

Business and biodiversity

Nature impact management and assessment in value chains

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RAMBOLL

Bright ideas.
Sustainable change.

Agenda

9:00 FiBS & Introductions

9:15 Introduction to value chain assessment and frameworks

9:35 Biodiversity measurement navigation: Decision tree

Break

10.15 Workshop: Navigation questions

10.45 Workshop: Choosing the right tool

Break

11.15 Biodiversity measurement: LCA based tool presentation

12:00 Event ends

Introductions

Introduce yourself to a person next to you who you don't know

Introduction to value chain assessment and frameworks

Introduction to frameworks and value chain assessment

Contents

1. Why do we need to consider biodiversity?
2. The different frameworks
3. Science Based Targets for Nature approach



Overexploitation



Climate change



Land and sea use change



Pollution



Invasive species

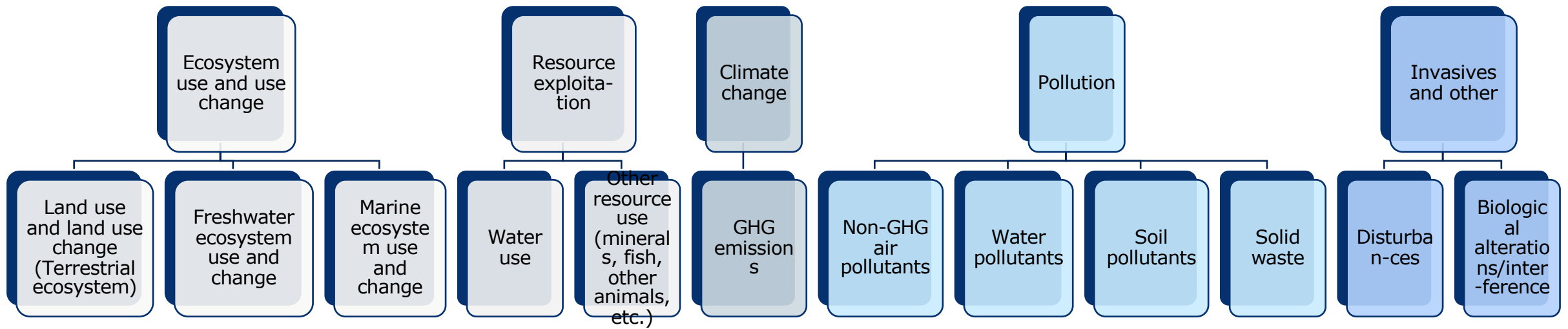
According to the World Economic Forum (WEF) preliminary report the most significant threats for business and finance in the next 10 years are:

1. Failure in climate actions
2. Extreme weather conditions
- 3. Nature loss**

Over half of the global GDP – 44 trillion € – is potentially under a large threat. (WEF 2022)

On the other hand, WEF 2020 estimates that nature positive solutions have business potential for more than 10 billion/year, 400 million new jobs. (Sitra 2022)

What are the Main Drivers of Biodiversity Loss?





Why should businesses consider biodiversity?

Nature loss causes multiple risk for businesses:

- Depletion of natural resources inflicts **physical risks** for businesses.
- Biodiversity regulation and growing number of rules increases **legal risks**.
- Change in supply and demand causes **market risks**, when consumers and clients become more aware of biodiversity loss.
- **Reputational risks** increases when businesses become responsible for their biodiversity harming actions and actions that they did not do to prevent the harm.

On the other hand, preventing nature loss can create new **business opportunities** especially for pioneer companies.

- **Biodiversity business opportunities generate and promote sustainable business and develop competitive advantages.**
- Mandatory biodiversity reporting and changes in regulation are coming and preparation for the future can help businesses and ease the upcoming workload.
- **Climate actions and promoting biodiversity** usually go hand-in-hand and help companies reach their sustainability goals.

What is currently happening in the field of biodiversity?

