks have been added to the lexicon of financial risk managers, supervisors and monetary policymakers. Private financial institutions increasingly see opportunities in financing the energy transition and strive for a positive real-world impact. Until now this powerful movement has focused primarily on climate change. But research shows that biodiversity is as essential to our economy and financial system as climate, and the problem of losing nature is at least as acute as climate change, if not more so.

In October 2021 the Kunming Declaration reaffirmed the global commitment to reduce biodiversity loss through an agreement on the post-2020 Global

Biodiversity Framework. The framework will follow a 'whole-of-government' and 'whole-of-society' approach, including all relevant stakeholders in setting targets and policies and cooperating in implementing and executing those. To reach the biodiversity goals governments need to work with each other, but also with indigenous communities, the business sector and civil society. The financial sector too is an essential partner on the road from Kunming, as it is has been on the road from Paris.

However, the journeys from Paris and Kunming towards respectively stabilizing the global climate and restoring biodiversity are not different journeys. Whereas each has its own separate end goal, they are strongly linked. One goal cannot be met without the other. It is therefore important to link policies with regard to climate and biodiversity, to use synergies and avoid the worst tradeoffs.

This report discusses what the financial sector can do, as well as how governments can act to enable the financial sector to fully play its role in achieving both the climate and biodiversity targets. In order to do that, we will formulate recommendations for the private financial institutions, governments and public financial institutions, building on what has already been set in motion with regard to climate in recent years and on the first green shoots of biodiversity policies in finance. These recommendations aim to help describe the role of finance in the post-2020 Global Biodiversity Framework as well as guide governments and financial institutions thereafter.

This report starts with chapter 2 where we describe the current biodiversity and climate change problems and efforts to solve them, as well as synergy and tradeoffs between these agendas. Next, we discuss the relevance of biodiversity and climate change for the economy and financial sector. Then, in chapter 3, we discuss the current state of affairs of climate change in the financial sector, both private and public. In chapter 4 we analyse the state of affairs regarding the financing of biodiversity. Based on this, in chapter 5, we draw our conclusions and formulate recommendations on what private financial institutions can do and how government can stimulate and enable the financial sector to contribute to both biodiversity and climate goals, exploiting the potential for synergies and managing the tradeoffs.

2. THE CLIMATE AND BIODIVERSITY PROBLEM AND THEIR FINANCIAL IMPACT

The climate and biodiversity problem

Climate change is caused by greenhouse gas emissions generated by human activities. Climate change is observed in every region on Earth and global temperature rise currently measures on average approximately 1.1°C warming since 1850-1900 (IPCC, 2018). Beside higher average temperatures, climate change also causes rising sea levels, increasing ocean acidification and extreme events such as floods, droughts, heat waves and wildfires (IPBES-IPCC, 2021).

Global mean temperatures will continue to rise if no mitigation policies are undertaken. One main reason for concern is reaching tipping points in the climate system, abrupt accelerations of climate change when the climate system crosses specific thresholds (IPCC, 2018). Such tipping points include the thawing of permafrost, the loss of the Amazon rainforest, ice sheet disintegration and atmospheric changes (Dietz et al., 2021). The tipping points for Greenland and Antarctic ice sheet are expected to occur between a change of 1.5 and 2°C. As a consequence, millions of people are expected to be displaced by rising sea levels and many more to face food shortages, declining in water supplies, increased sickness and heat-related deaths (Hoegh-Guldberg et al., 2018).

These expected effects differ per region. Urban areas will be more exposed to heat waves and flooding. The consequences for developing countries are most severe as people depend heavily on their natural environment and have least resources to fight climate change (Kelemen et al., 2009).

Climate change is also one of the most important drivers of biodiversity loss (CBD, 2018). The Convention on Biological Diversity (CBD) defines biodiversity as the variability among living organisms at all levels, from genetic levels to landscape levels. Biodiversity underpins the generation of vital ecosystem services which provide benefits to people.

Biodiversity is declining at unprecedented rates. Human modification of nature has resulted in the loss of 83% of wild mammal species and 41% of plants. Only 13% of wetland present in 1700 remained by 2000 (IPBES, 2019). Approximately 1 million plants and animal species are in danger of extinction. (WWF, 2020a). Current studies indicate that biodiversity loss will continue and that internationally agreed environmental goals are unlikely to be met (IPBES 2019, Kok et al., 2018b).

The main drivers of global biodiversity loss are habitat loss, land and sea use change, overexploitation of ecosystems, climate change, pollution, invasive alien species, infrastructure and fragmentation. The future state of biodiversity is largely shaped by activities in agriculture, fisheries, forestry, extraction industries, energy sectors and water management (Kok et al., 2018a).

The Climate Accord and the Convention on Biological Diversity

At the 1992 Rio Earth Summit, a series of environmental agreements was adopted including the United Nations Framework Convention on Climate Change (FCCC). The United Nations Convention on Biological Diversity (CBD) also originates from the 1992 Rio Earth Summit and attempts to address biodiversity loss.

The UNFCCC is governed by the Conference of Parties (COP). The COP 21 in 2015 in Paris led to the Paris Agreement that established binding commitments, but also left room for nationally determined contributions (NDC). There is one quantitative long-term objective to limit global temperature increases to well below 2°C compared to pre-industrial levels, aiming for 1.5°C. In order to achieve the long-term temperature goal, the global GHG emissions need to peak as soon as possible and thereafter reduce rapidly. By the second half of the century, GHG emission neutrality should be achieved. All parties in both developed and developing countries should undertake efforts to reduce GHG emissions as their nationally determined contribution (NDC). For this, the parties are stimulated to develop national long-term development strategies. In 2009 at COP15, developed countries committed to mobilizing USD 100 billion climate finance per year to developing countries by 2020. The Paris Agreement reaffirmed this responsibility. The 2015 agreement also explicitly stated that finance flows, also private ones, should be made consistent with low-GHG-emission and climate-resilient pathways (UNFCCC, 2015).

In October 2021 the first part of COP15 of CBD through its Kunming Declaration reaffirms the global commitment to reducing biodiversity loss and to reaching an agreement on the post-2020 Global Biodiversity Framework (GBF) (CBD, 2021b). The draft post-2020 Global Biodiversity Framework planned to be agreed during the second part of COP15 in Kunming in the second half of 2022, sets out four long-

term goals for 2050 and corresponding milestones for 2030. The four long-term goals are:

1. Increase the area (+15%), connectivity and integrity of ecosystems; reduce the number of threatened species; maintain at least 90% of genetic diversity.

2. Value and maintain nature's contribution to people and support the global development agenda.

3. Ensure that the benefits from use of genetic resources are shared fairly and equitably.

4. Ensure that the means of implementation are available to achieve the Framework's 2050 vision (CBD, 2021a)

The Kunming Accord is built upon a whole-of-society approach, meaning that all types of actors beyond governments are engaged, including local authorities, NGOs, indigenous peoples, youth groups, the business and finance community, the scientific community and citizens (CBD, 2021a).

The "Milestones" for 2030 that need to be realized through the implementation of 21 Action Targets include (CBD, 2020):

- Conserving existing intact and wilderness areas; at least 20% of freshwater, marine and terrestrial ecosystems are restored; 30% of global land and sea areas are conserved under a system of protected areas.
- Eliminate plastic waste.
- Contribute to the mitigation of and adaptation to climate change through ecosystem-based approaches and avoid negative impacts of climate change mitigation efforts on biodiversity.
- Making it mandatory for businesses to report on their dependencies and impacts on biodiversity.

To close the funding gap of at least 700 billion per year the draft agreement calls for the elimination of incentives harmful to biodiversity, such as harmful subsidies, by at least USD 500 billion per year and an increase of nature-positive financial resources from all sources to at least USD 200 billion per year (CBD, 2021a).

Synergies and tradeoffs between climate and biodiversity

Climate change and biodiversity loss are interconnected: they share root causes, which also makes available solutions intertwined (Lucas et al., 2020). Climate change mitigation measures will be beneficial to biodiversity as climate change is the main driver of biodiversity loss. Conversely, conserving biodiversity may help climate change mitigation. For instance, planting trees generally improves biodiversity, and being carbon sinks, trees help sequester carbon from the

atmosphere. However, policies for climate change mitigation can also harm biodiversity. Overall, the evidence suggests that biodiversity conservation is mostly also beneficial to climate change mitigation but that climate mitigation can more often have negative side effects to biodiversity (IPBES-IPCC, 2021). We discuss these in turn.

Synergies

The most important synergy is protection of carbon-rich and species-rich ecosystems. Carbon offsetting can do this, as a nature-based solution to sequester carbon through investments in forest conservation and through afforestation to compensate for emissions elsewhere. Although optimal locations for biodiversity protection do not always coincide completely with optimal land-based carbon capture placement, there is significant overlap (IPBES-IPCC, 2021). For instance, mangroves are important carbon sinks, even more than terrestrial forests. The destruction of mangroves is the most important driver of biodiversity loss in freshwater and terrestrial ecosystems (Alongi, 2014). Restoration is probably the cheapest and most easily implemented nature-based climate mitigation measure, while at the same time enhancing the resilience of biodiversity and people (IPBES-IPCC, 2021).

Sustainable agriculture, fishery and forestry could also improve biodiversity, increase carbon storage, and reduce GHG emissions (IPBES-IPCC, 2021). Sustainable agriculture management includes intensified use of agriculture by increasing the productivity and enhancing carbon stocks. The former practice would free land for biodiversity conservation. Diversification of crop and forest species could enhance biodiversity and reduce climate induced losses of food and timber, especially in the light of extreme weather events (e.g. droughts and fires) and insect, pest and disease outbreaks (IPBES-IPCC, 2021).

