Common ground in biodiversity footprint methodologies for the financial sector

asn bank

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finance in motion

ACTIAM, ASN Bank, CDC Biodiversité

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Foreword

Modern enterprises, companies and investors have begun recognising their competitive advantage when fully understanding their impacts and dependencies on nature. The awareness is sinking into the boards that we are hitting planetary boundaries and that the sustainability challenge calls for new approaches. There is growing perception that natural capital is the underlying layer of sustainability, on which both society and the economy depend. Assessing, valuing and accounting one's impacts and dependence on natural capital and ecosystem services, and how this translates into financial risk, equips the management with a sustainability metric for the 21st century. However, making natural capital mainstream requires more cooperation and networks to build momentum at international, national and private corporate levels. We need more cooperation towards developing tools for valuing nature and integrating natural capital and ecosystem accounting in policies and in business decision making.

Therefore, the EU engages in mainstreaming the measurement of natural capital at a variety of scales. The EU Business and Biodiversity Platform (EU B@B) is running a community of practice with financial institutions to share best practice to integrate biodiversity and natural capital into mainstream financial activities, and contribute to the development and application of biodiversity metrics for business.

Therefore I would like to strongly commend the efforts by the four front-runners that are setting out their joint efforts in this paper who are contributing to the EU Community of Practice on Finance and Biodiversity. I think that this cooperation of a group of financials, ASN Bank and CDC Biodiversité, ACTIAM and Finance in Motion in the development of a biodiversity foot printing methodology and striving to set out a common ground can become a milestone on the way to standardising biodiversity metrics for financials.

This work could also inform the implementation and further development of the action plan on sustainable finance, which the European Commission adopted this year and which includes the ambition to gradually create a unified classification system on what can be considered an environmentally sustainable economic activity. If we are to achieve sustainability, the consideration and the measurement of our relationship with nature in all decisions has to become the new normal.

Humberto DELGADO ROSA , Director for Natural Capital in DG Environment of the European Commission

Executive summary

In the last three years, ASN Bank, part of de Volksbank in the Netherlands, and CDC Biodiversité (France) have invested significant efforts in the development of a biodiversity footprinting methodology that fits their objectives: the 'Global Biodiversity Score' (GBS) developed by CDC Biodiversité and the 'Biodiversity Footprint for Financial Institutions' (BFFI) methodology developed by ASN Bank, PRé Consultants and CREM. Both CDC Biodiversité and ASN Bank found their objectives and approaches are quite similar. At the start of 2018, ASN Bank and CDC Biodiversité, together with ACTIAM and Finance in Motion, decided to share experiences in biodiversity footprinting and explore the common ground between the footprinting methodologies of CDC Biodiversité and ASN Bank, and the biodiversity related approaches by ACTIAM and Finance in Motion. The objective of this initiative is to learn from each other and to explore whether common rules or concepts could be identified as starting points for any financial institution interested in assessing its biodiversity footprint. The primary target group of this paper are policy makers, decision makers and Environmental, Social and Governance (ESG) specialists in financial institutions. However, the report is just as valuable to researchers and consultants in the biodiversity footprinting field.

The cooperation between CDC Biodiversité, ASN Bank and ACTIAM, supported by Finance in Motion, has shown that there is a lot of common ground between the methodologies, e.g. regarding the definition of biodiversity, the inclusion of the main pressures on biodiversity, the scientific background of the pressure-impact models involved, the type of input data and transparent reporting about the methodology. Moreover, there is common ground on the way these methodologies should be used (with care) and the fact that there is no (need for) a one-size-fits-all. Different objectives, applications and required levels of detail will require different methodologies. We do agree however, that a high level of compatibility of methodologies, e.g. assessment methodologies on a micro and macro level, is desired from the viewpoint of consistency and the use and exchange of data.

Our common ground on biodiversity footprinting for financial institutions includes, among others our view on the steps to calculate a biodiversity footprint:

1. Analysis of the focus of the investment: what do we know about the economic activities of the investee, where do activities take place? How should negative or positive impacts be attributed to the investor?
2. Assessment of the pressures on biodiversity induced by the economic activities invested in, including land use, land transformation, water use, greenhouse gas emissions, and other emissions to air, water and soil.
3. Assessment of the impact on biodiversity resulting from these environmental impacts, using pressure–impact relations provided by biodiversity impact models.
4. Interpretation of the footprint results. This includes a complementary (qualitative) analysis of the quantitative results, for example to put results into perspective or context, identify perimeter/methodological limitations and provide an assessment (quantitative and/or qualitative) of uncertainty and how to deal with this uncertainty.

Next to that common ground was found on the key concepts of scopes and attribution rules. The use of scopes as a way to describe impacts and their attribution through the value chain.

The way in which attribution of environmental pressures and impact on biodiversity can take place for financial institutions, including concepts like 'follow the money', the influence of the financial institution on steering the investment and the share of assets owned. At the same time, we recognise the challenges that remain in this area, e.g. with respect to indirect investments.

Moreover, we identified a number of 'requirements' and 'desired characteristics' of a biodiversity footprint. For requirements this includes elements such as relevance, responsivity to change, transparency, fit for purpose and compatibility. For desired characteristics this includes looking at biodiversity as a whole, cross-sectoral, global and the whole value chain.

The development of biodiversity footprinting methodologies is of course not an objective in itself. Biodiversity footprinting is needed to measure both positive and negative impacts on biodiversity in order to decide on material issues. These in turn can contribute to making policy on a national and international level, monitoring progress designing products and services by corporations and making investment decisions.

The 'Biodiversity week' in November 2018 in Paris, the COP 14 in Egypt and the COP 15 in China present valuable opportunities to exchange experiences, to further explore the potential applications of biodiversity footprinting by government, businesses, NGOs and the financial sector and to expand the common ground in this area.

About the initiators and supporters of this common ground paper

About ASN Bank

ASN Bank from The Netherlands is a retail bank that was founded in 1960. It has €15 billion under management. Dominant asset classes are: mortgages, government bonds, renewable energy, healthcare, water management, green bonds, investment funds (listed companies). ASN Bank is part of the Dutch Volksbank group. De Volksbank is a family of banking brands (ASN Bank, BLG Wonen, RegioBank and SNS) with a particular focus on the Dutch retail market, including small and medium-sized enterprises. De Volksbank aims to meet the specific financial needs of its brands' customers in a people-oriented, efficient and sustainable way. De Volksbank has a balance sheet total of € 63 billion and approximately 3,200 employees (FTEs), making it a major player in the Dutch retail market.

ASN Bank's mission: 'Our economic conduct is aimed at promoting sustainability in society. We help to secure changes that are intended to put an end to processes whose harmful effects are shifted to future generations or foisted onto the environment, nature and vulnerable communities. In doing so, we do not lose sight of the necessity to yield returns in the long run that safeguard the continued existence of our bank. We manage the funds that our customers entrust to us in a manner that does justice to their expectations.'

We have translated our mission into policy. Our three sustainability pillars –climate change, biodiversity and human rights, are at the heart of this policy. ASN Bank has set itself three long term goals in line with its sustainability pillars:

- Climate: all investments and loans of ASN Bank are climate positive in 2030.
- Biodiversity: all investments and loans of ASN Bank result in a positive effect on biodiversity in 2030.
- Human rights: all clothing companies in which we invest pay their workers a living wage in 2030.

For each sustainability pillar we have developed metrics and initiated groundbreaking platforms with frontrunners in the sector (PCAF, PLWF & PBAF). Our extensive CSR-policy can be found here: https://www.asnbank.nl/over-asn-bank/duurzaamheid/beleidsdocumenten.html

About CDC Biodiversité

CDC Biodiversité is a direct subsidiary of the Caisse des Dépôts (CDC, the French largest public financial institution with €166 billion in assets managed for the general interest) and has been demonstrating for over 10 years the group's desire to innovate in the general interest by creating new economic models that can contribute to the conservation of biodiversity.
CDC Biodiversité is sharing its leading experience and innovative tools with scientific, institutional and private stakeholders: offset banking, climate change adaptation projects through the Nature 2050 program and a biodiversity footprint assessment tool, the "Global Biodiversity Score" or GBS. The GBS aims to provide the biodiversity counterpart of the equivalent CO_2 ton and to measure the impacts of economic activities on ecosystems along the value chain. The development of the GBS is supported in the Business for Positive Biodiversity (B4B+) Club, a club of businesses and financial institutions engaged in the process of assessing and limiting their impacts on biodiversity. The main objective of the Club is to co-develop and road-test the methodology at the corporate level for businesses and portfolio level for FIs. Lessons learnt from the B4B+ Club contributed significantly to this publication.

About ACTIAM

ACTIAM is an asset manager with a strong legacy in responsible and impact investing. With over 100 staff we manage €54.1bn (ultimo December 2017) primarily for insurance companies, pension funds, banks and intermediaries. We offer a comprehensive range of investment solutions: from index strategies to impact investing. We impose strict criteria on investments and follow a robust selection process. Our capabilities are focused towards generating both higher returns and an improving sustainable world now and in the future. In our strategies we focus on three material themes: climate, water and land, for which we have defined targets that we measure in footprints:
1. Climate: 40% reduction of greenhouse gas emissions in our portfolio by 2040 (compared to 2010).
2. Water: a water-neutral portfolio by 2030.
3. Land: a portfolio with zero deforestation by 2030.

Taken a step further, these themes capture the biodiversity risks and/or opportunities in our portfolio. We believe that companies adopting sustainable business practices are better prepared for the future. This is why we aim to invest actively in companies that help to create a sustainable future and that contribute to the accomplishment of the Sustainable Development Goals. Together with our partners, we strive towards continually making a positive impact.

About Finance in Motion (supporter)

Finance in Motion is a global impact asset manager focused exclusively on sustainable development in low and middle-income countries. The company develops and advises impact investment funds whose blended finance structures bring together public and private investors to promote economic prosperity, social development, climate change mitigation and adaptation, sustainable use of natural resources and biodiversity conservation.

Over the course of its operations, Finance in Motion has unleashed a cumulative total of EUR 4 billion toward these goals in Southeast Europe, the Caucasus, Latin America, the Middle East, and North Africa. In addition to investment activities, the funds also provide technical assistance to support investees, foster responsible finance, and maximize impact in the countries they serve. Finance in Motion furthermore makes selected direct investments in impactful enterprises that share the company's values.

Through its 17 offices across more than 30 countries, Finance in Motion helps partners develop their businesses and demonstrate that sustainable and financial returns can go hand-in-hand.