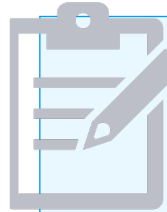
Required

Voluntary



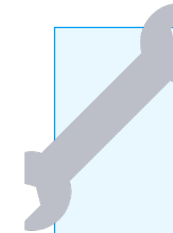
Global

- SDG targets
- Global Biodiversity Framework
- UN Montreal COP 15



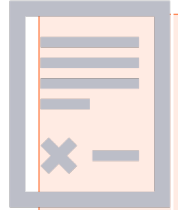
Project

- IBES Business and biodiversity method assesment
- ALIGN project
- UN environmental accounting



International frameworks

- TNFD
- SBTN
- PBAF
- Many more...



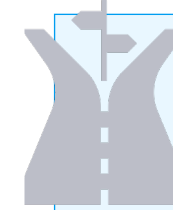
Reporting

- EU taxonomy
- CSRD
- National laws and regulations
- Sustainable financial reporting directive
- EU green claims

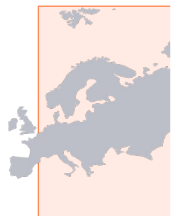


Standards

- GRI
- International Sustainability standards board
- Many other sustainability standards



National sector-specific biodiversity roadmaps



EU & Finland




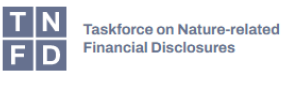
- EU's Biodiversity Strategy
- Finland's National Biodiversity Strategy



Sector-specific sustainability standards

- Certificates
- sector-specific sustainability standards
- BREEM etc

Some of the different frameworks

Name	Scope	Overview	Advantages	Limitations	Link
Science Based Targets for Nature (SBTN) 	State of nature	A framework that sets measurable targets to become nature positive by assessing, prioritizing, measuring, addressing and tracking impacts and dependencies on nature	Consolidated, comprehensive and based on science. Targets address the interconnection of issue areas and interrelated risks. No monitoring and reporting burden for companies; builds on existing resources and tools. Draws on Natural Capital Protocol, existing practices in land-conversion-free supply chains, and lifecycle (impact) assessment (LC(I)A).	No single unit of measurement for SBTs for nature exists, but different metrics can be used. Still at a developmental stage. Laborious for companies with several suppliers. Balancing scientific robustness with universality and flexibility seems to be a technical challenge.	https://sciencebasedtargetsnetwork.org/
Guidelines for corporate biodiversity performance, IUCN 	Biodiversity	Produces key elements of a corporate-level biodiversity strategic plan through four stages: understanding impacts, developing a vision, developing a framework of indicators, and implementation by collecting data & reporting. Can incorporate different metrics.	Simple, stepwise process for all companies. Allows retrofitting and adapting existing goals. Implementation is easier the closer the company is to biodiversity and the more directly it uses, or influences the use of, natural resources at sites within their value chain	Dependence on site-level data of biodiversity indicators: not possible for all companies to collect	https://portals.iucn.org/library/sites/library/files/documents/2021-009-En.pdf
Natural Capital Protocol 	Holistic environment	International standardized decision-making framework for identifying, measuring and evaluating direct and indirect impacts and reliance on natural capital	International standardized framework; high uptake and wide range of case studies. Flexible, offers a range of tools. Can be applied alongside other standards and frameworks (ISO, TNFD). Allows assessment to be qualitative, quantitative or monetary.	Technical document, so not accessible to everyone and requires expert assistance. Not a guidance or standalone tool, requires the use of natural capital tools. Not a reporting framework.	https://capitalscoalition.org/capitals-approach/natural-capital-protocol/?fwp_filter_tabs=guide_supplement
Taskforce on Nature-Related Disclosures (TNFD) 	Biodiversity	A framework for organizations to report their own nature-related problems and opportunities in order to channel financial flows away from nature-negative activities toward nature-positive ones	Creates a streamlined framework for tracking and reporting for nature, unifies data collection, and integrates traditional business drivers into prioritization process. Aims to transform the results of impact assessment and tracking effects into actual changes on corporate level operations. Aligns with SBTN	Currently still a prototype. Scalability and data management architecture still need developing.	https://tnfd.global/

Comparison of SBTN & TNFD

SBTN

Overview: A framework that sets measurable targets that allows businesses to become nature positive in areas that have high impacts within value chains.