Another example of a nature-based solution that benefits both biodiversity and climate mitigation and adaptation is green urban infrastructure: increasing green space in cities that helps urban cooling and flood abatement, but also mitigates air pollution. This entails creating more gardens, parks, green roofs etc. to reduce urban heat island effects, increase carbon storage, and enhance urban biodiversity. This is a particularly important development in light of the growing urban population (IPBES-IPCC, 2021).

The combination of nature-based and technology-based climate change solutions, such as grazing and cropping beneath solar panels, can provide synergies (IPBES-IPCC, 2021). Offshore renewable energy turbines can have beneficial effects on marine systems through the creation of artificial reefs which can provide new habitats and increase heterogeneity in species (Langhamer, 2012).

Tradeoffs

However, there is also a risk that the biodiversity conservation and climate mitigation agendas negatively impact each other. Habitats that store carbon are not always the most diverse or intact (Roberts et al., 2020). Land-based climate mitigation measures focused on carbon capture and storage, such as planting forests or monoculture crops for biomass energy and afforestation or reforestation, can thus also harm biodiversity (IPBES-IPCC, 2021). There are cases where non-native tree plantations are replacing intact native ecosystems (e.g. grasslands). Single-species plantations also risk the development and spread of diseases and pests (Liu et al., 2018). In Chile, subsidized plantation forestry reduced native forests by 13%, reducing biodiversity while increasing carbon storage by 2% (Seddon, 2021). Indonesia also experiences deforestation through palm oil crop plantations and is increasing consumption further through a national biofuel policy (Petrenko et al., 2016). Furthermore, the rainforests in Indonesia grow on carbon-rich soil. To balance out the carbon lost from the displacement of rainforest by palm oil biofuel, will take between 75 and 600 years (Petrenko et al., 2016). Hence, a single-minded focus on climate change mitigation by replacing the consumption of fossil by other fuels might actually harm both the climate and biodiversity system (IPBES-IPCC, 2021).

This is all the more relevant as, at COP26, an agreement was struck on the rules for international trading of carbon credits that is expected to boost the market for carbon offsets. This agreement, enshrined in the Article 6 of the Paris Agreement, has legally and institutionally reinforced the previous efforts to establish ground rules for a functional carbon credit market (Klein, 2021). Even so, the agreement has been criticised for lacking clear standards, transparency and risking double-counting as well as the omission of mandatory indigenous and local stakeholder engagement and in general for improperly accounting for previous imperfections in carbon offset systems (Appunn, 2021; Crook & Dufrasne, 2021; Finance for Biodiversity & Climate Advisers, 2021).

Intensification of agriculture can also be detrimental to biodiversity, such as through the use of phosphorus fertilisers (Van den Berg et al., 2011), pesticides and agricultural water withdrawals (IPBES-IPCC, 2021).

Technology-based measures for climate mitigation can threaten biodiversity as these require extraction of resources and result in toxic waste creation. For example, renewable energies often necessitate mining for minerals and do not always have proper mechanisms for disposal of waste and reuse. Renewable energy infrastructures can also negatively alter the natural environment. For instance, solar plants require large land areas which can destroy natural habitats. Technological measures focused on climate adaptation sometimes ignore their impact on biodiversity (e.g. building sea walls) (IPBES-IPCC, 2021). In addition,

hydropower can have large negative effects on biodiversity, as witnessed by the building of the Three Gorges Dam and the construction of several dams along the Yangtze River (Wu et al., 2019).

A tradeoff between biodiversity conservation and carbon is possible through stimulating ecotourism as a source of funding for biodiversity preservation. Tourism is a significant contributor to global GDP and it is expected to grow at an annual 4% (Lenzen et al., 2018). Ecotourism has prevented further deforestation in many countries, including Costa Rica (Koens et al., 2009). However, tourism is also highly carbon-intensive. Tourism's global carbon footprint accounts for 8% of global GHG emissions and is expected to increase (Lenzen et al., 2018).

The economic impact of climate change and biodiversity loss

The first study into the global macroeconomic effects of climate change (Stern, 2007) estimated that the overall costs of climate change will be equivalent to losing at least 5 percent of global GDP. Wider estimates of damage yield costs of 20 percent of GDP or more. 'Socially contingent' impacts, such as migration and conflict, were not quantified (Stern, 2007). Later, many other studies tried to quantify the effect of climate change and the cost of mitigation. An overview of the literature by the PBL Netherlands Environmental Assessment Agency shows economic damage ranging from 10 percent to 47 percent of global GDP if the temperature increase reaches 4□C degrees Celsius (A. Hof et al., 2014). In more recent studies the economic damage of such a scenario is estimated at between 4 percent of GDP (Nordhaus & Moffat, 2017) and 40 percent of GDP (Burke et al., 2015), with 16 percent of GDP as the best estimate (Howard & Sterner, 2017).

Like the physical consequences of climate change, the impact on the economy is not geographically uniform. The countries in the Global South will be more affected than in the North. Burke et al. (2015) estimate that by 2100 GDP per capita in South Asia, Southeast Asia and Sub-Sahara Africa will be 80 percent lower should global warming hit 3.7□C compared to a scenario without climate change. Weitzman (2009) even speaks of potentially infinite costs of unmitigated climate change, including, in the extreme, human extinction.

It is estimated that over 50% of global GDP depends on biodiversity. The loss of coastal habitats and protection already puts 100-300 million people at risk of floods and hurricanes. The effect of climate change on invasive species is also concerning as it can lead to the emergence of new diseases (IPBES-IPCC, 2021; NGFS, 2021a). The highest dependency on nature is found in primary sectors such as agriculture, fisheries, aquaculture and forestry. Other sectors dependent on nature include energy, water, oil, gas and mining. Biodiversity loss would thus impact the business operations and profitability of companies in these sectors (DNB, 2020).

The economic impact of biodiversity loss is highly unevenly distributed globally. A 90% loss in the services of tropical forests, wild pollinators, and marine fisheries is estimated to result in a loss of 2.4% of real GDP by 2030 globally. Disaggregating this number shows that lower income countries will be impacted much more at -10.1% GDP, than rich countries, which are projected to lose 0.8% of their GDP (Dasgupta, 2021; Johnson et al., 2021).

The financial impact of climate change and biodiversity loss

The economic impact of climate change and biodiversity loss will impact most financial institutions materially through traditional financial risks such as credit risk and market risk (DNB, 2020; NGFS, 2021a). These risks can have their origin in either physical or transition shocks.

The financial impact of biodiversity loss and climate change resulting from physical changes in the world is referred to as the 'physical risk'. Physical sources of risk include, for example, the disappearance or decline of ecosystem services on which economic actors depend or rising sea levels due to climate change. The impacts of both climate change and biodiversity loss are subject to non-linear dynamics, such as feedback loops and tipping points when certain thresholds are exceeded (Rockström et al., 2009; Steffen et al., 2015). It is difficult to predict when such thresholds occur (Hillebrand et al., 2020; Lovejoy & Nobre, 2018). Recent studies on biodiversity-related risks emphasize that the concept of 'green swans', i.e. 'low probability high impact' shocks caused by climate- or biodiversity-related events such as a pandemic, is particularly relevant when dealing with biodiversity (Bolton et al., 2020; Chandellier & Malacain, 2021; Dasgupta, 2021).

However, even if effective action is undertaken to halt biodiversity loss and climate change, this can result in new biodiversity- and climate-related financial risks. These 'transition risks' result from a misalignment between financial institutions' portfolio allocations and strategies and developments aimed at reducing or reversing the damage to biodiversity and ecosystems and to mitigate climate change, such as government measures, technological breakthroughs, litigation and changing consumer preferences. For instance, the sudden loss in value of a company whose business model is dependent on deforestation that becomes forbidden, or the fossil fuel reserves that become worthless when demand falls.

It is, however, not only the impact of destruction of biodiversity and the climate on the financial portfolio's that matter. The reverse is also true: lending and investments impact biodiversity and climate change. This interaction between the financial sector investments and the biodiversity loss and climate change exacerbation is called 'double materiality' (Oman & Svartzman, 2021).

The impact of financial institutions on nature however is not only relevant for its direct or indirect financial risk. Increasingly clients and employees of financial institutions care about this impact — as a value in itself. Neglecting this impact may therefore lead to loss of clients and employees. Central banks also increasingly look at the impact of their policies (ECB, 2021b), as indeed their mandates oblige them to do (van Tilburg & Simić, 2021).

Disregarding nature related risks will lead to an underestimation of both financial risks and opportunities. The Finance for Biodiversity Initiative (2021) argues that the combined physical impacts of nature loss and climate change can compound business risks significantly. The strongest examples exist for agriculture, forestry and fisheries, built infrastructure and utilities. By considering climate but not nature, the market values of bioenergy, large infrastructure projects and low-carbon materials in 2050 are likely to be overestimated due to their large potential negative impacts on nature (C. Hof et al., 2018; Seiler & Folkeson, 2006; Sonter et al., 2018).

According to a modelling exercise by Vivid Economics, gross domestic product (GDP) growth in the agriculture sector alone is inflated by an estimated USD 1.9 trillion, and current market expectations for new sectors like bioenergy could be overstated by a factor of 30 (Finance for Biodiversity, 2021a). Risks are also severely underestimated for sectors that have relatively small climate risks but rely heavily on nature, such as pharmaceuticals.