1. Introduction

1.1 Background and objective of the common ground paper

In the last three years, ASN Bank (The Netherlands) and CDC Biodiversité (France) have invested significant efforts in the development of a biodiversity footprinting methodology that fits their objectives: the 'Global Biodiversity Score' (GBS) developed by CDC Biodiversité[1] and the 'Biodiversity Footprint for Financial Institutions' (BFFI) methodology developed by ASN Bank, PRé Consultants and CREM[2]. Both CDC Biodiversité and ASN Bank found their objectives and approaches are quite similar. Among other things, both footprinting approaches are partially based on research conducted at the Netherlands Environmental Assessment Agency (PBL) and the Netherlands National Institute for Public Health and the Environment (RIVM).

At the start of 2018, ASN Bank, CDC Biodiversité and ACTIAM, supported by Finance in Motion, decided to share experiences in biodiversity footprinting and explore the common ground between the footprinting methodologies of CDC Biodiversité and ASN Bank, and the biodiversity related approaches by ACTIAM and Finance in Motion. The objective of this initiative is to learn from each other and to explore whether common rules or concepts could be identified as starting points for any financial institution interested in assessing its biodiversity footprint. The collaboration of the four financial institutions was facilitated by their common participation to the European Union's Business @ Biodiversity platform[3].

This paper is the result of this cooperation between the four financial institutions. The paper describes the common ground between the footprinting methodologies used by ASN Bank and CDC Biodiversité, taking into account the approaches of ACTIAM and Finance in Motion on biodiversity related topics like carbon, water, land use and deforestation. The paper focuses on introducing key biodiversity footprinting concepts and practical illustrations of biodiversity footprinting, including a discussion on the interpretation of results.

1.2 Reader

The primary target group of this report are policy makers, decision makers and Environmental, Social and Governance (ESG) specialists in financial institutions. However, the report is just as valuable to researchers and consultants in the biodiversity footprinting field.

Section 2 of the paper addresses the question what a biodiversity footprint is and how it is relevant to financial institutions. Moreover, a (brief) overview is provided of selected initiatives that focus on the assessment of impacts and dependencies on biodiversity and the way these initiatives can be positioned according to their use.

Section 3 discusses the common ground between the footprint approaches of CDC Biodiversité and ASN Bank, addressing the definition of biodiversity and presenting areas of common ground. In this common ground, a distinction is made between *'Requirements'* (what do the authors believe a footprint should comply with) and *'Desired characteristics'* (what should a footprint preferably cover?). The requirements and characteristics are illustrated with cases: practical examples of the approaches by CDC Biodiversité, ASN Bank, ACTIAM and Finance in Motion.

In the last section some concluding remarks are presented, as well as a view on the road ahead.

1 A report describing the GBS can be found at http://www.mission-economie-biodiversite.com/wp-content/uploads/2017/11/N11-TRAVAUX-DU-CLUB-B4B-INDICATEUR-GBS-UK-BD.pdf

2 A report describing the biodiversity footprint methodology used by ASN Bank can be found on https://www.asnbank.nl/over-asn-bank/duurzaamheid/biodiversiteit/biodiversity-in-2030.html

3 http://ec.europa.eu/environment/biodiversity/business/annual-conference/annual-conference-2018/index_en.htm

2. Why a biodiversity footprint for financial institutions?

2.1 Why is biodiversity relevant for financial institutions?

The reasons for managing the impact on biodiversity range from managing investment risks to the use of biodiversity as a way to contribute to policies/objectives on carbon, water or the SDGs.

There is broad consensus that the rapid loss of biodiversity is one of the major challenges for society. Research by the Stockholm Resilience Centre[4] introduces the issue of 'Planetary boundaries'. This research shows that the loss of biosphere integrity (biodiversity loss and extinctions) is already considered a high risk to humanity (see Figure 1) and is even more urgent than climate change.

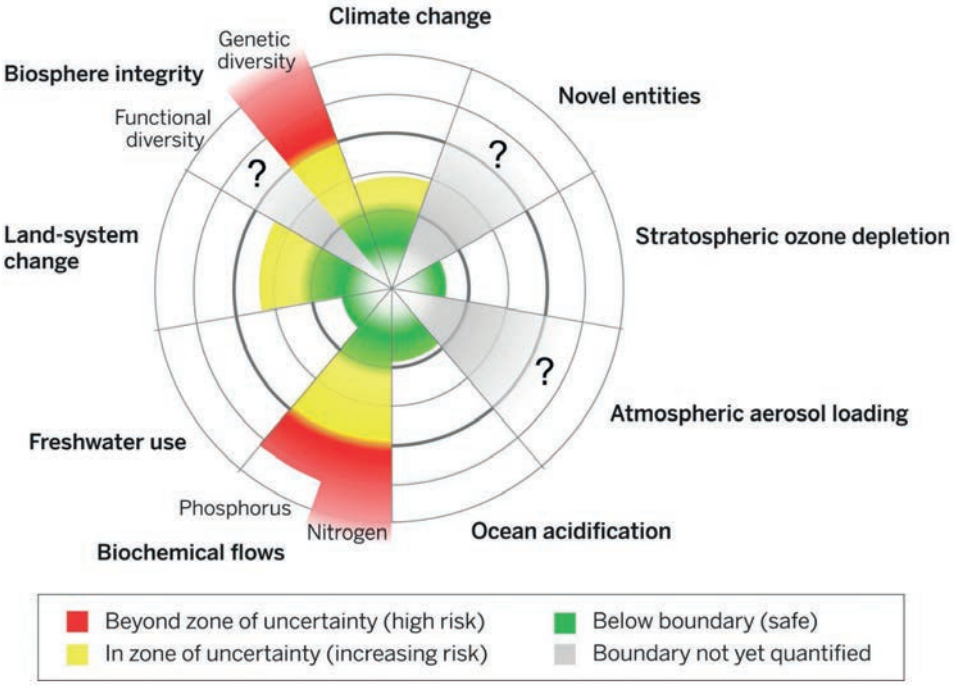


Figure 1: The nine planetary boundaries within which humanity can continue to develop and thrive for generations to come (Steffen et al. 2015)

Many financial institutions do not yet have an understanding of their sustainability performance, let alone insight in the risks and opportunities associated with biodiversity. There is, however, a growing number of financial institutions that have a climate or water policy in place and/or have committed themselves to contributing to the sustainable development goals (SDGs). The conservation and improvement of biodiversity enhances the capacity of an ecosystem to store and purify water, to store carbon and to provide the resources and services people depend on. By taking positive and negative impacts on biodiversity into account in investments and loans, a financial institution can contribute to its social and environmental objectives. This is also illustrated by Figure 2, developed by the Netherlands Environmental Assessment Agency (PBL): the SDGs linked to the natural resource base are at the basis of the SDGs linked to production and consumption and well-being.

4 http://www.stockholmresilience.org/research/planetary-boundaries/planetary-boundaries/about-the-research/the-nine-planetary-boundaries.html

Figure 2: The SDGs and the natural resource base (adapted from PBL, 2017)

The loss of biodiversity may also affect the businesses financial institutions invest in. Most businesses depend on biodiversity, either directly or through their supply chains. This dependency ranges from the resources used, such as water, food and fibres, to the services that ecosystems offer, such as pollination and flood control[5]. The same is true for society as a whole. Due to the perceived abundance of high quality natural resources, organisations tend to take them for granted. However, ecosystem degradation, as well as an increased awareness of this degradation amongst governments and civil society, means that natural resources cannot be exploited indefinitely. Biodiversity underpins the stock of natural capital and the ability of ecosystems to provide the flows of ecosystem services (Figure 3).

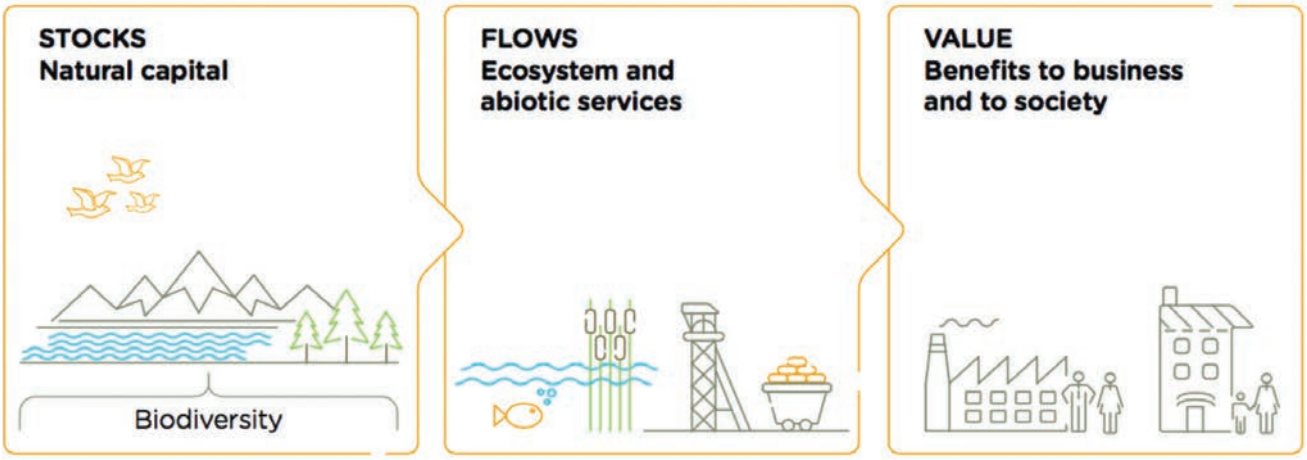


Figure 3: Biodiversity and Natural capital stocks, flows and value (Natural Capital Protocol, 2016)