Advantages: Targets based on science. Builds on existing resources and tools. Draws on Natural Capital Protocol, existing practices in land-conversion-free supply chains, and lifecycle (impact) assessment (LC(I)A). Aligns with TNFD.

Limitations: Guidelines only recently published for the first stages – no full guidance published. Still at a developmental stage. Laborious for companies with several suppliers.

TNFD

Overview: A framework for organizations to report their own nature-related problems and opportunities in order to channel financial flows away from nature-negative activities toward nature-positive ones.

Advantages: Creates a streamlined framework for tracking and reporting for nature and into a prioritization process. Aims to transform the results of impact assessment and tracking effects into actual changes on corporate level operations. Aligns with SBTN.

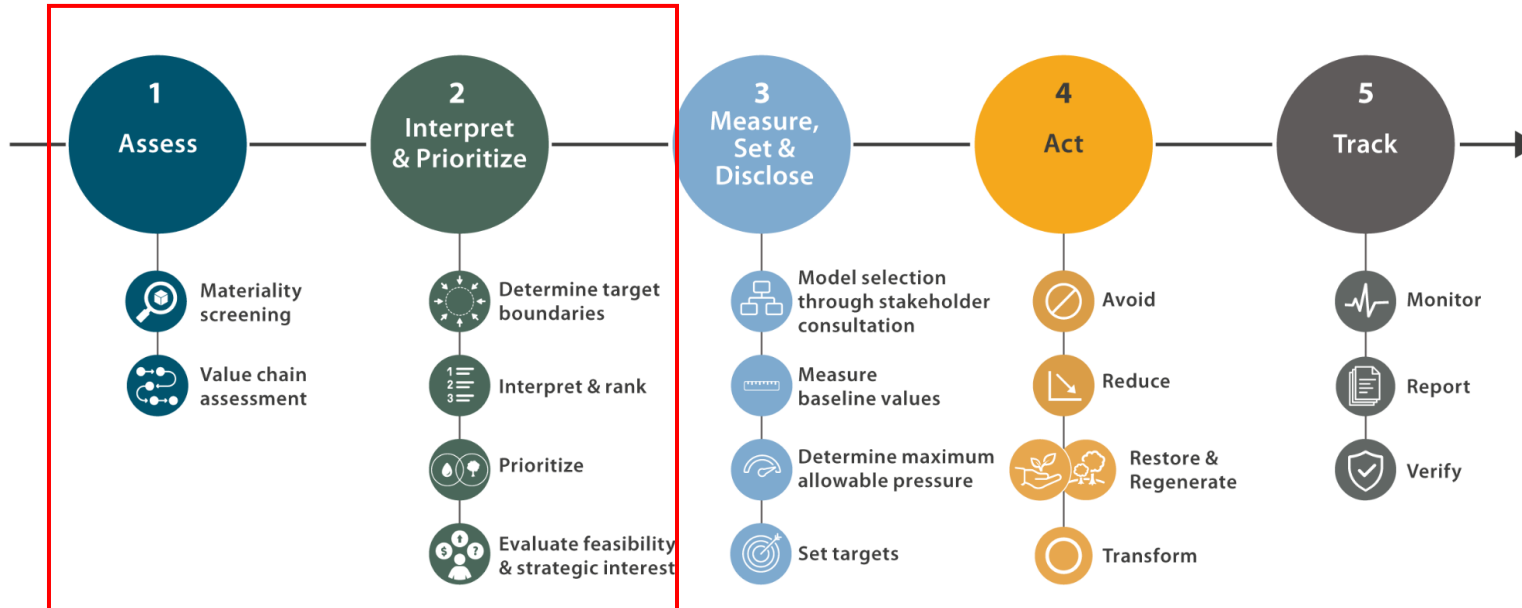
Limitations: Guidelines only recently published. Scalability and data management still need developing.