In contrast, nature also offers increased opportunities: such as greater demand for nature-positive carbon sequestration through nature-based solutions and for novel agricultural practices such as regenerative or vertical farming (Finance for Biodiversity, 2021a).

3. CLIMATE FINANCE

The role of the financial sector in mitigating climate change has been discussed for some time. A breakthrough in the discussion was the concept of the carbon bubble. This term denotes investments into fossil fuels leading to emissions beyond what the global carbon budget allows, leaving them exposed to being stranded (Carbon Tracker, 2011). This risk lens with regards to investments in fossil fuel has built support among supervisors to act (Carney, 2015). The Paris global Climate agreement of 2015 contributed to the momentum, setting a clear objective of net zero carbon emissions in 2050. The Paris agreement also explicitly acknowledged the role of the private financial sector.

This chapter discusses developments in climate finance. We look both at experiences with addressing climate change and at recommendations of private financial actors, academics and civil society.

Data, transparency and goal setting

In the previous chapter we noted that the 2015 Climate agreement explicitly stated that finance flows, including private ones, should be made consistent with low-GHG-emission and climate-resilient pathways (UNFCCC, 2015). However, the methodologies to measure this alignment still needed to be developed.

In 2017 the Taskforce for Climate Related Financial Disclosures (TCFD) presented its recommendations (TCFD, 2017). Since then, and particularly in the EU, several legislative proposals have been made and accepted which oblige companies and financial institutions to report on their performance with regard to climate change-related risks. Most notably these are the Corporate Sustainability Reporting Directive (CSRD), Sustainable Finance Disclosure Regulation (SFDR) and Taxonomy (European Commission, 2021d). Most recently the International Financial Reporting Standards Foundation (IFRS) has installed the International Sustainability

Standards Board to further develop the accounting framework for climate change (IFRS, 2021).

In the meantime, a sprawling industry has emerged that provides data and tools to interpret the data. However, models differ and different providers arrive at very different conclusions (Bingler & Colesanti Senni, 2020). For example, a study conducted by Bingler et al. looks at twelve different transition risk tools and the convergence of their output on the corpus of bonds purchased by the ECB. The results show a general divergence between these tools, but they seem to converge on the best and the worst performers, i.e. those least and most exposed to transition risk (Bingler et al., 2020). In another study on the subset of stocks on European stock markets, no correlation and sometimes even negative correlation was found between selected transition risk tools (Raynaud et al., 2020).

These differences in performance have resulted in a discussion of regulation of these data providers. India is the first jurisdiction to propose regulation aimed at ESG ratings providers (Securities and Exchange Board of India, 2022). In the EU proposals have been made by the French and Dutch financial markets authorities (AMF & AFM, 2020).

Increasingly financial institutions set themselves goals in the field of climate in line with the Paris agreement. Partly this alignment can be seen as an indicator of transition risk, with a well aligned portfolio minimizing transition risk. Partly this is also driven by an explicit wish to have a positive impact, something that financial institutions' clients, but also their employees, find increasingly relevant (Frusch et al., 2020). In 2019 the Dutch financial sector was the first to publicly commit itself to the national Climate Accord signed in that year. The Accord is a roadmap towards 2030 to reduce CO2-emissions in line with the global Paris Accord (Klimaatcommitment, 2022). At COP 26 the Global Financial Alliance for Net Zero was launched by over 400 large financial institutions with combined assets of 130 trillion (GFANZ, 2022). This announcement has received some criticism. Firstly, the headline number of 130 trillion does not refer to funds available for sustainable investment, but the total assets under management of GFANZ member, part of which is actually invested in fossil fuels. That number also includes some double counting. Thirdly, the criteria for joining GFANZ does not include stopping fossil fuel investments, but only publishing climate commitments (Kyriakopoulou, 2021; Reclaim Finance, 2021). In spite of these criticisms, the developments around sustainable finance are seen as a commendable first step and a turning point relative to previous years (Kyriakopoulou, 2021).

This development is also encouraged by civil society. Proposals have been made to make this more obligatory. As, for instance, in France where, since 2019, the Loi PACTE makes the environmental responsibility of companies in society explicit and

provides for the possibility of including a raison d'être in the statutes and to adopt a new corporate form, the 'société à mission' (Segrestin et al., 2018).

Private finance climate actions

There are several ways in which private financial institutions can reduce their own exposure to climate related risks and/or to contribute to mitigate climate change. These are the pricing of capital, followed by engagement and exclusion.

Pricing of capital

The most direct way for financiers to encourage companies to behave more responsibly is to reward them financially for doing so. ING was among the first banks globally to issue a sustainability-linked loan facility, when it issued a EUR 1 billion loan to Philips in 2017. The interest rate depended on the company's sustainability ranking and performance, as assessed by ESG data provider Sustainalytics, an assessment where climate is the dominant factor (ING, 2017).

Engagement

Financial institutions can also engage with corporates on their climate performance through investor-company dialogues or through bank-client dialogues. Investors and lenders can consider divestment and exclusion if the companies do not comply.

Increasingly this engagement is conducted by alliances of investors. Most prominent is Climate Action 100+, an initiative of 600+ investors worldwide, managing USD 65 trillion of assets, that engage cooperatively on the topic of climate change with some of the world's 165 largest GHG emitters, covering 80% of global industrial emissions. Engagement with the companies is a collaborative two-tier activity, spearheaded by a lead-investors, and backed by a group of investors (ING, n.d.). Initiatives such as Climate Action 100+ are backed by empirical research, showing that such two-tier engagement strategies are effective. Coordinated engagement is more successful if the lead-investors are domestic in relation to the focus company, and the total coalition of investors is authoritative (Dimson et al., 2018).

Climate Action 100+ has succeeded in persuading companies to publish information about their Paris alignment and their targets for alignment. Investors can also influence board appointment decisions. In 2021 a small hedge fund, Engine number 1, forced oil giant Exxon to accept three new members on its board who brought with them knowledge of climate change (Hiller & Herbst-Bayliss, 2021). Civil society organisations have become more successful in this field. For example, as early as 2015, Follow This started its campaign of shareholder resolutions demanding a Paris-aligned strategy, including scope 3, by Shell (Kranendonk, 2015).

Exclusion

Divestment is a matter of dispute among investors and generally seen as too small a movement to materially influence the cost of capital (Berk & van Binsbergen, 2021). Although most argue that it is better to stay invested to use shareholder rights for engagement efforts, divestment as a pressure-strategy is under increasing attention (Mooney, 2021). Recently, the largest Dutch pension fund ABP announced that it will divest from fossil fuels, following similar moves by the pension funds for metal workers (PME) and the catering industry (ABP, 2021; Hoekstra, 2021; Reuters, 2021). As an economic decision to diversify its sources of income the Norwegian Sovereign Wealth Fund has divested from oil and gas companies. Divestment has become a strong source of influence on energy policy. A recent report suggests that 1000+ institutions have committed to a form of fossil fuel divestment, together representing USD 39.2 tn AUM (Divest-Invest, 2021).

The public budget

The Paris agreement obliges all countries to establish Nationally Determined Contributions, which are roadmaps that show how carbon emissions will be reduced. In terms of translating international long-term objectives into concrete regulations and spending the Netherlands has been a frontrunner with its Climate Accord of 2019. Together with a broad alliance of stakeholders a roadmap towards 2030 has been created with progress being monitored and policies adapted where needed (Climate Agreement, 2019). The European Union is a global leader in terms of implementing the Paris Accord through its Green Deal and Fit for 55 packages (European Commission, 2021a, 2021e).

Internationally, in 2019, the Coalition of Finance Ministers for Climate Action was formed. The key objective of this Coalition is to promote climate action through the use of public finance and fiscal policy. The Coalition currently comprises 62 Finance Ministers (The Coalition of Finance Ministers for Climate Action, 2021). That there is still ample room for improvement in this field is clear when looking at production subsidies in the form of tax reductions or direct government transfers and consumption subsidies through direct fuel price reduction to end-users. Estimates of such global fossil energy subsidies vary from USD 450 billion in 2020 (Parry et al., 2021) to USD 640 billion (Koplow & Steenblik, 2022). If one also includes negative externalities for clean air and global warming as a form of subsidy, this brings up the global energy subsidy tally to USD 5.9 trillion (Parry et al., 2021).

Such subsidies are harmful as they stimulate overconsumption contributing to environmental degradation and diverting public finances from more productive uses (Urpelainen & George, 2021). However, there are ways to redirect these financial flows. For instance, subsidies could be made conditional on the transition pathway progress for certain firms, as was done with Ørsted in Denmark. In addition, these subsidies could be converted to investments in education and

healthcare as was done in Egypt in 2013. Lastly, energy subsidies could be redirected as direct grants to the worst-off in society, who are most likely to be impacted by energy price increases (Timperley, 2021).

In 2010, the COP Parties established the Green Climate Fund (GCF) to provide funds to developing country Parties. Furthermore, the Parties established the Standing Committee on Finance. The COP also stated that (developed) countries should provide sufficient finance, technology and capacity-building support to ensure pre-2020 action. The Agreement urged developed countries to jointly provide USD 100 billion annually by 2020 for investment in private projects contributing to mitigation and adaptation. However, a UN report in 2020 revealed that USD 100 billion target was not met (Bhattacharya et al., 2020).