5 https://www.cbd.int/doc/articles/2002-/A-00473.pdf

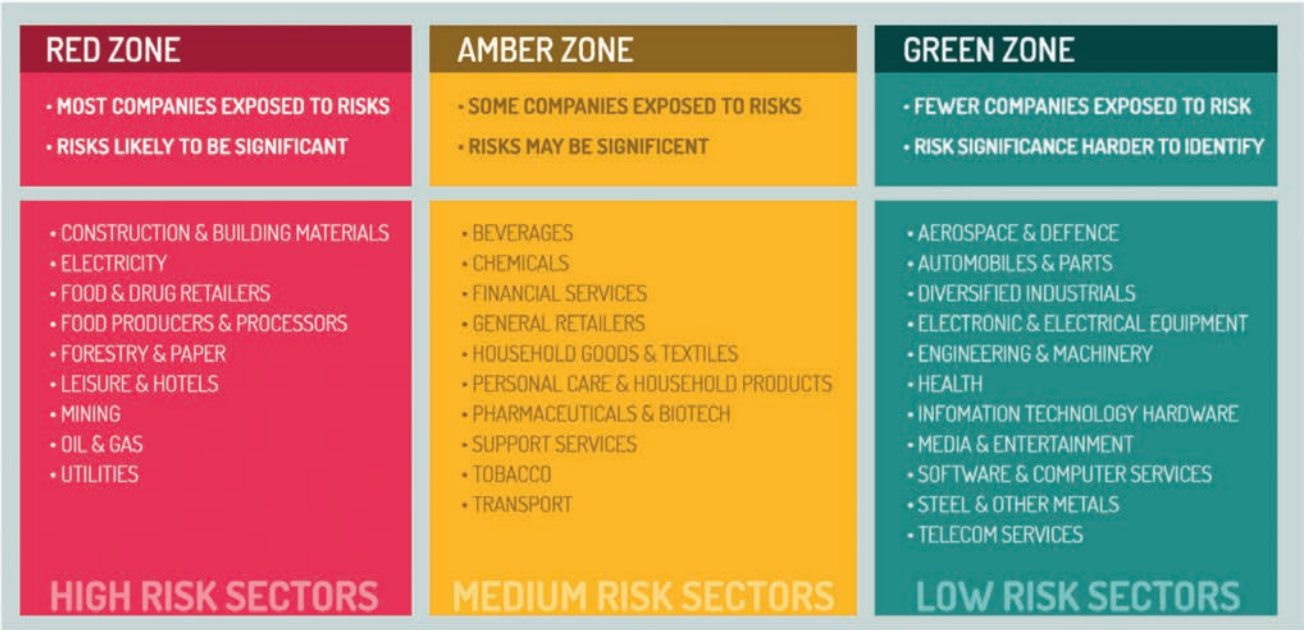


Table 1: Sectors that run a risk as a result of the loss of biodiversity (CREM, VBDO, 2016; adapted from F&C Asset Management, 2004).

Financial institutions investing in 'red zone' or 'amber zone' sectors may be faced with risks regarding their return on investment. They can mitigate this risk by reducing the negative impacts and dependencies of their investments on biodiversity (e.g. through efficient resource use) and by contributing to positive impacts, strengthening the biodiversity their investees depend on. A biodiversity footprint offers a first step towards such a strategy by showing to what extent investments and loans affect biodiversity.

2.2 What is a biodiversity footprint?

Most human activities impact biodiversity, either positively or negatively. These impacts can be measured and expressed as a biodiversity footprint. A biodiversity footprint can be based on monitoring of actual changes in biodiversity through time (assessment of actual impact), or by assessing the 'potential' or expected impact, based on the contribution of an economic activity to drivers of biodiversity loss or biodiversity gain (assessment of potential impacts). A biodiversity footprint is in many ways similar to carbon or water footprinting. However, contrary to carbon or water footprinting, there is no broadly accepted metric for a biodiversity footprint yet; there is no equivalent of an IPCC endorsed carbon metric. Both methodologies discussed here measure biodiversity impact in terms of a loss or gain in species richness (see also section 3.1).

Complementary to a quantitative calculation of a biodiversity footprint, a qualitative assessment can be used to analyse and address impacts not (yet) adequately covered by the quantitative footprint calculation, thereby complementing the quantitative result and enabling a correct interpretation of the footprinting results.

In the case of a biodiversity footprint for financial institutions, the footprint may focus on the impact of the financial institution itself (e.g. impacts resulting from land use and energy use by a bank's buildings) and on the impact of the economic activities the financial institution invests in. The latter impact will generally be much larger. This paper focuses on the biodiversity footprint of the investments and loans of a financial institution.

2.3 The use of a biodiversity footprint

In general, five broad uses can be distinguished for a biodiversity footprint, covering different application areas and answering different questions (examples in bullet points):

1. Public policy
   - How can quantified targets for countries/sectors be set and monitored to reduce biodiversity loss; e.g. by the Convention on Biological Diversity (CBD), national governments and other actors?
   - How can trends in biodiversity decline be expressed and how can the contribution of each industry be assessed in national assessments?
   - What does the biodiversity footprint per capita look like?
   - What % of the total impact on biodiversity on a country level is 'imported' through dependencies on foreign resources?
2. Corporation / Portfolio
   - What is the biodiversity footprint of a financial institution or company? What is the footprint of different asset classes and investments?
   - How do the investments in companies compare to each other regarding their biodiversity impact?
3. Supply chain
   - How do different suppliers and supply chains compare with regard to the impact on biodiversity?[6]
4. Product or service
   - What design and composition of products or services guarantee the lowest biodiversity footprint? How do different commodities compare with regard to the impact on biodiversity?
5. Project or site
   - How can operational impacts on biodiversity be minimised at the site or project level and how can positive impacts be measured and compared?

Footprints can be used both for internal purposes and for external reporting purposes and can be used to set quantitative targets like a 'No Net Loss' or 'Biodiversity Net Gain'.

The focus of this working paper lies on the Corporate/Portfolio use. Such portfolio or corporate biodiversity impact assessments range from a preliminary screening to identify impact 'hot spots' and the main drivers of biodiversity gains or losses, to in-depth evaluations of the footprint of specific companies and investments. Ultimately, financial institutions can use biodiversity footprinting for strategic purposes. For example, to inform sustainable investment decisions and policies, to use in voting and engagement with companies that they invest in, to identify investment opportunities and to set quantitative targets like 'No Net Loss' or 'Biodiversity Net Gain'. Also, it can support reporting purposes, for example by informing stakeholders about the overall footprint of the portfolio and progress on targets.

2.4 Overview of international initiatives

CDC Biodiversité and ASN Bank developed their 'GBS' and 'BFFI' methodologies more or less independently. Meanwhile, other initiatives emerged in parallel. Without pretending to be comprehensive, the following overview shows that the initiatives have different characteristics and application areas and support different decisions. It does not seek to assess these approaches against any criteria but rather aims to show the expected and stated uses of each initiative.

6 Assessing the impact of the commodities produced by raw material producers falls under 4, Product or service use.

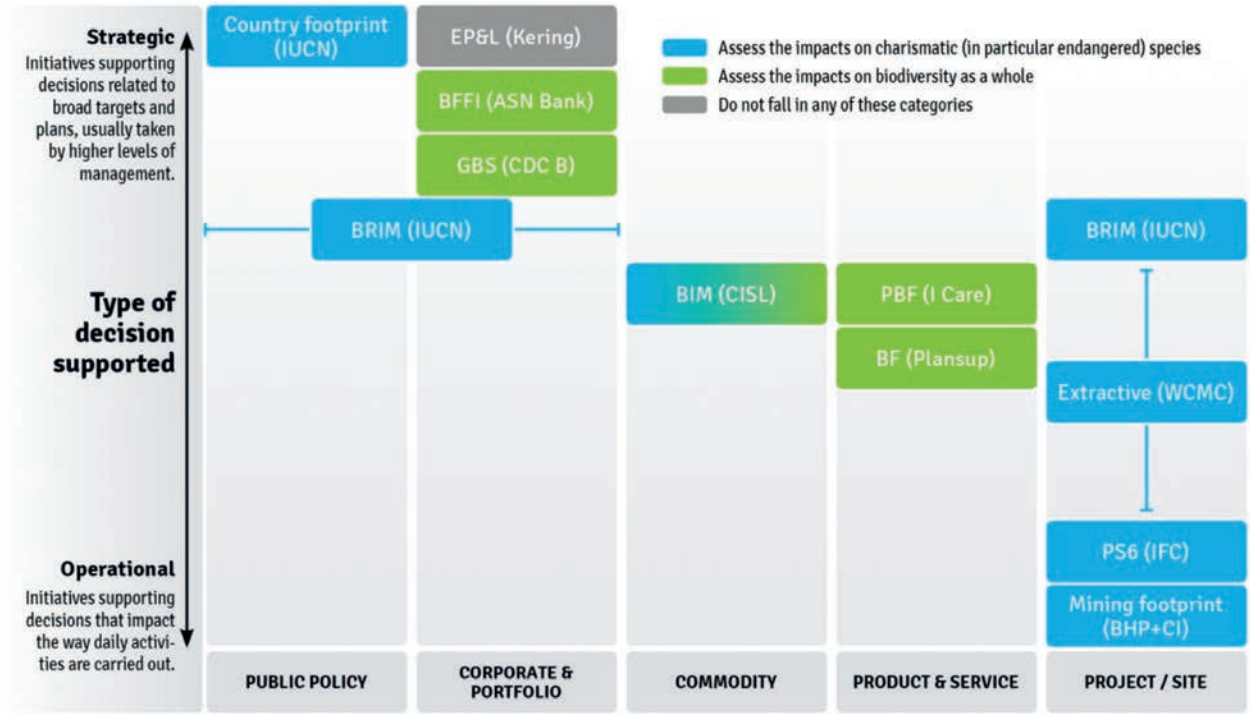


Figure 4: Mapping of biodiversity footprint initiatives

A selection of international initiatives is briefly characterised below:

- **Country biodiversity footprint**[7] (IUCN): the IUCN is conducting an assessment of the biodiversity footprint of countries and their balance of trade.
- **EP&L (**Kering): Kering assesses its land use (among other indicators) impact through its Environmental Profit & Loss methodology[8].
- **BFFI** (ASN Bank): PRé and CREM assess the biodiversity footprint of the assets of ASN Bank through the Biodiversity Footprint for Financial Institutions, combining data from Exiobase, the ReCiPe methodology and a qualitative analysis.
- **GBS** (CDC B): CDC Biodiversité is developing the Global Biodiversity Score, a tool to assess the biodiversity footprint of economic and financial activities.
- **BRIM** (IUCN): the IUCN is developing the Biodiversity Return on Investment Metric to assess the gains of investing in biodiversity conservation[9].
- **BIM** (CISL): Cambridge Institute for Sustainable Leadership is developing the Biodiversity Impact Metric to compare the impacts of different commodities and supply chains[10].
- **PBF** (I CARE): I CARE assesses the impact of products and services through its Product Biodiversity Footprint[11].
- **BF** (Plansup): Plansup assesses the Biodiversity Footprint of a range of businesses, e.g. to compare biodiversity improvement options[12].

7 Provisional name as the project does not currently have an official name.
8 http://www.kering.com/en/sustainability/epl
9 https://www.iucn.org/regions/washington-dc-office/our-work/biodiversity-return-investment-metric
10 https://www.cisl.cam.ac.uk/resources/working-papers-folder/healthy-ecosystem-metric-framework
11 http://www.productbiodiversityfootprint.com/
12 http://www.plansup.nl/models/biodiversity-footprint-model/

- **PS6** (IFC): the Performance Standard 6 of the International Finance Corporation (of the World Bank) does not, strictly speaking, assess footprints. It provides guidance on how to follow the mitigation hierarchy and introduce environmental safeguards regarding key concepts like critical habitats. It is included on the chart because of its extensive use by several sectors with direct impacts on biodiversity, and to highlight its operational and project/site focus[13].
- **Mining footprint**[14] (BHP + CI): the extractive company BHP is "developing a framework to evaluate and verify the benefits [related to biodiversity of its] actions" through a seven-year partnership with Conservation International. It involves pressure-state-response indicators at the site level.
- **Extractive** (WCMC): UNEP-WCMC is developing biodiversity indicators for extractive companies under its Proteus Partnership with the industry. It is focused on following pressure-state-response at the site level.