Alignment of TNFD & SBTN



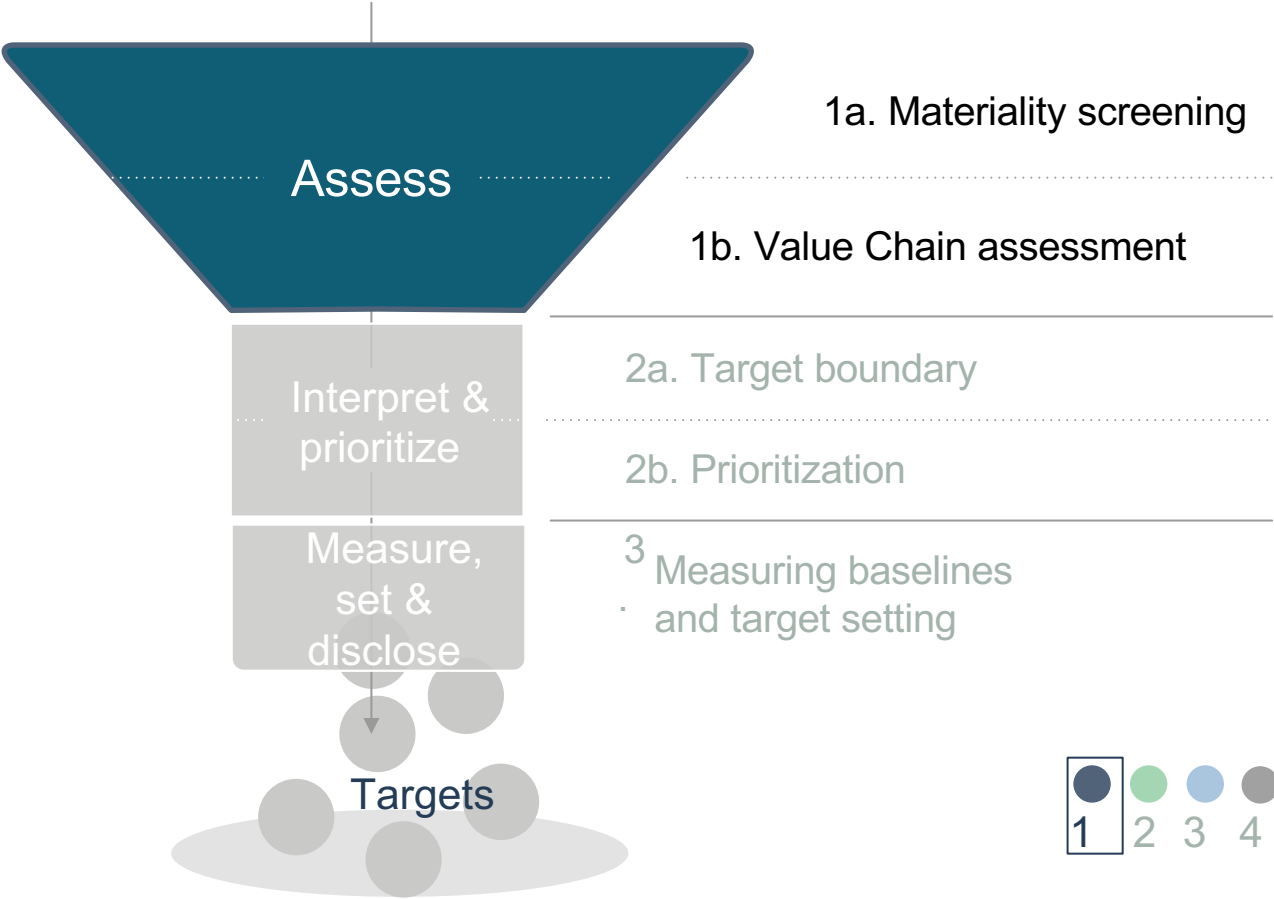
SBTN Framework approach – getting started with the assessment