Public investment institutions

Public investment institutions also play an important role in financing the energy transition. Firstly, by taking the role of an early investor of innovative technologies, taking on high risks and high initial investment costs in order to reduce these for (private) financiers in later stages of the technology's development. This is for instance the case for the KfW in Germany and Green Investment Bank in the UK (Polzin & Sanders, 2021). KfW has also played a large role in Germany's Energiewende lending through local banks to wind park developments and energy efficiency measures. In addition, KfW has used its influence to go beyond investing, and venture into capacity building through climate consultancy, education, and lobbying efforts (Mazzucato & Penna, 2015).

However, public investment institutions can also hamper the energy transition. Many countries still support fossil fuel investment through export credit agencies (ECAs), public entities that provide corporations government-backed guarantees, credits, loans and insurance in the support of exports. At COP26 over 25 countries pledged that before 2023 they will end public funding for fossil fuel projects abroad (COP26, 2021b).

Ten large multilateral development banks, including the World Bank, European Investment Bank, European Bank for Reconstruction and Development and Asian and African Development Banks, have also made climate- and nature-related commitments at COP26. Aside from capacity and partnership building, they pledged to reduce the investments that lead to nature loss and promote nature-positive investments (COP26, 2021a). This commitment is especially relevant given that the World Bank was recently criticized for being a laggard in terms of climate action and its CEO for stalling the green investments agenda (Hodgson, 2021). Nevertheless, the World Bank promised to align all new investments with the Paris Agreement by July 2023 and increase from 26 to 35 percent the proportion of climate finance between 2021 and 2025 (World Bank Group, 2021). Similarly, the EIB

has pledged to increase its green lending to above 50% by 2025 and leverage EUR 1 trillion in new green investments (EIB, 2020).

Supervision

Central bank policies

Climate has now been widely embraced as relevant to financial supervisors (BIS, 2021; NGFS, 2021c). Outside of Europe since 2006 the People's Bank of China (PBoC) has conducted informal window guidance for green lending targets and since 2007 for negative 'dirty' lending targets. The former was discontinued in 2019 and the latter in 2014 (Dikau & Volz, 2021). Also, to encourage the development of green credits by banks the PBoC included the performance of green finance in its macro-prudential assessment (MPA) potentially leading to a higher interest rate for deposits with the PBoC (Cheng et al., 2021)

In 2019 the Bank of England was the first to publish Supervisory expectations as to how banks and insurers are expected to manage their climate risks (Bank of England, 2019). The ECB followed suit in 2020 (ECB, 2020). Within Europe the Hungarian central bank (MNB) piloted a 'green bank subsidy' program that entails reducing capital requirements for banks that issue loans intended for improving the energy efficiency of houses (MNB, 2019).

Despite its statements that climate is a material risk, the ECB has so far not adapted the capital requirements of banks based on their climate performance. This however may be about to change now that the ECB has found that 90% of the largest banks do not meet the supervisory expectations on climate (ECB, 2021d). In the words of Elderson, Vice-Chair of the ECB Supervisory Board: This "creates the space for us to act as supervisors" (Elderson, 2021). According to Elderson 2022 will be the year that climate and environmental risks become integrated in the micro prudential supervisory review[1] and evaluation process which will ultimately influence banks' minimum capital requirements (Elderson, 2022). This is all the more likely, given the dismal disclosure track record of the Eurozone banks in 2022 (ECB, 2022).

A recent ECB publication has put this more concretely specifically for macro prudential supervision: "To ensure financial stability, [...] climate-related risks may require the application of macroprudential policies complementary to banks' own risk management and direct supervision. Such complementary macroprudential and supervisory approaches may be needed to account for the long horizon of climate-related risks and their complex interactions" (Baranović et al., 2021). It is for this reason that banks expect climate risks to translate into capital requirements soon after the current stress tests (Comfort & Schwartzkopff, 2022).

[1] 'Micro-prudential' refers to the supervision of individual institutions, while 'macro-prudential' entails the supervision of the financial system as a whole.

DNB has made knowledge about climate change part of its fit and proper test for the almost 2000 financial professionals that annually need its approval to be appointed as a board member or in other key positions (Banken.nl, 2020). In France, the financial market regulator requires knowledge of climate change for the "certification AMF" needed to act as an asset manager (AMF, 2021).

Other proposals

Academia and civil society have made calls for supervisors to act more forcefully. In particular, there is a proposal for setting capital requirements for excessive climate risks. From a macro-prudential point of view Schoenmaker and van Tilburg argued for an array of cyclical and structural measures (such as Loan-To-Value limits for climate-sensitive investments, increase in capital buffers for climate-sensitive investments, and outright restrictions to large exposures for such investments) in order to reduce the exposure of the banking sector to climate-related financial risk (Schoenmaker & van Tilburg, 2016). Others appealed to supervisors to treat banks' new fossil fuel explorations equivalently to equity exposure, meaning in effect they would have to cover the full amount of the loan with their own funds (Hohn, 2021; Philipponnat, 2020). Others have called for central banks to (re)institute stricter lending quotas, credit floors/ceilings, and more stringent sectoral lending (Bezemer et al., 2018).

Most fundamentally there is the critique that both climate and biodiversity should not be considered risks but rather as uncertainty. Thus, the current approach of integration into existing risk models will most probably never be viable, as the effects of biodiversity loss cannot be quantified (Kedward et al., 2020).

Instead, a precautionary approach is suggested that relies on heuristics, experience, and softer, qualitative skills of central bankers. Such as the reaction of central banks that we have seen during the 2008-financial crisis and more recently during the pandemic with capital buffer boosting policies, swap line introductions, launching of asset purchasing programs, etc. To this end, the use of supervisory instruments such as explicit credit allocation quotas for certain sectors, sector-differentiated capital buffers, credit floors or ceilings, differentiated loan rates, etc. is suggested (Kedward et al., 2020).

Monetary policy

Early in 2021 the NGFS presented a report on options for central banks to adapt monetary policy operations. It concludes that adjusting central bank operational frameworks to more adequately reflect climate-related considerations is feasible but that a range of practical and analytical challenges needs to be overcome, including data gaps and uncertainties with regard to risk quantification (NGFS, 2021b). In the summer of 2021, the ECB presented the conclusions of its monetary

strategy review. The outcome was to integrate climate concerns in its policymaking (ECB, 2021b). This includes further research and model development, but also the intention to possibly refactor the collateral framework and Asset Purchasing Programme (ECB, 2021a). The following provides summaries for some of these proposals.

Asset purchases

Despite the data gaps and methodological challenges, other central banks have already decided to take action. The Swedish Riksbank in 2019 sold off bonds issued by the Canadian province of Alberta and Australian states of Queensland and Western Australia due to their ties to fossil industries (Flodén, 2019). The PBoC has gone further than simply designing this taxonomy and has introduced a preferential green bond purchasing scheme. This scheme gives favorable funding conditions to commercial banks that offer green bonds (as aligned with the Catalogue) as collateral for central bank lending operations (Macaire & Naef, 2021).

The Bank of England has announced its plans to decarbonize its Corporate Bond Purchase Scheme (CBPS). To this end the BoE will compile a scorecard for each company, based, among others, on emissions intensity, and will conduct the tilting of its bonds accordingly (Bank of England, 2021). However, this approach has been criticized as this approach would reduce the BoE's Weighted Average Carbon Intensity (WACI) by only 7%, far from its target of 25% by 2025. The CBPS tilting could even entail an increase in exposure to carbon intensive companies due to the Bank's adherence to the market neutrality principle (Dafermos et al., 2022).

Green Targeted Longer Term Refinancing Operations (TLTROs)

Green TLTROs are a proposed modification to the existing ECB's cheap funding for banks program which would further decrease interest rates for banks in exchange for more green lending projects (van 't Klooster & van Tilburg, 2020). In its assessment of options for greening monetary policy the NGFS labeled green targeted refinancing operations as strongly positive in contributing to mitigating climate change (NGFS, 2021b). The ECB also recognized their relevance in that "support for the green objectives of the EU could be ensured by the fact that green TLTROs would reduce the costs related to the green transition by promoting investments in green activities" (ECB, 2021c). Greening TLTRO has also been advised by academics and NGOs as a way to directly inject finance for green projects into the economy through the banking sector that plays such a dominant role in Europe (van 't Klooster & van Tilburg, 2020). A follow-up on this idea has been put forward where the green TLTRO funds would be used to finance housing renovations in the Eurozone (Batsaikhan & Jourdan, 2021). However, no official proposals for this have been put on the table yet.

Outside of Europe this is not only theory. The Bank of Japan has recently designed a refinancing operations scheme in which commercial banks will be offered a zero per cent interest rate credit if they issue more green loans (Haruhiko, 2021). The People's Bank of China has recently announced a new carbon reduction supporting scheme that will refinance banks cheaply for loans targeting carbon reduction (PBoC, 2021). Since 2015 the central bank of Bangladesh has offered private banks reduced refinancing rates for the loans they issue for improvement of water and energy efficiency in the textile sector (Barkawi & Monnin, 2015).

Own funds

With their own funds (own investments, own pension funds or foreign exchange portfolios) central banks are often more ambitious. DNB aims to make its own investments and foreign exchange portfolios Paris aligned (DNB, 2019, 2021).

Debt for climate swaps

A recent simulation of the effect of climate change on sovereign credit ratings for 108 countries estimated that climate-induced sovereign downgrades could begin as early as 2030. In a higher emissions scenario (i.e., RCP 8.5) 63 sovereigns experience climate-induced downgrades by 2030. This effect increases in intensity and across countries over the century (Klusak et al., 2021).