More in depth comparisons of biodiversity footprint methodologies can be found in the following two reports:

- Lammerant J., Assessment of biodiversity accounting approaches for business; Discussion paper for EU Business @ Biodiversity Platform, Draft report, 5 September 2018.
- Technical report on existing methodologies & tools for biodiversity metrics, Core initiative on Biodiversity; One Planet Program on Sustainable Food Systems, Zurich, July 2018.

13 https://www.ifc.org/wps/wcm/connect/topics_ext_content/ifc_external_corporate_site/sustainability-at-ifc/policies-standards/performance-standards/ps6

14 Name suggested by the authors as the project does not currently have an official name.

3. Our common ground in biodiversity footprinting for financial institutions

3.1 Introduction

In this section, we provide an overview of the common ground we found in biodiversity footprinting for financial institutions. The approaches we use to assess the biodiversity footprint can be seen as examples and as a starting point on how to conduct impact assessments. We want to inspire others in developing this work further and do not claim that the approaches used by us should always we used. At the same time, our work has led us to identify a number of 'requirements' and 'desired characteristics' for biodiversity footprint tools, which we believe could guide the ongoing work on biodiversity footprinting in the right direction.

We will also address some footprinting topics that do not result in a requirement or desired characteristic, but simply serve as inspiration on how one could address these topics. Examples include the use of 'scoping', the 'attribution' of impacts to investments and the use of a 'spatial dimension' and 'time dimension' in the footprint and unit of measurement.

The following areas of common ground are briefly presented and discussed:

- Biodiversity and metrics
- Methodological steps
- Focus of the investment
- Value chain & scope
- Pressures
- Pressure response relations
- Spatial dimensions
- Time dimensions
- Interpretation of the footprint results

3.2 Biodiversity and biodiversity metrics

Biodiversity

We use the definition of biodiversity from the convention text from the Convention of Biological Diversity (CBD):

"Biological diversity" means *the variability among living organisms from all sources including, inter alia, terrestrial, marine and other aquatic ecosystems and the ecological complexes of which they are part; this includes diversity within species, between species and of ecosystems.*

We value biodiversity as the life support system for society and we acknowledge its intrinsic value. The term 'biodiversity' can have many meanings and can be defined on many levels[15]. As a result, different indicators can be used to describe the quality or intactness of ecosystems. We believe there are several reasons why it makes sense to seek to protect all biodiversity and not just endangered species, charismatic species or species supporting specific ecosystem services:

- Biodiversity maximizes ecosystem resilience, thereby securing the future of current ecosystem services and contains an 'option' on ecosystem services that have yet to be discovered or used.
- Ecological functionality depends on common as well as charismatic or endangered species. It is therefore necessary to assess the changes in the populations of common species to maintain these functions. Focusing only on species extinction risk overlooks rapid declines in the number of individuals of species that are not at risk of extinction (Ceballos, Ehrlich, and Dirzo 2017)[16].
- The intrinsic value of biodiversity prevents a focus on ecosystem services only.

Our approaches focus on biodiversity 'intactness' and not on ecosystem services or endangered species. We consider vascular plants, birds, mammals, amphibians, reptiles, insects, and lower organisms in water. We agree that not only terrestrial, but also fresh water and marine biodiversity needs to be covered.

15 For instance, diversity in habitats, species, genes, threatened species, etc.

16 For example, if the population of a very common bird such as the sparrow declines sharply while remaining within the species' sustainability thresholds, the extinction risk does not increase even though there is a huge impact on the population dynamic.

Desired characteristic 1:
Biodiversity as a whole. *The biodiversity footprint focuses on biodiversity as a whole, not on a subset of, for example, common and charismatic species.*

Metrics
To assess the impact on biodiversity, our methodologies (GBS and BFFI) use an unaffected piece of nature as a reference point. Both methodologies express impact in terms of an increase or decrease in the number of species. GBS uses the Mean Species Abundance (MSA) metric to calculate impacts, while BFFI uses the Potentially Disappeared Fraction of Species (PDF) as a metric. Both methodologies link this metric with a spatial factor (the area where the impact takes place) and a time factor (the assessment period). Both MSA and PDF can be used across all sectors and across all countries and (eco)regions.

Desired characteristic 2:
Cross-sectoral. *The use of one common metric across industries makes benchmarking of companies easier, allows to set global and national policy targets encompassing all economic activities and simplifies extra-financial performance evaluations.*

Desired characteristic 3:
Global. *Similarly, having one metric across countries, instead of a range of country-specific metrics makes biodiversity footprints easier to to compare and aggregate when dealing with cross-country operations or projects.*

3.3 Methodological steps

We distinguish four steps to assess the impact of investments and loans on biodiversity and interpret the results for strategic purposes:

1. Analysis of the focus of the investment: what do we know about the economic activities of the investee, where do activities take place? How should negative or positive impacts be attributed to the investor?
2. Assessment of the pressures on biodiversity induced by the economic activities invested in, including land use, land transformation, water use, greenhouse gas emissions, and other emissions to air, water and soil.
3. Assessment of the impact on biodiversity resulting from these environmental impacts, using pressure – impact relations provided by the biodiversity impact models 'ReCiPe' (BFFI) and 'GLOBIO' (GBS). GLOBIO is a model which has been developed since 2003 by the PBL, UNEP GRID-Arendal and UNEP-WCMC to calculate the impact of environmental drivers on biodiversity in the past, present and future. It draws on driver-impact links found in scientific research. ReCiPe is a model developed in 2008 and updated in 2016 by PRé Sustainability, CML, Radbout University, RIVM and NTNU Trondheim to calculate the impact of environmental pressures on human health, resource scarcity and biodiversity. Like GLOBIO, the ReCiPe model draws on pressure-impact relations from scientific research.
4. Interpretation of the footprint results. The interpretation of the results includes an explanation of the quantitative results (putting results into perspective/context) and an analysis of impacts not or not well covered by the indicator, i.e. to qualify the results of the quantitative analysis, to verify how the limitations might change the footprint results and how this could be addressed.

It must be realized that the output of step 1 is needed as an input for step 2, the output of step 2 is needed as an input for step 3 and the decisions in each of these 3 steps will affect the interpretation of the results in step 4. For example, the decision to use a location-specific impact assessment methodology in step 3 will lead to the need for location-specific data in step 1 and, if these data are available, will enable a location specific interpretation and use of the results.

In practice, these 4 steps are followed by steps to translate the footprint results into action. For example, by combining the results with an FI's objectives on biodiversity, climate, water or SDGs, priority areas of action can be identified. Actions may include the engagement with companies invested in, the adjustment of the FI's investment criteria and an increased emphasis on creating positive impacts on biodiversity to contribute to a No Net Loss or Net Positive Contribution objective.

Figure 5 illustrates the generic process of conducting a biodiversity footprint analysis (step 1 to 4) and the use of the results (steps 5 and 6).

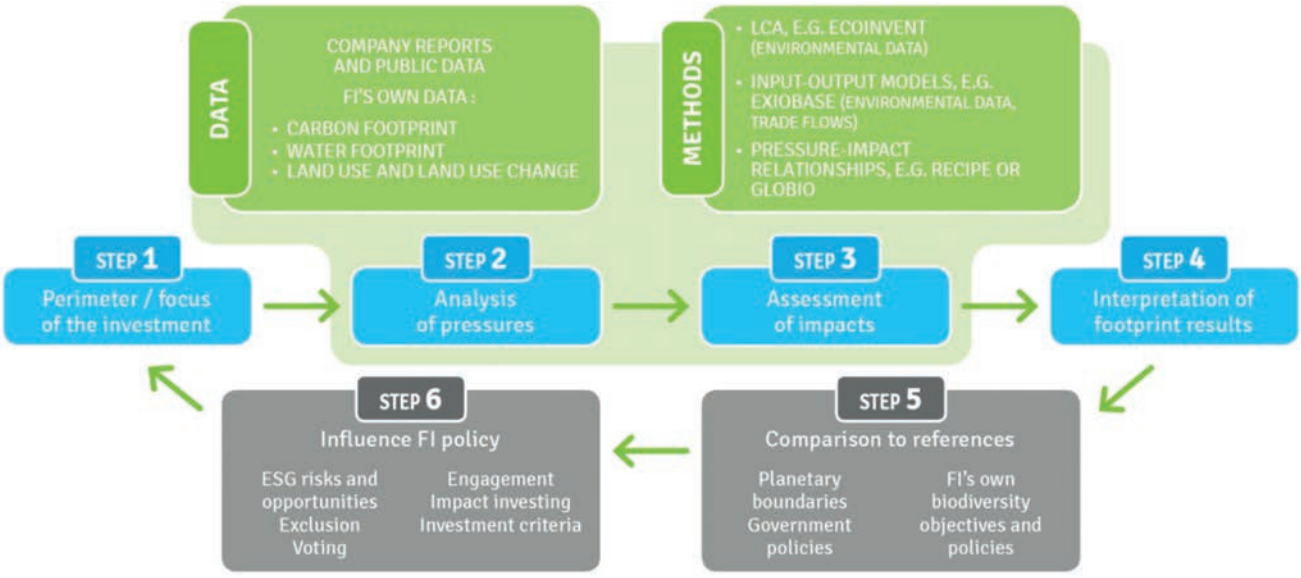


Figure 5: Conducting a biodiversity footprint analysis and use of the results

3.4 Step 1 Analysis of the focus of the investment

3.4.1 From investment to economic activities

While FIs have data available on investments in companies, projects or funds, databases like Exiobase[17] need data per sector and per country as an input to calculate the environmental pressures resulting from the economic activities the FI invests in. This means that each investment in a business, organization or project needs to be defined in terms of the economic activities linked to the investment. This can be quite straightforward, e.g. in case of an investment in a mining or agricultural company, but can also be more complicated, e.g. in case of an investment in a company producing a range of products or services. An analysis of company reports may be needed to assess what is being produced and where production takes place. Currently, this is one of the major challenges in calculating a biodiversity footprint, as it requires supply chain transparency and reporting from investees.