SBTN framework



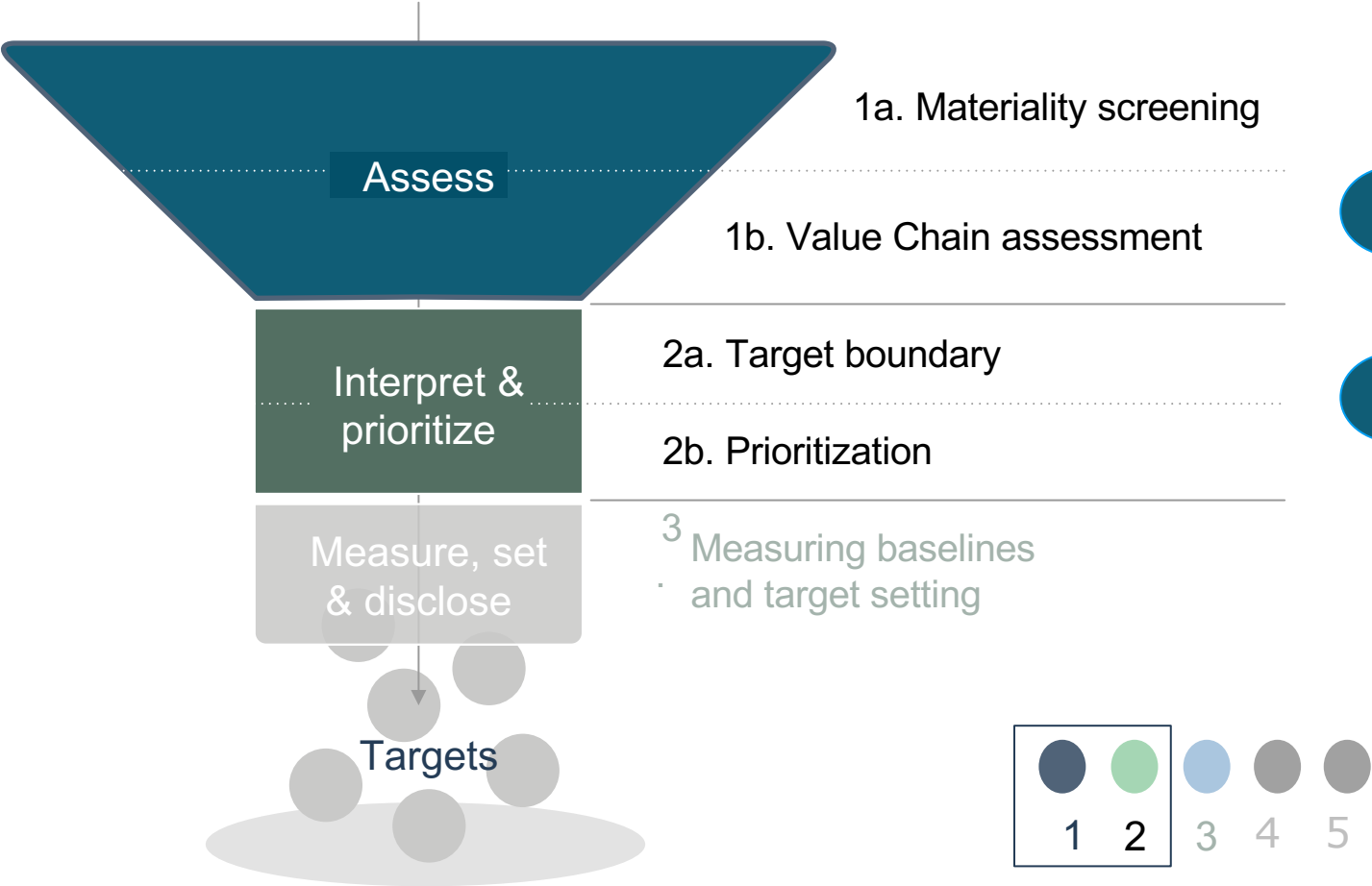
- A five-stage process
- Developed through the Science Based Targets Network that has been used to help companies set targets for carbon and climate change. It is part of the Global Commons Alliance – a network of 50+ organizations
- SBT for nature guidance only published this year. Guidance only available for the first steps. **A new framework still being developed**
- Companies are able to assess biodiversity impacts along the whole value chain of their business – **Upstream – Direct – Downstream**
- It then allows companies to set science-based targets for nature **where it is needed the most**

STEP 1: ASSESS – MATERIALITY AND VALUE CHAIN ASSESSMENT



- 1 What are the company's impacts on biodiversity along the whole value chain?
- 2 Of these impacts, which are material?