Climate change has already been found to drive up the costs of capital of the most vulnerable countries, undermining an often already bleak debt sustainability. One study found this effect to be on average 117 basis points for 40 climate vulnerable countries, translating into annually USD 40 billion additional interest payments. A number likely to expand to between USD 146-168 billion over the next decade (Buhr et al., 2018). The increase in costs of sovereign debt impedes investments in development and resilience. The impact of COVID19 reinforced this. In at least 62 developing countries, the external debt service was larger than health care expenditure (V20 Presidency, 2021).

The vulnerable countries have set out multiple expectations regarding debt support and flexibility, including debt forgiveness and Debt for Climate (DFC) swaps for middle-and-low-income vulnerable economies (V20 Presidency, 2021). Multilateral agencies such as the World Bank Group and multilateral development banks can facilitate this through guarantee facilities such as the Guarantee Facility for Green and Inclusive Recovery. However, for this to work, Debt for Climate or Nature swaps need to be standardized and scaled (The Economist, 2021).

Global monetary solutions

To support the global economy during the corona pandemic the International Monetary Fund (IMF) issued new Special Drawing Rights (SDRs) equivalent to an amount of USD 650 billion. By their nature most of the new SDRs are allocated

towards high- and medium-income countries (Task Force on Climate, 2021). To channel the purchasing power to the places where it is needed most the IMF has proposed the creation of the new Resilience and Sustainability Trust (RST). This fund would tackle not only the impact of the Covid-19 shock but would also address climate change-induced events, lack of investment in digitalization, demographic shifts, etc. (Pazarbasioglu & Ramakrishnan, 2021). However, the IMF-proposed amount of USD 50 billion for this fund would be insufficient only for climate investments. It is estimated that for climate adaptation and mitigation at least USD 140 billion per year is needed until 2030 and USD 280 billion per year until 2050 (Steele et al., 2021).

Conclusion and reflections on climate finance

Climate is high on the agenda of the private financial sector and its supervisors. Ministries of Finance and even monetary policymakers are also starting to take climate change into account. However, action has generally been limited. Both private and public finance is still flowing to companies and projects which are not aligned with the Paris Climate Accord. Most action has been in the field of increased data availability and transparency. The challenge therefore is for both private financial institutions and for fiscal policymakers to become truly 'Paris-aligned'. Supervisors and monetary policymakers can do more to accommodate this development using the instruments at their disposal. Given the short window of opportunity to halt climate change the financial sector should accept that climate is not something that can completely be integrated in its models and thus quantified. To prevent being 'exactly wrong rather than roughly right' financial professionals and their supervisors should start to act on the precautionary principle and stop the most harmful investments. Practical examples of how this can be done are already implemented by frontrunners in all fields, from private banking and asset management to public budgets, public investment institutions, supervisors and monetary policymakers.

4. BIODIVERSITY FINANCE

This chapter lists some of the most important developments around biodiversity and finance. We follow the same structure as the previous chapter on climate finance. We start with the developments in data, transparency and goal setting before focusing on the policies of private financial institutions and the role of the public budget and public investment institutions. Then we look at the role of supervisors, monetary policy makers and debt restructuring.

Data, transparency and goal setting

There are currently several biodiversity measurement tools available, and the field is rapidly developing. The Pledge for Biodiversity (2021) identifies BFFI, CBF, GBS(FI), STAR, and Encore as the most important tools for the financial sector. The Biodiversity Footprint for Financial Institutions (BFFI) methodology was initiated by ASN Bank and measures the impacts of investment portfolios (PBAF, 2020). Several institutes in France, led by Iceberg Datalabs and I-care, have developed the Corporate Biodiversity Footprint (CBF). The CBF measures the impact of companies on biodiversity with an 'average species abundance' indicator. It is used by AXA investment Managers, BNP Paribas Asset Management, Sycomore Asset Management and Mirova (Pledge for Biodiversity, 2021). The Global Biodiversity Score (GBS) and the Global Biodiversity Score for Financial Institutions (GBSFI) were introduced by Carbon4Finance and CDC Biodiversité. The first focuses on assessing the biodiversity footprints of companies, the latter for financial institutions on a portfolio level. ENCORE (Exploring Natural Capital Opportunities, Risks, and Exposure) is a tool that assesses how companies depend on and impact nature and what risks are imposed on businesses through environmental change. The tool was developed by the Natural Capital Finance Alliance. STAR (Species Threat Abatement and Restoration metric) measures how investments can contribute to reducing the risks of species extinction, through a localized approach.

These tools differ on various levels, for example on the levels of methodology, data usage, application, and scope. There is a need for better alignment between existing tools and metrics, thus allowing for better comparison between them. A case in point is the Align Project of the European Commission, that aims to align accounting approaches for nature (European Commission, 2022). Globally there is the Taskforce for Nature related Financial Disclosures (TNFD) bringing together many of the organizations active in the field of biodiversity data and methodologies to "develop and deliver a risk management and disclosure framework for organizations to report and act on evolving nature-related risks" (TNFD, 2021). The global financial reporting standard setter IFRS in 2021 initiated the International Sustainability Standards Board (IFRS, 2021). After feedback from stakeholders the IFRS Foundation Trustees decided that the ISSB should cover sustainability broadly but start with climate. The ISSB chair indicated that natural capital and biodiversity could be next in line (IFRS, 2022).

Within the EU companies and financial institution are increasingly obliged to report on their biodiversity-related risk management performance. France has been a forerunner with its law on Energy and Climate. Article 29 requires financial institutions to disclose the dependence and impact of their financial activities on both climate and biodiversity. The decree came into force on May 28, 2021. On biodiversity, financial institutions are required to disclose their alignment strategies by setting targets and alignment measures in accordance with international biodiversity goals. Article 29 adopts the concept of double materiality.

In March 2018, the EC put forward its action plan on financing sustainable growth. Part of this action plan was the goal to strengthen sustainability disclosure. The Sustainable Financial Disclosure Regulation (SFDR) lays down disclosure obligations for financial market participants offering investment products. The European Supervisory Agencies proposed the inclusion of biodiversity in these disclosure requirements, called 'Principal adverse impacts statements' (PAIs). These are to include, for instance, share of investments in companies that operate in biodiversity-sensitive areas and whose operations might impact protected species (EBA, 2021). While climate change mitigation and adaptation criteria are already in place, reporting for the environmental objectives, including biodiversity, is yet to start in January 2023 (ESMA, 2022).

The Corporate Sustainability Reporting Directive (CSRD) will require all large companies and listed companies to report information according to EU sustainability reporting standards from 2023 onwards (European Commission, 2021). In March 2021 the European Financial Reporting Advisory Group (EFRAG) published their recommendations for setting these standards. These include aligning with the broader EU Taxonomy regulation and including biodiversity as one of the reporting obligations (EFRAG, 2021). CSRD was published in April 2021 by

the European Commission and is as of February 2022 discussed in the European Parliament, in the process of drafting their report to the Commission's proposal (European Parliament, 2022). In parallel, the Council finished their discussion and published their General Approach in February (European Council, 2022). This proposal includes mandates for reporting not only on climate, but also biodiversity and ecosystem impact (European Commission, 2021c).

Also relevant is the EU Taxonomy Regulation, a classification system establishing a list of economic activities that contribute to an environmental objective. While the SFDR applies to investments, and the CSRD applies to companies, the Taxonomy Regulation applies to both financial market participants and companies. The six areas covered by the Taxonomy are climate mitigation, climate adaptation, water and marine resources, circular economy, pollution prevention and control and the protection and restoration of biodiversity. Currently the technical specifications of only the former two areas pertaining to climate have been finalized, with the nature-focused work still on the roadmap. In addition to contributing to these goals, the taxonomy mandates firms to respect minimum safeguards with respect to human rights and labor rights and Do No Significant Harm (DNSH) to any of the other environmental criteria (European Commission, 2020).

In terms of goal setting, 30 financial institutions with more than USD 8.7 trillion of assets under management committed to addressing deforestation in their portfolios by 2025 (Global Canopy, 2021c). The Dutch ethical bank ASN has also set the goal of becoming 'net positive effect on biodiversity' by 2030. This not only includes ASN's own operation but includes all loans and investments (ASN Bank, n.d.). Dutch asset manager ACTIAM aims for water-neutrality and zero deforestation by 2030 (Working Group Biodiversity, 2021).

Private finance biodiversity actions

Pricing of capital

The most direct way for financiers to encourage companies to behave more responsibly is to reward them financially for doing so. ING was globally among the first banks to issue a sustainability-linked loan facility, when it issued a EUR 1 billion loan to Philips in 2017. The interest rate depended on the company's sustainability ranking and performance, as assessed by Sustainalytics. An assessment where biodiversity is one of the factors (ING, 2017). Most recently Rabobank gave a favorable loan to Dutch mattress manufacturer Auping for its high score on the Circular Transition Indicator (Rabobank, 2021). In 2020 UPM, a Finnish pulp and paper maker took out a EUR750 million loan with BNP Paribas. The reduction of interest rate was linked to sustainability performance indicators, including having a net-positive impact to biodiversity in the Finnish forest (Global Canopy, 2021b).