3.4.2 Scope

An important question when calculating the biodiversity footprint of an investment is to what extent the FI feels responsible for the impacts in the investees' value chain(s). For example, an investment in a sportswear brand may be treated as an investment in a retailer when the sportswear brand does not produce the products itself. However, one might also argue that by investing in the brand, the FI is indirectly also responsible for the production of the sportswear products and the materials used in these products.

A key concept developed by the Greenhouse Gas Protocol for climate footprinting to describe the impacts and their attribution through the value chain is **scopes**. When considering the impact caused by a business, scopes allow to distinguish between the impacts of a company's own operations and impacts occurring along its value chain; in particular those of its suppliers but also downstream impacts, e.g. due to a product's end of life phase.

17 http://www.exiobase.eu/

For carbon emissions, one distinguishes three scopes, which can be adapted for biodiversity:

- **Scope 1**: impacts resulting from what the entity (e.g. a company) consumes or restores on the area controlled by the entity and other impacts directly caused by the entity during the period assessed.
- **Scope 2**: impacts resulting from (emissions from) the generation of acquired and consumed electricity, steam, heat, or cooling (collectively referred to as 'energy').
- **Scope 3**: impacts which are a consequence of the activities of the company, but occur from sources not owned or controlled by the company, both upstream and downstream of its activities.

The three scopes assess only the *'dynamic footprint'*, i.e. the footprint caused by changes, consumptions or restorations. However, existing spatial pressures can limit the ability of biodiversity to thrive even without any change in pressures. For instance, the very existence of a palm oil plantation prevents the area it occupies from growing back into a natural tropical forest and thus prevents biodiversity from reaching 100% MSA. This *'static footprint'* or *'ecological opportunity cost'*[18] is captured through the concept of a **'Scope 0',** which is not used in climate footprinting (see Figure 6). This scope 0 is the spatial footprint (land use, fragmentation, encroachment) of existing facilities (excluding any consumption/expansion or restoration during the assessment period, which will be captured in scope 1)[19]. Scope 0 footprints should be accounted for separately and, unlike footprints from other scopes, should not be summed up over time to avoid double-counting. While the ecological opportunity cost or spatial footprint is a part of both the GBS and BFFI, the scope 0 terminology is currently only applied by the GBS.

The concept of Scope 0 is useful for all impact assessment methodologies to describe clearly and more comprehensively what impacts are assessed and what cause these impacts.

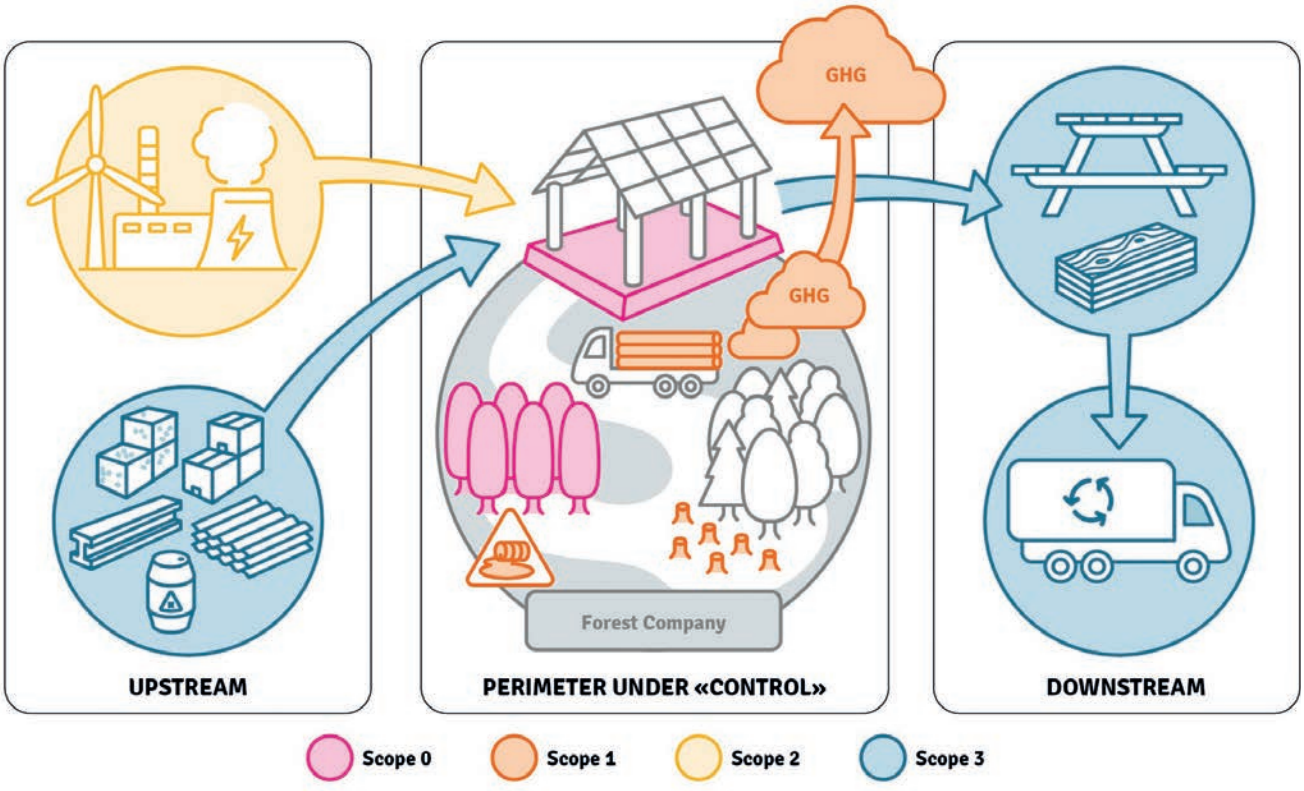


Figure 6: Graphical presentation for the four scopes (simplified, with only three pressures); Scope 0 is an addition to the usual three scopes

18 In microeconomic theory, the opportunity cost is the 'cost' incurred by not enjoying the benefit that would have been if an alternative scenario had occurred. It is not necessarily a monetary or financial cost. Here we use the term 'ecological opportunity cost' to address the biodiversity lost due to the existence of an economic activity, compared to a scenario where the activity would not have occurred.

19 But also the past emissions still impacting biodiversity today, for instance greenhouse gas emissions emitted years ago but still warming the atmosphere. See Figure 6.

Figure 6 is a simplified illustration, with only three pressure types represented and not all scopes represented for each pressure, but the scope concept applies to all pressure types. In Figure 6, the harvested plantation expands over natural forest during the period assessed, and the associated land use change causes a Scope 1 habitat change impact. Forestry activities, such as fertilization, harvesting and log transport also cause Scope 1 impacts, in terms of climate change and pollution. In addition to these Scope 1 (*dynamic*) impacts, the log storage facility and the plantation trees occupy an area that is thus unavailable for intact natural habitats. This static footprint (which can be considered an "ecological opportunity cost") is the Scope 0 introduced above. The energy purchased to power the storage facility (in particular electricity) belongs to the Scope 2 of the forestry company. Finally, all the upstream inputs and downstream use and end-of-life of the forestry products belong to scope 3.

In the BFFI approach, the 'ecological opportunity costs' are calculated as a default, so BFFI always uses the scope zero approach. This is illustrated in a textbox in section 3.6.3.

The concept of scopes makes it possible to avoid double counting by reporting scope 0, 1, 2 and 3 separately and not adding them.

Which scopes should be included in the footprint calculation of a financial institution? From the perspective of carbon footprinting, the inclusion of scopes 1 (impacts of the company itself) and 2 (impacts of the energy companies the company sources its energy from) is a generally accepted approach. The inclusion of the full scope 3 (the impact of suppliers and of sub suppliers), however, is not. In biodiversity footprinting we believe inclusion of scope 3 is preferable since most impacts on biodiversity take place in the supply chain (scope 3). The impact on biodiversity is typically highest in raw material production and processing, like agriculture and mining, mainly due to land use intensity and land use changes.

Regardless of the choices made, an FI should always be transparent about the decisions made regarding the scopes included in the footprint, the rationale behind these decisions and the consequences for the interpretation of the results.

Desired characteristic 4:
Covering the entire value chain. *Indirect impacts on biodiversity from the production of raw materials purchased, product or service use and product end-of-life are often significant and higher than the direct impact of a company. Assessing the impacts throughout the entire value chain is therefore critical to properly account for impacts and look for measures that can effectively reduce these impacts.*

Example
ASN Bank includes the biodiversity impacts in the value chains (scope 3) of the businesses the bank invests in. Including scope 3 means in the case of the sportswear brand that the impact of the production of the sportswear and the cotton in the sportswear is also included, even though ASN Bank does not directly invest in cotton production.

By taking this approach, the footprint result shows how the biodiversity impact hot spots relate to the different investments of the bank across the portfolio and where in the value chains linked to these investments the impact is highest and why. This allows the bank to decide on follow-up steps that are material to managing the bank's (negative and positive) impacts, even when these impacts take place further up the supply chain.

3.4.3 Attribution

When assessing impacts throughout the value chain, clear rules are necessary to attribute the impacts to each stakeholder involved, including the FI conducting the footprint. Impact attribution rules have also been developed for carbon footprinting, e.g. by the Greenhouse Gas Protocol (World Business Council for Sustainable Development and World Resources Institute 2004). These rules could also be used for biodiversity footprinting.

In general, three approaches can be considered, and the choice of one method over the other must be consistent with the (financial) accounting choices of the entity assessed:

- **Financial control**: the entity assessed "retains the majority risks and rewards of ownership of the operation's assets" (World Business Council for Sustainable Development and World Resources Institute 2004), which usually means it controls more than 50% of the voting right of the considered operation. 100% of the impact of the operation is then attributed to the entity.
- **Operational control**: the entity has "the full authority to introduce and implement its operating policies" (World Business Council for Sustainable Development and World Resources Institute 2004). Similarly, 100% of the impact of the operation is then attributed to the entity.
- **Share of the assets owned**: the entity accounts for biodiversity impact according to its share (*pro rata*) of the assets owned (debt and equity)[20].

For financial institutions, the attribution approach followed by the Platform Carbon Accounting Financials (PCAF) provides a valuable example:

- Follow the money as far as possible to understand and account for the carbon impact in the real economy.
- In principle scope 1, 2 and relevant categories of scope 3 of the investee should be included. When deviating from this (e.g. when scope 3 is not relevant), it should be made clear why.
- Include all financial flows (i.e. equity and debt) to the investee as much as possible. When deviating from this, it should be made clear why.

Attribution may prove to be a challenge in the case of indirect investments, e.g. in the case of a fund/bank lending to other financial institutions who then on-lend to end-borrowers (where most impacts occur). How should the impacts be attributed to the initial lender? The same is true for (simple) debt products, e.g. what about the impact of a working capital provided by a bank to a company? Such cases of attribution will require case-by-case solutions.

Example: Attribution and State bonds

The Exiobase dataset used in the BFFI approach has collected data on the expenditure by governments; this expenditure is linked to the sectors and countries from which it purchases its resources. If ASN purchases bonds, it owns a certain percentage of all bonds, and the assumption is made that, by owning this percentage, it is co responsible for the impact the expenditure of the government has. One could argue that this is a worst-case assumption as the government does not use bonds to spend immediately, but the approach is similar to the way an attribution is made when investing in companies. By owning a certain percentage of a company's shares and bonds, the bank co-owns the company and is co-responsible for the environmental pressures induced by the company's activities. Although one cannot say a bank co-owns a country, the attribution rule is the same.

Example: Transparent methodology on carbon and water footprinting

ACTIAM measures the carbon and water footprints of its portfolio. ACTIAM is completely transparent about the methodology it uses to calculate the footprints. The methodology documents describe the scope, measures, data, calculations and assumptions of the footprints. Also, ACTIAM finds it important that methodologies are shared and co-developed in the financial sector, which is why it for example co-developed the carbon footprinting methodology together with ASN Bank and other FIs in PCAF and also co-released a toolkit in collaboration with sustainability non-profit CERES, that contains the water footprint methodology[21]. Plus, ACTIAM publishes its methodology online[22] and footprint results are reported every year[23] in the annual report and audited.

20 The GHG Protocol considers only the share of equity because it focuses on non-financial institutions. For FIs however, the appropriate measure of asset ownership is the sum of debt and equity.

21 Ceres, Case Study: Aiming for Portfolio-Level Water Neutrality. ACTIAM, December 2017, available at: https://www.ceres.org/resources/toolkits/investor-water-toolkit/details#portfolio-asset-class-analysis

22 ACTIAM, Methodology on carbon footprint of investments, December 2016, available at:

23 ACTIAM, Carbon footprint of funds, 30 June 2017, available at: www.actiam.nl/nl/documenten/verantwoord/Documents/Carbon_footprint_of_funds.pdf

Example – BNP Paribas Asset Management listed equity portfolio

CDC Biodiversité worked on a case study with the French financial institution BNP Paribas Asset Management (BNPP AM) to compute the footprint of one of their portfolios of listed equities. The portfolio assessed contained companies relatively exposed to the agri-food industry. Attribution factors were required to assess BNPP AM's responsibility in the footprint of the companies in the portfolio. Several practical issues about the calculation of these attribution factors were encountered.

Since the value and the number of shares fluctuate over time, so do the attribution factors described above as $\frac{investment\ value}{enterprise\ value}$. For instance, consider a company Z with a debt of €1000 and 10 shares with an initial value of €100/share and thus a market capitalization of €1000. If the shares' valuation moves from €100/share to €50/share the attribution factor changes:

- Initial attribution factor for owner of 1 share: $\frac{100}{10x100+1000} = 5\%$
- Attribution factor for owner of 1 share after the price change:
  - If the value invested (€100) is used: $\frac{100}{10x50+1000} = 6.6\%$
  - If the current value of the investment is used (€50): $\frac{50}{10x50+1000} = 3.3\%$

Also, the attribution factor changes if there is a share buy-back or a share emission or the ratio of the investment over the market capitalization evolves. Hence, assessing the attribution factors on a particular date, e.g. December 31st, may lead to biases. Computing attribution factors more frequently and averaging them over the period considered is a possible solution to this issue. It is to be noted that for this case study, attribution factors were calculated based on the information available on the day of the evaluation.

3.5 Step 2 Analysis of the pressures induced by the economic activities

In the second step the pressures (or 'stressors') induced by the economic activities invested in are assessed. Data related to these pressures can either be derived from primary data from a company or project (preferred approach), or can be based on existing databases. These data include the inputs (e.g. resource use, land use, water use) and outputs (emissions) of economic activities. For the biodiversity footprint to be relevant, the main pressures on biodiversity should be covered in this step.

Requirement 1:

Relevant. *The footprint should be relevant and cover the* ***most important pressures*** *on biodiversity. Five main pressures on biodiversity can be distinguished: habitat change (land use change and physical modification of rivers or water withdrawal from rivers), overexploitation, invasive alien species, pollution, and climate change (Millennium Ecosystem Assessment (Program) 2005). Biodiversity footprint assessments should broadly cover these pressures and ensure relevance. Drivers that cannot be included in the quantitative footprint are covered by means of a complementary qualitative analysis.*

Many of the databases which connect economic activities to environmental pressures, like Exiobase, are so-called 'Extended Input-Output (IO)' databases. Traditionally, these databases specify the economic and sometimes physical flows between economic sectors in a country and between countries. The term 'extended' refers to the fact that social and environmental data are added to each sector and each country (e.g. greenhouse gas emissions from the textiles sector in Turkey). While Extended IO databases provide a complete impact overview of all activities, the level of detail of the sector definitions may be limited, e.g. 'textiles' instead of 'textiles from cotton' or 'textiles from polyester'. Moreover, in these databases, all companies operating in the same sector are supposed to create the same impacts per dollar value created. As such, it is not possible to make a distinction between companies with a very good or a very bad sustainability performance: the responsiveness to change on a company level is limited. This will also influence the interpretation and use of the footprinting results. For example, when sector averages are used, investment criteria focusing on sustainability measures (e.g. criteria requiring FSC certification in case of wood-based operations), are not reflected in the footprint score. In general, responsiveness to change should be a key feature of a biodiversity footprint, even though this responsiveness can be limited due to the data resources used.

Requirement 2:
Responsive to change. *The footprint of an economic activity should be susceptible to changes in the activity, e.g. measures taken by a company to minimize environmental pressures induced by the activity.*

Alternatively, more conventional life-cycle assessment (LCA) databases can be used, such as the ecoinvent database. This type of data can be much more specific and provides environmental data for a specific type of cotton in a specific region. While this increases the precision, it is hard to use in a generic hotspot assessment of an investment portfolio.

Collecting data directly from the source is even more precise. While maybe not suitable for hotspot identification throughout the value chain, it is especially useful for a detailed assessment, e.g. on the level of a single company or project, where the responsiveness to change should be optimal.

It is of course possible to combine these sources, an important rule being to put effort where it matters most. Collecting specific data is expensive and may therefore only pay-off when precision really matters. A biodiversity impact hotspot analysis with generic data can point the user towards the most relevant topics to focus on.

Example: Use of different databases in BFFI
In the BFFI, Exiobase data are used for the footprint analysis on a portfolio level. However, data from ecoinvent[24] was used to assess the environmental pressures from the construction and recycling of windmills and solar cells, as relatively good data was available on the impacts of the small number of producers.

Regardless of the type of data that is being used to assess the pressures on biodiversity, data use and methodological decisions should be fully transparent to allow for a traceable and replicable assessment.

Requirement 3:
Transparent. *Both the data and footprint methodology used need to be transparent. Publication of hypotheses, attribution rules applied and data sources ensure the transparency, traceability and replicability of the methodology.*

Desired characteristic 5:
Consensus. *A certain level of consensus is required for a footprint to be broadly accepted and legitimate. This implies that:*
- *The methodology and data used are public and peer-reviewed or broadly accepted by the scientific community;*
- *A wide community of stakeholders reviewed the methodology, including researchers, public authorities, NGOs and businesses.*

Requirement 4:
Fit for purpose. *The data and methods used should be compatible with each other and should match the objective, application and scope of the biodiversity footprint.*

24 www.ecoinvent.org

Requirement 5:
Rigor. *The information, data and methods used should be technically robust (from a scientific and economic perspective), transparent and fit for purpose.*

Requirement 6:
Consistency. *The use of the footprint methodology should be consistent to enable a comparison of footprinting results over time and between different datasets, e.g. to compare the footprint of different economic activities.*

3.6 Step 3 Analysis of the impact on biodiversity

3.6.1 Pressure-impact relations

To link environmental impacts to the impact on biodiversity, the footprint methodology uses scientifically based 'pressure-impact' relations (also called 'dose-response' relations) which enable a quantitative link between the pressures on biodiversity and the resulting impact.

Requirement 7:
Quantitative link between pressures and impacts. *Changes in the intensity of pressures must be translated into footprint changes and the links need to be explicit and quantitative. This ensures that the footprint is responsive to change, relevant for companies and investors and results are replicable.*

The pressure-impact relationships used by our approaches (originating from the ReCiPe and GLOBIO models) have their own uncertainties and their precision will be improved over time as new scientific data become available to strengthen the statistical relationships.

Example: The pressure-impact relation on climate change
Climate change is an important pressure on biodiversity and is taken into account by both the GBS and BFFI methodology. The first step in the pressure-impact relation, i.e. the relation between GHG-emissions and the rise of temperatures, is the same for both methodologies:
The temperature change caused by GHG emissions depends on the time horizon considered, i.e. how long these emissions are expected to remain in the atmosphere. We consider a time horizon of a hundred years in the calculations, consistent with the IPCC (Stocker 2014). The integrated absolute global mean temperature potential (IAGTP) of CO_2 for this time horizon is $4.76.10^{-14}$ °C.yr/kg (Joos et al. 2013). The step from temperature rise to the impact on biodiversity is then expressed in the GBS and BFFI's respective metric (MSA and PDF).

3.6.2 Spatial dimension of impacts

We use the potentially disappeared fraction of species (PDF) and the mean species abundance (MSA) as metrics. These metrics include a spatial dimension as their value should be multiplied by the area to which they apply (e.g. expressed in km^2). The MSA and area size are interchangeable (see example). The same is true for the spatial dimension in the BFFI metric: PDF.ha.yr.

Example: Interpretation of the spatial dimension in the MSA and PDF metric

This example is illustrated with the MSA metric, where (but things work similarly for PDF), a change in MSA from 100% to 75% over an area of 1 km² amounts to a loss of (100%-75%)*1 = 0.25 km² MSA. This is equivalent to an MSA of 100% across 0.75 km² and an MSA of 0% across 0.25 km², as shown in Figure 7.