More directly impacting biodiversity are financial initiatives that ask lower land lease prices from farmers. Insurer a.s.r., one of the biggest private landowners in the Netherlands, decided in 2021 to provide leasers who manage their lands sustainably with a 5-10% discount. A.s.r. uses the Open Bodem Index (OBI) to indicate which land users are sustainable enough to be eligible for discounts on their lease (van der Boon, 2021). In 2018, Rabobank initiated the biodiversity monitor, a tool that quantifies biodiversity-enhancing performance in the dairy sector at the farm level. Farmers in the top 25% are rewarded with an interest rate discount (The Sustainable Finance Platform, 2020). Furthermore, it can give access to Rabobank's impact loans a form of blended finance in cooperation with the European Investment Bank (EIB) that offers a discounted interest rate on loans to sustainable companies (Rabobank, 2017; Working Group Biodiversity, 2021).

Deutz et al. (2020) estimates that although there is a noticeable growth in green bonds issuances, in 2019 only 0.5-1.0% percent of raised capital through green bonds was allocated towards biodiversity conservation (Global Canopy, 2021a). Sustainable Landscape Bonds direct resources to promote sustainable land use. This can be used to establish long-term agricultural systems that do not harm natural ecosystems. As such, they can also be utilized to hedge future costs for natural resource restoration, while generating short-term returns (Global Canopy, 2021b) In the Netherlands BD Grondbeheer offers perpetual soil bonds (BD Grondbeheer, n.d.). The fiscally attractive National Greenfund (Groenfonds) has the Investment Fund Sustainable Agriculture, that finances farmers who adhere to sustainable key performance indicators like reducing nitrogen, increasing biodiversity and improvement of animal welfare (Nationaal Groenfonds, n.d.). NWB Bank (the public bank for the Dutch water authorities), regularly issues green bonds, or so-called water bonds. In total, twelve separate water bonds have been issued, for a total of EUR 5.2 billion. The revenues of these bonds are utilized for loans for the water authorities that use the loans for projects that promote sustainability, such as climate adaptation, climate mitigation or biodiversity restoration or preservation (NWB Bank, 2020).

Internationally ASN Bank launched its Biodiversity Fund in 2020, targeted at biodiversity restoration and conservation. It was the first among Dutch financial institutions to launch such a fund (ASN Bank, 2021). Since 2014, The Kempen SDG Farmland Fund, set up for Pensioenfonds PostNL, promotes the transition to more sustainable food production in OECD-countries. The fund has a size of EUR 42 million (Kempen Capital Management, 2021a, 2021b). Rabobank has installed the Carbon Bank in 2021. The purpose of the carbon bank is to promote projects that store carbon in trees and soil, in cooperation with farmers. The bank is an intermediate between on the one hand parties that want to store GHG emissions and on the other hand parties that want to reduce their GHG emissions (The Rabobank Carbon Bank, n.d.).

Engagement

Financial institutions can engage with corporates on their biodiversity performance through investor-company dialogues. Investors and lenders can consider divestment and exclusion if the companies do not comply with biodiversity targets (Global Canopy, 2021b). Robeco for example engages with companies with exposure to commodities driving deforestation, such as palm oil, beef, tropical timber, and cocoa. Robeco also engages with the government of Brazil to reduce deforestation in the Amazon (Fuchs & van Gool, 2020). Dutch investors increasingly also work together in engagement. This can be done through international platforms, but is also done through the Dutch initiatives for international responsible investing (IMVO) covenants for the pension funds and insurance sector. Here a collective engagement is conducted that focuses on deforestation with regard to the soy chain in the Amazon and the Cerrado, where possible making a link with intensive livestock farming in the Netherlands (IMVO, 2021).

In the light of the increasing awareness of biodiversity risks to investors' portfolios, a similar approach to Climate Action 100+ is now in the making for biodiversity. This Nature Action 100+ was proposed by the World Bank in 2021, and is now being set up by several investors and initiatives, including the Finance for Biodiversity Pledge (World Bank, 2020).

Exclusion

Divestment strategies in biodiversity are not yet gaining as much traction as in climate, and the matter is still under dispute. But there are a few examples. Nordea AM sold its stake in the Brazilian meat company JBS because of deforestation concerns (Toplensky, 2020). NIBM, a Norwegian government fund, is considering the same (Global Witness, 2022). Exclusion lists of Dutch financial institutions do not typically include specific activities on the topic of biodiversity. However, most financial institutions have a statement on deforestation of high conservation (ecological, social, cultural, historical) value (HCV) or primary forests (Eerlijke Bankwijzer, 2020). Divesting practices can follow a so-called two-tier approach: exclusions are either made on an ethical base or based on an increased perception of risk. Norges bank for example, recently made divestments based on risk-perception in relation to deforestation (Norges Bank, 2019). Before divesting, financial institutions can also place companies 'under investigation'. Without divesting their current interests, they then put a stop on providing additional capital. An example is asset manager Storebrand that has placed the companies Bunge and ADM under observation (Olsen, 2022).

Rulemaking

Governments influence the financial viability of projects and companies through their policies. For instance, the European Commission proposed new regulation to

curb deforestation and forest degradation. The main driver of deforestation is the expansion of agricultural land in the production of commodities such as soy, beef, palm oil, coffee. As consumer of these commodities linked to deforestation, the Commission proposed a Regulation to minimize EU-driven deforestation and forest degradation by promoting deforestation-free products. This proposal is part of a broad plan of actions to restore and protect world's forests. The Regulation sets out due diligence rules for parties placing the commodities on the EU market that are linked with deforestation. This regulation would ensure that only deforestation-free products are allowed on the EU market. Operators need to collect the geographic coordinates of the commodities that enter the EU market. The Commission will operate a benchmarking system to identify the level of risk of countries in the production of non-deforestation-free commodities (European Commission, 2021f). NGO's have called for the inclusion of guidelines for the financial sector in the European guidelines on deforestation (Global Witness, 2021).

The public budget

Public spending can have a direct influence on biodiversity, but is also directional for the rest of society and hence private finance. Public spending thus is also a market-making activity. For instance, if agricultural subsidies allow for the use of pesticides, private financiers will invest in the production of those pesticides. Public sector funding represents 80-85% of total biodiversity conservation funding. Only a few governmental spending programs in Europe, China and the US amount to over 50% of total global biodiversity finance (Global Canopy, 2021a).

Under the CBD framework, governments are committed to develop National Biodiversity Strategies and Plans (NBSAPs). Some countries have developed NBSAP with formal legal status, whereas other countries established aspirational documents or outlines to mobilize finance. To date, 193 out of 196 Parties have developed at least one NBSAP. The UNDP-managed Biodiversity Finance Initiative (BIOFIN) assists countries on how they can finance their national biodiversity goals by developing National Biodiversity Finance Plans (NBFPs) (Global Canopy, 2021a). So far, the BIOFIN method has been implemented in 40 countries in Eurasia, Asia and Pacific, Africa, Latin America and Caribbean (BIOFIN, 2018). Based on this analysis Sri Lanka for instance reformed its chemical fertilizer subsidy scheme to improve farmer health and environmental quality. Excessive use of subsidized fertilizer led to metal contamination in soils and waterways, resulting in biodiversity loss. The subsidy reform was aimed at reducing the negative impact on health and environment. The new policy directive was implemented in 2015 and supports the use of alternative options, including organic fertilizers. The subsidy also resulted in lower public spending without harming farmers' livelihoods (BIOFIN, 2018).

Developed countries failed to double biodiversity-related financial flows as agreed in 2010 (Kraljević & Mitlacher, 2020). The same bleak picture emerges when looking

at the income side of the government budget. Biodiversity-relevant taxes, including taxes on fertilizers, forest products and timber harvest, raised USD 8.1 billion in 2019, representing only 1% of total environmentally related tax revenue (OECD, 2022). Meanwhile, subsidies (on fossil fuels as well as in agriculture and fisheries) causing harm to biodiversity amount to some USD 500 billion per year, while the total resources being spent to promote biodiversity conservation and sustainable use amount to USD 78 to 91 billion per year (OECD, 2020).

Another problem for government budgets is tax avoidance. This in itself leads to losses to public funds, meaning less money available to fund biodiversity goals. But tax exemptions also directly contribute to biodiversity losses through providing cover for illegal, unreported and unregulated fishing; obscuring financial flows to deforestation practices in the Amazon; and illicit financial flows out of African countries related to the export of extractive commodities (Dempsey et al., 2021; UNCTAD, 2020).

Probably the single most relevant budgetary expenditure for biodiversity are agricultural subsidies, such as the EU Direct Payments to farmers within the Common Agricultural Policy (CAP). This policy has historically been a driver behind the intensification of European agriculture. A recent empirical study shows that farming regions with the lowest climate and biodiversity impact generate less income than their more climate-intensive counterparts, but at the same time receive less support from CAP subsidies (Scown et al., 2020). CAP post-2020 entails higher environmental requirements from farmers and member states, but these are claimed to be too voluntarily and not specific enough (Pe'er et al., 2020). Thus, the outcomes of CAP policies seem to contradict the targets for increased investments in organic farming and High Nature Value farmlands that are the cornerstones of the EU's Biodiversity and Farm to Fork Strategies that aim to raise the biological farming in the EU to 25% in 2030 (WWF, 2020b).

An important recent budgetary development are the recovery plans drawn up in reaction to the corona crisis. An analysis of the EUR 500 billion that already have been committed across ten European countries shows how these do not really provide a high return for nature. In total, 98% of climate-relevant investment would reduce GHG emissions, whereas only 46% of nature-relevant spending would actually strengthen nature. A majority of nature-relevant spending, as part of NRRPs, will actually damage biodiversity and nature. Furthermore, nature-based solutions (e.g., urban greening, wetland restoration etc.) constitutes of only 1% of NRRP spending (Vivid Economics, 2021).