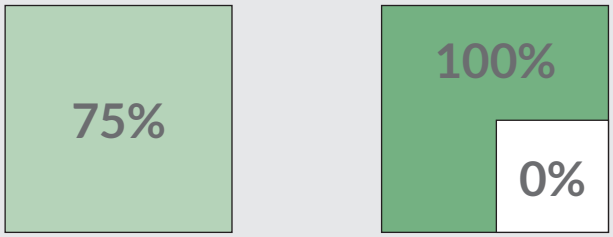


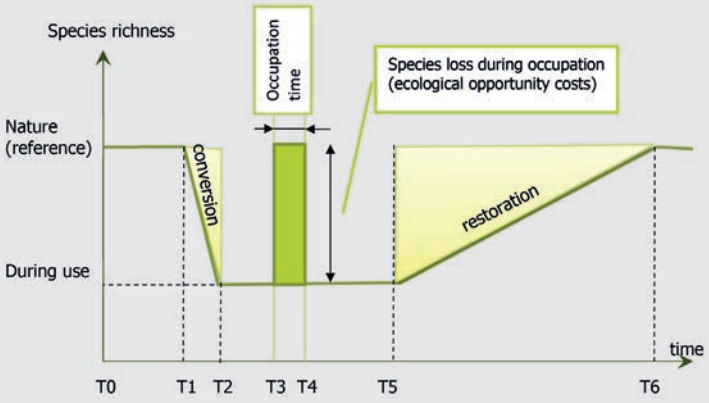
Figure 7: Illustration of the spatial dimension of the metrics

Apart from the spatial dimension in the metric, the spatial dimension also plays a role in the (scientific) modelling of the pressure-impact relations. For example, while a single CO_2 emission will create ecosystem damage on a global scale, land conversion due to developing a mine is typically a local impact and acidifying substances will have a regional effect. This spatial dimension is taken into account in the pressure-response models of GLOBIO and ReCiPe.

3.6.3 Time dimension of impacts

Apart from a spatial dimension, impacts also have a time dimension. Land use for economic activities, reducing the level of biodiversity, may take place during a certain period of time and converted land may at some point in time become nature again. This time dimension also plays a role in emission related pressures. An emission does not cause an impact for eternity; it will, at a certain time, vanish or be converted in a less harmful substance. For instance, a methane emission will be converted into CO_2 after one or two decades, and this CO_2 will be absorbed by plants and oceans in one or two centuries. Likewise, many toxic substances will often have an impact during a few days or weeks before they break down.

Example: Land use modelling in the BFFI method and the ecological opportunity cost or 'static footprint'



T0 – T1: The area is undisturbed
T1 – T2: The area is converted into a production area
T2 – T3: The area is used by a company (not necessarily company A)
T3 – T4: The area is used by company A during this time span to produce a certain good (for instance in the case of agriculture; the time needed to make an harvest).
T4 – T5: The area is still used by a company (not necessarily company A)
T5 – T6: The area is restored (either actively or passively)

Figure 8: Graphical presentation of the land-use modelling in the BFFI method

In the BFFI approach the impact is always measured with the product of species loss area and time. Like in the GBS method, the natural biodiversity is taken as reference. Between T1 and T2, an actor converts the land and lowers the diversity. This actor is also held responsible for the restoration that will occur in future, between T5 and T6. For instance, a mining company that restores the mining area. If this actor does not actively restore the area; it is burdened with a long restoration time. At T3, the actor that converted the land is not always known and it is not necessarily the same actor as the company using the land during T3–T4, the time before (T2-T3) and the time after (T4-T5).

In the BFFI, a palm oil plantation that starts using already converted land at T3, is burdened with the species loss during the time it occupies the land (T3-T4). This is comparable with the Scope 0. So where GBS has a separate methodology for the dynamic and static footprint, the BFFI combines these. It is however possible to also split this up in the BFFI methodology.

Both in the BFFI methodology and the GBS, the time dimension is reflected in the footprint metric, PDF.m^2.yr and MSA.m2.yr respectively.

Example: the time dimension in PDF.m2.yr and MSA.m2.yr
As explained in the previous section, in both the BFFI metric and the GBS metric, area and time are interchangeable, as long as the multiplication of PDF/MSA, area and time results in the same score. For example, a footprint of 5000 [unit].m^2.yr ([unit] can be replaced by either PDF or MSA) can have the following meanings (and it is impossible to say from that result which is the right one):

- 50% species loss in 1000 m^2 during one year or
- 50% species loss in 100m^2 during 10 years or
- 5% species loss in 10,000 m^2 during 1 year.

For the portfolio assessment conducted for ASN bank, an investment during a year has been considered, resulting in an impact unit of PDF.m2 (PDF.m^2.yr/yr). Moreover, the fact that PDF and m^2 are interchangeable has been used to express the impact of the investments in m^2 of area in which all biodiversity is lost (PDF is 100% = 1).

3.7 Positive impact

A biodiversity footprint is about positive impacts and negative impacts. This is true for the BFFI and GBS, which can be used to calculate positive impacts when the data are available. At the same time, the discussion regarding the methodological approach towards positive impacts is still relatively new. For example, how are positive impacts defined? Do avoided GHG emissions resulting from investments in green energy count as a positive impact or should the biodiversity actually increase compared to the current situation, e.g. through nature restoration? Does an investment in an FSC certified production forest result in a positive impact compared to the situation when the production forest was not yet FSC certified? Or is the certification only minimising the negative impact of the production forest compared to the pristine nature that it used to be?

The UNEP Finance Initiative (UNEP FI) has started work on how to account for positive impact but its guidelines currently "do not prescribe which methodologies and KPIs to use to identify, analyse and verify positive impact, instead they require that there be transparency and disclosure on both the assessment framework and its conclusions" and they argue for positive impacts to "be based on the actual impacts achieved" (Principles for positive impact finance; a common framework to finance the sustainable development goals, UNEP FI, 2018). This illustrates how definitions and methods to assess positive impacts are still a work in progress.

An important factor in the assessment of positive impacts is the reference point that is taken in the impact assessment. Referring to the explanation of the different scopes in section 3.4.2, a positive impact may take place in scope 1, e.g. because of investments in better management practices in an agricultural area, resulting in an increase in biodiversity. In this case, the reference situation is the situation preceding the investment.

Example: Contribution of the eco.business Fund to the storage of CO_2 from shade-grown coffee plantations

The eco.business Fund (EBF) promotes business and consumption practices that contribute to biodiversity conservation, the sustainable use of natural resources, climate change mitigation and adaptation to its impacts in Latin America and the Caribbean. The EBF, structured as a public-private partnership, was initiated by KfW, Conservation International (CI) and Finance in Motion. Finance in Motion is also acting as the fund advisor.

Interpretation of the impact. As of June 2018, the fund was supporting the renovation and maintenance of shade-grown coffee plantations in Nicaragua, El Salvador and Costa Rica, representing a total of 123 producers and an area of 24,166 hectares. When grown under shade, the cultivation of coffee yields a range of environmental benefits, such as the preservation of biodiversity through the provision of habitats and facilitation of connectivity between them. Another benefit is the capture of CO_2 in above-ground biomass, an important contribution to climate change mitigation, yet again positively impacting biodiversity conservation.

Through its interventions, the EBF can claim to contribute to the maintenance of the stock of CO_2 in above-ground biomass associated with coffee cultivation under shade. This is a cumulative impact on the medium- to long-term and not an impact per year.

Impact results. The impact measurement regarding CO_2 sequestration is based on a median CO_2 capture parameter (tCO_2 per hectare), determined through a screening of relevant scientific studies, and applied to the hectares of shade-grown coffee supported by the fund..

92 tCO2 stored per hectare in shade-grown coffee plantations ✖ **24,166 hectares** supported by the EBF = The EBF is contributing to store **2,2 Mt CO2**

Additional CO_2 storage generated by the support of shade-grown coffee as compared to coffee in monoculture (or full-sun system) is measured based on the CO_2 storage differentials between shade and full-sun systems.

52 additional tCO2 stored per hectare compared to full-sun systems ✖ **24,166 hectares** supported by the EBF = The EBF is contributing to store an **additional 1,3 Mt CO2** through its financing of plantations under shade

Pressure-impact models can be used to assess the positive impact on biodiversity resulting from this CO_2 storage.

Example: Contribution of the eco.business Fund to preservation of forests and native vegetation in Latin American countries
Introduction and background. The EBF provides financing to businesses holding sustainability standards that explicitly prevent forest conversion. In addition, several of the fund's eligible standards promote the preservation of native vegetation within the boundaries of the production unit. For example, Rainforest Alliance (RA) requires producers to hold a native vegetation coverage or reserve between 10-15% of the land under production, which is individually defined per crop.

Impact results. Through its no-land conversion criteria, the fund is ensuring that none of the certified producers in its portfolio is clearing forests. As of June 2018, the EBF was financing 56 RA-certified sub-borrowers, representing 36,670 hectares of farm area. Through this financing, in addition to the preservation of forests, the EBF is contributing to the preservation or restoration of an estimated 4,155 hectares of native vegetation.

Standard	Certified hectares under financing	Required native vegetation coverage	Ha of native vegetation protected
Rainforest Alliance	**36,670**	**10-15%**	**4,155**

The positive contribution to biodiversity can be assessed by comparing the differences in land-cover or vegetation coverage between RA and non-certified farms.

Example: Positive impacts and offshore wind parks
Investments in wind parks generate negative impacts, as windmills have to be produced from steel and aluminium and the installation of wind parks requires much energy generated in diesel engines. These impacts are accounted for in BFFI and GBS. Yet, wind parks also avoid negative impacts by installing more wind power and assuming a steady electricity consumption; wind energy replaces conventional electricity production. This leads to the reduction of CO_2 emissions, less coal mining (land-use) and lower levels of acidification from sulphur emissions, reducing negative impacts on biodiversity from conventional electricity production. Over the years this avoided impact is likely to vanish, as the ambition is to close down all fossil fuel power plants.

Wind parks also have positive impacts: recent research shows that the biodiversity in the sea in wind parks increases significantly; partially as there are no fishing activities and partially because the foundations function as a reef around which species group themselves.
Currently the BFFI approach only takes into account the first, temporary benefit; work is ongoing to assess the second benefit, the biodiversity gain in the sea.

3.8 Step 4 Interpretation of the footprint result

3.8.1 Complementary qualitative analysis

Any quantitative biodiversity footprint will have its limitations from the viewpoint of the characterisation of the economic activities invested in, the data available to assess the environmental pressures and the pressure-impact models used to calculate the impact on biodiversity. These limitations should be recognised, reported and taken into consideration in the interpretation and use of the footprint results. A qualitative analysis serves to put the quantitative results into perspective, identify scope/methodological limitations and provide an assessment (quantitative and/or qualitative) of uncertainty. This analysis can consist of three parts:

- A description of the context in which the footprint results should be interpreted, including, among others, the objective of the footprint (e.g. to identify biodiversity impact hot spots on a portfolio level);
- An identification of the general limitations of the quantitative analysis, relevant to all economic activities assessed (all sectors or investments);
- A sector-specific qualitative analysis focusing on sector specific issues regarding biodiversity impacts which may not be (fully) covered by the quantitative analysis. This analysis focusses on the sectors included in the footprint, e.g. the sectors an FI invests in.