Public investment institutions

Through subsidies, guarantees and co-financing governments try to steer private financial flows. Whereas nowhere near the priority of climate, biodiversity is also

moving higher up on the agenda of national and multilateral public investment institutions. A group of 450 global Public Development Banks (PDBs) issued in 2020 a joint declaration to reorient financial flows towards sustainability. The declaration affirmed their awareness of the need for biodiversity finance and willingness "to help align all financial flows with the future post-2020 Global Biodiversity Framework" (Finance in Common, 2020). The International Development Finance Club (IDFC), a group of 26 national and regional development banks and the largest provider of public development finance, committed to develop biodiversity strategies and actions plans (IDFC, 2020). Agence Francaise de Developpement (AFD) announced the ambition that 30% of its climate finance will be nature-positive by 2025, effectively doubling its financing for ecosystem protection (AFD, 2021). Similarly, the UK government announced GBP 3 billion earmarked for nature-positive investments (One Planet Summit, 2021).

The biodiversity efforts of large multilateral development banks lag behind their climate agendas. One reason is that these institutions are already active on the climate front, leaving little capacity for nature considerations. In addition, addressing biodiversity does not have a simple metric analogous to the 1.5□C Paris alignment in climate. Thirdly, many development banks' supervisors do not have awareness of nature-related financial risks, further impeding nature-positive investments (WWF & The Biodiversity Consultancy, 2021). This is all the more worrying, given that, by one assessment, large public development banks are exposed to the dependency risk (investments exposed to failing nature services) to the tune of USD 4.6 trillion, or 40% of their total investments (Finance for Biodiversity, 2021b).

On the other hand, development banks could be uniquely suitable for nature-related investments, having an intense and multi-decade knowledge of local circumstances, especially in the Global South, as well as deep relationships with government officials in these countries (IISD, 2020; Timilsina, 2021). One of the most promising solutions for nature-positive investments are nature-based solutions, not least due to their experience with previous lending in this area. In order to achieve this, development banks would need an improvement in nature-related data and tools (such as ENCORE and STAR databases), but also cooperation on the ground with relevant government bodies (IISD, 2020; WWF & The Biodiversity Consultancy, 2021).

Supervision

The NGFS, concluded that "risks related to biodiversity loss pose threats to financial stability, meaning that it falls within the mandates of central banks and financial supervisors" (NGFS Oct 21). As such private financial institutions need to manage

this risk as any other. Whether they do this satisfactorily is judged by their supervisors, who also have instruments to incentivise financial institutions.

So far, in the area of biodiversity, supervisors have focused on raising awareness raising through reports. Brazil's central bank BACEN has required the banks it supervises to take into account environmental risk as a part of its Basel III supervisory regulations since 2011. It was joined by the Brazilian Federation of Banks which introduced a further green self-regulation framework and showed that, three years after implementation, just less than 10% of private lending went to green investment (UNEP, 2015).

More recently the Dutch central bank (DNB) investigated the dependence of the Dutch financial system on biodiversity. It looked at EUR 1400 billion of loans, shares and bonds of mostly banks and pension funds. Of this, EUR 510 billion, or 36% of the portfolio examined, are highly or very highly dependent on at least one ecosystem service. This number is an underestimation as only the direct effects are taken into account and not yet dependencies in supply-chains (DNB and PBL, 2020). Most recently the central bank of France completed a similar study, applying similar methodology to the DNB. Using the same ENCORE model and the 21 ecosystem services, they found that the 42% of the value of the portfolio of French financial institutions are highly or very highly dependent on at least one ecosystem service, compared to the Dutch 36%. Also, similar to the Dutch case, the main dependencies are the surface and ground water, but also include ecosystem services such as erosion control, and flood and storm protection (Svartzman et al., 2021).

In 2020 the ECB published its supervisory expectations as to how it expects banks to prudently manage and transparently disclose their climate and environmental risks (ECB, 2020). The first progress report found that "only a handful of institutions have started taking into account other environmental risk drivers, such as biodiversity loss and pollution. For virtually all institutions, such other environmental risks are still a blind spot" (ECB, 2021d). This has not improved in 2022 (ECB, 2022). The ECB will challenge banks with these findings in the supervisory dialogue and in 2022 will conduct a full supervisory review of banks' practices and take concrete follow-up measures where needed. DNB is also examining scenarios on biodiversity that could help to perform a stress test on biodiversity.

Supervisors often assess directors and supervisory directors and other important officials of financial institutions. In Europe the reviews for large banks are performed in conjunction with the European Central Bank (ECB). The test concerns whether the candidate is suitable for the position and whether his or her reliability is beyond doubt. Does the candidate have the right knowledge and skills

and the desired professional behavior? How does the candidate fit into the board? Each year, 1,700 to 2,000 applications for assessments are received. Biodiversity does not currently play a role in this assessment.

Monetary policy

Monetary policy is steering economic development through its current broad monetary policies that include the large scale buying of corporate bonds. So far biodiversity plays no role in setting and executing such monetary policies. A notable exception is the Bangladesh Bank that offers private banks reduced refinancing rates for the loans they issue to designated sectors. In 2015 the bank announced opening a special line of financing of USD 200 million specifically for improvement of water and energy efficiency in the textile sector in the country (Barkawi & Monnin, 2015).

Through its Corporate Sector Purchase Programme (CSPP) the ECB has bought EUR 310 billion of corporate bonds, 20% of the euro-denominated corporate bond market. 40% of that portfolio is highly or very highly dependent on ecosystem services (Kedward et al., 2021). In addition, over 70% of this portfolio potentially contributes to key drivers of biodiversity loss (Kedward et al., 2021). On a company-level, EUR 38.6 billion of the corporate bond portfolio is exposed to high water risk. In addition, the ECB potentially has EUR 17.2 billion in financial exposure to negative biodiversity impacts (Kedward et al., 2021).

WWF has proposed the ECB to go beyond climate and include other environmental considerations in the collateral framework and asset purchasing programs, but also in the bank refinancing programs, foreign exchange portfolios and bank reserve requirements (WWF, 2021).

The Bank of England has recently had its remit expanded by the UK Minister of Finance to include considering environmental factors more broadly when setting its monetary policy (Sunak, 2021).

Some central banks have taken first steps taking biodiversity into account in managing their own funds. For instance, the Banque de France takes biodiversity into account by investing in energy and ecological transition funds linked with reduced marine pollution. In 2020 the bank also started measuring its impact on biodiversity (Banque de France, 2021). The Bank of Italy gives priority to firms that: “focus on the responsible use of natural resources and their effects on ecosystems” and “favours those with the best ESG profile” (Banca d’Italia, 2021). The Swiss National Bank explicitly excludes companies that “cause severe environmental damage” or “seriously damage biodiversity” (SNB, 2021). The Dutch central bank DNB has introduced ESG considerations in its own internal funds portfolio and is examining how to include biodiversity considerations as well.

Debt for nature swaps

Like climate, biodiversity can also be taken into account in restructuring debts. Several Debt for nature deals have been struck over the last decade. Whereas these are promising, they are also still small and took a long time to negotiate. For instance, Costa Rica received a USD 20 million debt write-off from the US and as a result received a total of USD 50 million investment to protect its natural habitats, doubling the size of marine protected areas and expand terrestrial parks. These are intended to serve as a basis for eco-tourism and sustainable fishing practices (Walsh, 2010). Similarly, in 2010, the Seychelles bought back a USD 21.6 million debt at a discount, and is paying off the amount to the Seychelles Conservation and Climate Adaptation Trust that in turn, finances marine conservation activities. Under the scheme, the Seychelles committed to keeping 30% of its marine resources protected (World Ocean Initiative, 2020). Most recently, in 2021, Belize has also repurchased a part of its foreign debt at a discount with the help from The Nature Conservancy. A part of the savings, USD 23 million, is dedicated to maintaining marine life and, similarly to Seychelles, protecting 30% of its waters (The Economist, 2021).

Conclusions and reflections on biodiversity finance

Biodiversity is considerably lower on the financial agenda than climate change, despite the fact that planetary boundaries are exceeded to a much greater extent than climate change. However, unlike climate change, the effects so far have been much more local, and away from the main global economic centers where climate change already is making its impact felt. Also, and maybe because of this, there has been a global agreement for climate since 2015 with its binding targets for individual nations. Biodiversity is also more complex and multidimensional than climate change which has been simplified to the one metric of CO2-emissions.

However, biodiversity data and methodologies are on the table and frontrunners are already setting themselves targets. Over the last years biodiversity has also quickly gained momentum in the financial sector. This feeds the hope that strong and clear agreement on biodiversity and hence the Global Biodiversity Framework could do for biodiversity what the Paris Climate Agreement has done for climate change: galvanizing action from both public and private financial institutions and their rule-makers and supervisors.

It would be highly relevant to build upon the initiatives for climate change. This is something we see already happening, with the start of the TNFD modelled on the TCFD on financial reporting and talk of a Natura Action 100+ engagement initiative modelled on Climate Action 100+. These should however not remain separate initiatives. As we discussed in chapter 2, the synergies and tradeoffs between climate and biodiversity require an integrated approach.

5. CONCLUSIONS AND RECOMMENDATIONS

Conclusions

Globally biodiversity is declining at an alarming speed while carbon emissions have not yet peaked. The impact on humans and their economy is growing. Whereas the exact impact and timing is hard to predict, it is clear that it will be substantial, potentially systemic, and largely irreversible.

The financial sector will not be shielded. Biodiversity loss and climate change needs to be on the radar of every financial risk manager and supervisor. The energy transition and restoring biodiversity offers financial opportunities and aligns with the mission for a positive impact of public financial institutions, including central banks, and an increasing number of private financial institutions.

The financial sector has potent instruments at its disposal to effectively reduce biodiversity- and climate-related risks and seize opportunities from both biodiversity and climate risk. Companies can be forced to change their ways or risk losing access to finance. Companies that improve biodiversity or mitigate climate change can be appropriately rewarded.

While awareness of biodiversity risks is rising fast on the financial agenda, the impact on the ground so far has been limited. The challenge ahead is to match the severity and urgency of the biodiversity and climate problem with an appropriate and effective reaction from the financial sector.

We cannot wait to act until biodiversity and climate are fully integrated into current financial models and tools. And we certainly cannot wait with measures for biodiversity until climate change has been solved. This integration may never take place fully due to the multi-facetted dimensions of both biodiversity and climate change and the fundamental uncertainty of the way they work, their effects, and their overlaps. Supervisors have been studying and modelling climate

change for over seven years now. However, despite climate being labelled a material risk driver, this has had no consequence within Europe for the capital requirements for banks. Biodiversity, too, is now widely recognized as a material financial risk, however it is not being managed.

The next few years will be decisive to ensure we do not cross critical, irreversible, thresholds. It is for that reason that the financial sector and its supervisors should follow the precautionary principle and start to act, accepting that it is better to be roughly right than to be exactly wrong.

In recent years there has been much European regulation to increase data availability and transparency. So far, this has mainly been focused on climate change related data. France has shown that it is possible to broaden the scope to biodiversity.

Public budgets are market making and currently do not effectively help to preserve biodiversity or halt climate change. The aim of the 2010 biodiversity framework to double spending on preservation has not been met and annually over USD500 billion of public spending actually harms biodiversity. In 2019, the Coalition of Finance Ministers for Climate Action was formed to promote climate action through the use of public finance and fiscal policy. However, climate negative subsidies still have the same order of magnitude as those for biodiversity.

Public investment institutions play an important role in driving the energy transition. However, so far, biodiversity has not been high on the agenda of the public investment institutions — either those operating nationally or those operating internationally.

Supervisors have started to consider climate change, but have not yet acted. For biodiversity the situation is, arguably, worse. The ECB recently concluded that, for virtually all banks, biodiversity risks are still a blind spot. We do, however, see that, outside of the eurozone, supervisors already link environmental risk performance to capital requirements, effectively providing an incentive for financial institutions for more nature-positive financing. Academics and civil society organisations also argue for this, and, more specifically, for supervisors to adopt the precautionary principle and act now. We cannot wait to act until biodiversity is fully integrated into current financial models and tools.

Monetary policy is starting to take climate change into account, yet still needs to move on biodiversity. The ECB is expected to integrate climate risks into its collateral framework this year. Other central banks have already done so and have also adjusted their purchasing programmes. For biodiversity there have been no such actions and none are planned.

Recommendations

We formulated the following recommendations to build upon the momentum for biodiversity in finance.

1. **Put biodiversity on your agenda.** Most financial institutions are working on the integration of climate change risks and opportunities in their systems. It is understandable that they want to finish this before taking on biodiversity. However, climate change and biodiversity are inherently interconnected and compounding: damage to one affects the other, often creating a multiplier effect. Climate and nature risks therefore cannot be handled in sequence and should be dealt with in tandem. To that end:
    a. Create awareness at the executive level on the importance of biodiversity.
    b. Make biodiversity part of an integrated strategy with climate change and develop a policy built on a carbon net-zero and nature positive transition pathway.

2. **Make biodiversity an integral part of risk management and start acting.** Biodiversity brings about physical, transition, and reputational risks. It should therefore be an integral part of risk management. To this end, as much as possible in cooperation with other financiers:
    a. Develop data and methodologies to identify and report on biodiversity related risks and opportunities.
    b. Map the hotspots in your portfolio with high risks on biodiversity loss, on a sectoral and geographical level.
    c. Engage with the most heavily exposed companies.
    d. Refrain from financing and investing in the most controversial and unresponsive companies.
    e. Use price incentives. Translate biodiversity risks and opportunities into differences in the cost of capital.

3. **Avoid tradeoffs between climate and biodiversity.** While biodiversity and climate change each have unique characteristics, the interaction is large. An integrated approach is needed. Especially in the field of carbon offsetting the focus should not only be on carbon as this may come at a great cost to biodiversity. To that end, work only with a voluntary carbon market system that can maintain trust through an open-source governance system: be transparent in terms of transactions, so that each credit purchase is visible to the public and that suspicious transactions can be publicly flagged and addressed (Finance for Biodiversity & Climate Advisers, 2021).

Recommendations to public policy makers

We have formulated the following recommendations to governments to encourage and enable the financial sector to play its role most effectively in preserving and restoring biodiversity.

1. **Make alignment of financial flows part of the post-2020 Global Biodiversity Framework.** The post-2020 Global Biodiversity Framework, to be agreed upon this year, should:
    a. Contain an explicit reference to aligning financial flows, both public and private, to its goals.
    b. This should encompass both increased resource mobilization or nature-positive finance as well as adhering to the 'do no harm'-principle, thus eliminating financing that is harmful to biodiversity.
    c. The goals of the GBF should be specific and measurable along a clear timeline to allow the financial sector to benchmark its performance and thus determine its alignment.

2. **Ensure that climate mitigation does not harm biodiversity.** While climate change mitigation and biodiversity conservation and restoration mostly go hand-in-hand, climate change mitigation, especially, may also hurt biodiversity. Carbon offset markets are expected to grow strongly in the coming years, as are crops for biofuel. So it is important that safeguards are built in that reforestation and afforestation is done in such a way that they contribute to rather than harm biodiversity.

3. **Improve the business case of nature-positive business.** The single best way to enable the financial sector to finance in a more nature-positive way is to structurally improve the business case of nature-positive business. This can be done through:
    a. Regulation, making biodiversity harmful activities illegal.
    b. Putting a price on such activities, giving negative externalities a price for instance through taxation of meat consumption, primary resource use, or non-sustainable land management.
    c. Procurement policies that create new markets for nature-positive products.
    d. Clear and credible long-term national biodiversity targets and transition plans that help private financial institutions to understand where developments, that could lead to transition risk, will be going.
    e. Ensure that the technical operationalization of the new transparency initiatives such as the CSRD, SFDR and Taxonomy includes biodiversity. Valuing both the positive impact as well as requiring disclosure of activities that harm biodiversity. Work towards global standards with the TNFD and IFRS.

f. Obliging boards to guard the corporate citizenship and responsible conduct of their company and allowing companies to formulate their societal objectives.

4. **Lead by example: the public budget.** Governments are important financial agents themselves. Through their budgets they can make or break nature-positive markets. To fully utilize this power:
   a. Biodiversity should not be the topic of just the ministry of the environment or nature. Create, to this end, an international coalition of Finance Ministers for Biodiversity or extend the mandate of the current Coalition of Finance Ministers for Climate Action.
   b. Test current expenditures, such as agricultural subsidies, on their climate and biodiversity impact.
   c. Also use the public impact investment institutions. Leverage private funding through blended finance and subsidies or work with guarantees where necessary.

5. **Supervision: act now.** There is consensus over the fact that climate and biodiversity pose both micro- and macroprudential risks. Risks that cannot be completely quantified. Therefore, steps need to be taken to align the current supervisory framework with the need to reduce these risks. To this end, in addition to what is already done with regard to climate:
   a. Demand assessments of exposure to both biodiversity dependencies and impacts from banks, pension funds and insurance companies, using existing methodologies such as DNB and Banque de France have done.
   b. Increase the capital requirements for both the largest biodiversity and climate risks. Look at specific sectors and companies therein with a poor track record and/or strategy (micro prudential).
   c. Introduce minimum exposures or floors for nature-positive and net zero investments and limits for nature negative and climate high risk loans and investments (macro prudential).
   d. Add the knowledge of climate and biodiversity to the fit and proper test of key financial personnel.

6. **Monetary policy: include biodiversity.** The ECB is currently studying ways to take climate into account in setting and implementing its monetary policies. The same rationale applies to biodiversity. Hence the ECB should:
   a. Include biodiversity in the review of its collateral framework and asset purchase programme, starting with differentiating between the best and worst performing sectors and companies.
   b. Also do this for the refinancing operations of banks and target these to nature-positive bank lending.

c. Own funds: Promote positive nature impact also through own non-monetary portfolios.

7. **Enable climate mitigation and nature-positive investments in the poorest countries.** The global climate and biodiversity goals can only be achieved when the poorest countries also have the financial means to invest in mitigating climate change and preserving and restoring biodiversity. To this end what is needed is:
   a. Debt Sustainability Analyses that take into account climate and biodiversity risks and spending needs.
   b. The introduction of sovereign debt with interest rates that differ based on the score on biodiversity and climate linked key performance indicators.
   c. Biodiversity and climate to be an integral part of debt restructuring efforts. Structural adjustment plans should be nature-positive rather than try to commoditize and sell of the nation's biodiversity, including capacity building on how to commercially structure nature-positive projects so that they become investable for private financial institutions.
   d. Developing means for global liquidity, such as created through the IMF's Special Drawing Rights, to be used to reward the preservation and restoration of biodiversity and climate change mitigation, thus rewarding care for the global public goods of biodiversity and a stable global climate.

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