The results of the qualitative analysis can be used to:

1. Adjust the result of the quantitative analysis (increase or reduction of the impact).
2. Take into account the reasons for a potentially higher or lower impact by means of investment criteria addressing these reasons, thereby reducing (or increasing, respectively) the chances that the impact (at a specific location) will indeed be higher (or lower, respectively).

This means that the qualitative analysis not only focuses on the assessment of the footprint (could it be higher or lower than the quantitative analysis shows?), but also on the action perspective resulting from the qualitative analysis (what to do with this result in practice?).

Example: Focus of a qualitative analysis

In the biodiversity footprint of the investment portfolio of ASN Bank, a qualitative analysis was conducted to assess how the limitations of the ReCiPe methodology might affect the BFFI footprint results. A screening was made of sector specific publications on biodiversity impacts to provide an overview of the main drivers (environmental pressures) of biodiversity loss for the sectors the bank invests in. The following pressures were included in the analysis: land conversion, pollution, climate change, overexploitation, introduction of invasive species and disturbance. The results were used to identify 'risk sectors': sectors that score on drivers of biodiversity loss which are not covered by ReCiPe and therefore do not show up in the footprint results.

For example, sectors in which the introduction of invasive species potentially plays an important role include the agricultural and forestry based sectors. Looking at sectors that are directly or indirectly linked to the investments of ASN bank, the following sectors (and clusters of sectors) were identified as 'risk' sectors: food & beverage, fashion & textiles, paper, construction, mortgages and housing corporations and furniture. The biodiversity footprint of investments linked to these sectors could be higher than calculated with ReCiPe. To address this footprint limitation, investment criteria on invasive species were suggested (see section 3.8.2).

Both the general limitations and sector specific limitations of the footprint were reported and taken into consideration in the interpretation of the footprint results.

Example: Investment criteria and the footprint of ASN bank

The biodiversity-related investment criteria of ASN bank already contribute to a reduced impact on biodiversity of the companies the bank invests in. However, since the BFFI methodology currently uses average sector data when calculating the bank's footprint, the results of these investment criteria do not yet show up in the footprint result.

As a first step to see if and how the footprint result could be adjusted for the investment criteria, a screening was made of the different investment criteria of ASN bank and the expected availability of data to take these criteria into account in a footprint calculation. The screening showed that this is still a challenge for many of the investment criteria. For example, what is the effect of Roundtable on Responsible Soy (RTRS) certification (mentioned in ASN Bank's investment criteria) on the impact on biodiversity of soy production? Biodiversity impact data of such initiatives/certifications are needed to enable the integration in the BFFI methodology.

3.8.2 Addressing general limitations by means of environmental safeguards

Factors and pressures that may influence the impact on biodiversity of economic activities but are not (yet) covered by the biodiversity footprinting methodology will not show-up in the (quantitative) footprint results. To make sure that these factors and pressures are not overlooked in the decisions taken following a footprint, a financial institution may decide (e.g. based on a complementary qualitative analysis) to address these factors and pressures by means of investment policies. Examples of such investment policies or 'environmental safeguards' are included in Table 2. By addressing these factors and pressures in this way, they can be 'taken out of the equation' of the footprint, thereby making the footprint result more reliable. For example, the fact

that an economic activity may take place in or close to a high conservation value area (HCVA) is a risk factor potentially affecting the impact on biodiversity. This is not covered by the BFFI or GBS footprint calculation. However, by either not investing in economic activities at such a location (exclusion/divestment) or requiring a biodiversity management plan from businesses operating at such a location, the risk can be excluded or minimised.

Issues not (fully) covered by the BFFI and GBS approaches	Investment policy options addressing the issue
Location specific impact characteristics:	
Water scarcity	• Investment criterion: use of a water management system if operating in water scarce areas • Exclusion/divestment in water-scarce areas
Proximity (to be specified) of HCVAs or protected areas	• Investment criterion: if operating in or near these areas: company has an environmental action plan covering biodiversity in place • Exclusion/divestment in companies operating in or near these areas
Presence of endangered or threatened Species	
Impact on soil fertility/soil quality	
Impacts (+ or -) on soil fertility and soil quality	• Best in class policy, e.g. investments only in organic production
Drivers of biodiversity loss	
Introduction of invasive species	• Investment criterion in case of 'high risk' sectors: policy and management system in place to prevent the introduction of invasive species • Specific certification initiatives may be used/required to guarantee compliance
Overexploitation	• No use of IUCN red list species; institutions aimed at protecting endangered species are excluded from this criterion • Companies/institutions must comply with CITES legislation • In case of 'high risk' sectors: companies should assess and establish a sustainable level of exploitation • Specific certification initiatives may be used/required to guarantee compliance
Disturbance	• Investment criterion: companies should carry out an Environmental Impact Assessment and implement its recommendations in case disturbance is a serious risk and they operate in or near a HCVA/protected area • Exclusion/divestment in case disturbance is expected to be a serious issue (e.g. based on an environmental impact assessment) and the company is operating in or near a HCVA/protected area

Table 2: Biodiversity topics not fully covered by BFFI and GBS and related policy options

3.8.3 Zooming in on biodiversity impact hot spots and compatibility of methodologies

The GBS and BFFI are currently applied to identify biodiversity impacts on a portfolio level and the use of data, like Exiobase data, is tailored to this application. An important use of the footprint results is the identification of biodiversity impact hotspots across the investment portfolio, enabling an FI to focus the next steps based on materiality. One of these steps could be to zoom in on the hotspots with a more precise and location specific footprinting methodology. Although both the GBS and BFFI can also be used to zoom in when more specific data are available, many other methodologies can be used as well, depending on the objective of the assessment. Although the variety in impact assessment applications and methodologies shows that there is no 'one-size-fits-all', a certain level of compatibility between the different methodologies is key and one of the reasons for the development of this 'Common ground' paper.

Requirement 8:
Compatibility. *A high degree of compatibility between impact assessment methodologies should be maintained. No single assessment tool can cover the variety of needs of all the stakeholders. To ensure consistency and relevance for businesses and to enable the exchange of data, a high degree of compatibility between assessment tools is necessary. This will allow the results of local-level assessments to feed into macro-level assessments and vice versa.*

Example: Cooperation to create common ground and compatibility
In 2018, UNEP-WCMC has initiated a project gathering around 20 experts from leading biodiversity indicator projects around the world to work on common standards and approaches to measure and report on corporate impact.

The EU B@B Platform organised the meeting 'Biodiversity Metrics for Business and Finance, update and next steps' on 18th September 2018, bringing together a group of experts and businesses around biodiversity metrics and discussing the opportunities for collaboration and future work.

Example: Pilot study with location-specific biodiversity data
Given the wish as an asset manager to differentiate between companies in terms of their impact on biodiversity, ACTIAM decided to conduct a biodiversity footprinting pilot in 2018. Based on its focus themes (climate, water, land) and the biodiversity risks and opportunities in different sectors in which ACTIAM invests, from a materiality point of view it decided to do a deep dive into the agro-commodity sector. Footprinting was based on a selection of holdings in this sector that were also covered by a more granular database (trase.earth) that contains land use data of specific players in the agro-commodity supply chain, more specifically soy sourced from Brazil. The land use footprints could then be converted into biodiversity footprints with location-specific characterization factors from Chaudhary et al. (2015). Looking at compatibility there were some challenges in translating the biomes used in the database to eco-regions used by the literature on characterisation factors. Currently, there are no compatible maps that can be overlaid to match eco-regions and the biomes. This is a field that is in development, so hopefully in the future these assessments can be conducted more easily.

Example: Combining existing footprints into a biodiversity footprint
As several other FIs, ACTIAM has measured the carbon and water footprints of its investments. However, it would also like to gain insight in the biodiversity footprint of its investments. As climate change and water consumption in high risk areas are key drivers of biodiversity loss, there is a need for a compatible level of detail in the data on other drivers of biodiversity loss such as water pollution, land use and the like. Currently, these data are not yet available, which is why, together with partners, ACTIAM is for example engaging companies to report on the amount of land that was deforested due to their operations.

4. Concluding remarks and the road ahead

4.1 Concluding remarks

The cooperation between CDC Biodiversité, ASN Bank, ACTIAM and Finance in Motion has shown that there is a lot of common ground between the methodologies of CDC Biodiversité and ASN Bank, e.g. regarding the definition of biodiversity, the inclusion of the main pressures on biodiversity from the viewpoint of relevance, the scientific background of the pressure-impact models involved and the type of data used as an input. Moreover, there is common ground on the way these methodologies should be used (with care) and the fact that there is no (need for) a one-size-fits-all. Different objectives, applications and required levels of detail will require different methodologies. We do agree however, that a high level of compatibility of methodologies, e.g. assessment methodologies on a micro and macro level, is desired from the viewpoint of consistency and the use and exchange of data.

The process of identifying the common ground between our methodologies and approaches has led to new insights for each of the organisations involved and to improvements in both the BFFI and the GBS. Sharing our methodologies and findings with other experts, e.g. during the 'Biodiversity metrics' meeting organised by the EU B@B Platform in September 2018, has contributed to these insights and improvements and has led to new contacts for further cooperation.

4.2 The road ahead

The development of biodiversity footprinting methodologies is of course not an objective in itself. As mentioned in this paper, biodiversity footprinting can contribute to policy making on a national and international level, to monitor progress, to policy making and design of products and services by corporations and to decision making by investors. Biodiversity footprinting is needed to measure both positive and negative impacts on biodiversity in order to decide on material issues. Discussions are under way with national governments, the Convention on Biological Diversity, environmental NGOs and academics to include corporate biodiversity footprints in the post-2020 global biodiversity agenda and into corporate social responsibility reporting.

The 'Biodiversity week' in November 2018 in Paris, the fourteenth meeting of the Conference of the Parties to the Convention on Biological Diversity (COP 14) in Egypt and the COP 15 in China present valuable opportunities to exchange experiences, to further explore the potential applications of biodiversity footprinting by government, businesses, NGOs and the financial sector and to expand the common ground in this area. The EU Business @ Biodiversity platform could also play a role in scaling up the work on common ground among its member FIs.

In 2019, we plan to continue our work towards a common approach to biodiversity footprinting for financial institutions, to list potential assessment methodologies for a number of asset classes, and to discuss the best way to consider avoided impacts, actual positive impacts and net positive impacts. Our work will remain focused on the biodiversity impacts of a corporation or portfolio and we recognize that a number of other methodologies are and will remain appropriate and relevant to assess the impacts at other scales, in particular at the site or project level.

Annex 1 Key references

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- Figure 3: Natural Capital Coalition. 2016. "Natural Capital Protocol". (Online) Available at: www.naturalcapitalcoalition.org/protocol
- Table 1: CREM and VBDO, Natural Capital & Financial Institutions, 2015