STEP 2: INTERPRET & PRIORITIZE



1

Which locations does my company need to set targets for?

2

What areas should be prioritized first?

Biodiversity measurement navigation: Decision tree

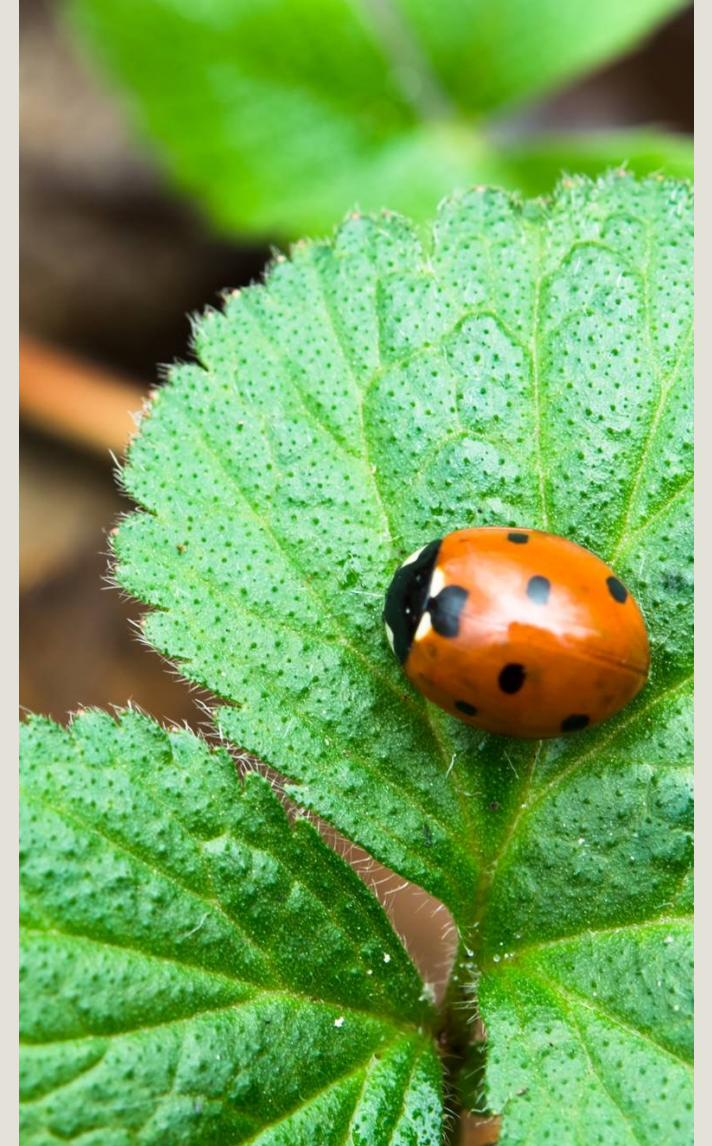


Biodiversity Measurement Navigation for Businesses

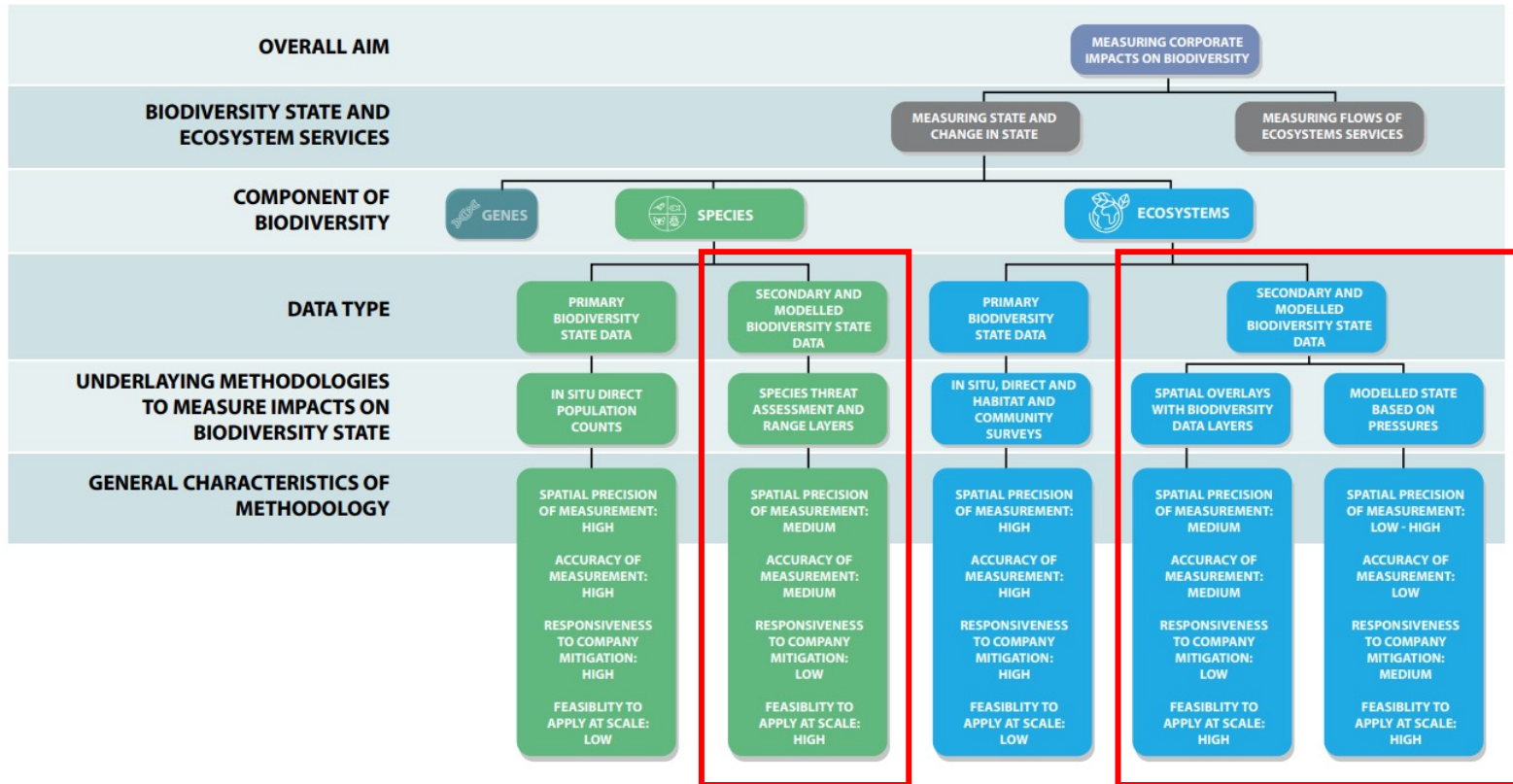
- **Lammerant, J., Starkey, M., De Horde, A., Bor, A-M., Driesen, K., Vanderheyden, Greet. 2021:** Assessment of Biodiversity Measurement Approaches for Businesses and Financial Institutions. EU Business @ Biodiversity Platform reports.

Biodiversity measurement

- Supply-chain-related biodiversity losses can be defined as **biodiversity footprints**
- Losses in a given region or country might be driven by production or consumption elsewhere, as the world is increasingly connected via international trade flows
- Biodiversity footprint can be quantified by different metrics such as **species.year** (species lost over time), **MSA.ha** (mean species abundance change/impacted area), or **PDF** (potentially disappeared fraction of species)
- Some open-source tools are available free of cost, some behind paywalls
- Many tools can utilize existing data e.g. LCA data, which may be readily available with companies that are interested in assessing impacts



Biodiversity measurement



NOTE: Biodiversity has many facets. Therefore, it is challenging to communicate an impact using just one metric. Evaluating the biodiversity impact of a corporate or a value chain segment through the lens of a single metric, regardless of its merits, is a limited approach of the reality. It should be complemented with engagement within the company, qualitative evaluations of its actions, and mitigation initiatives. Use of corporate-level assessment is relevant for screening impacts but does not substitute site-level due diligence.

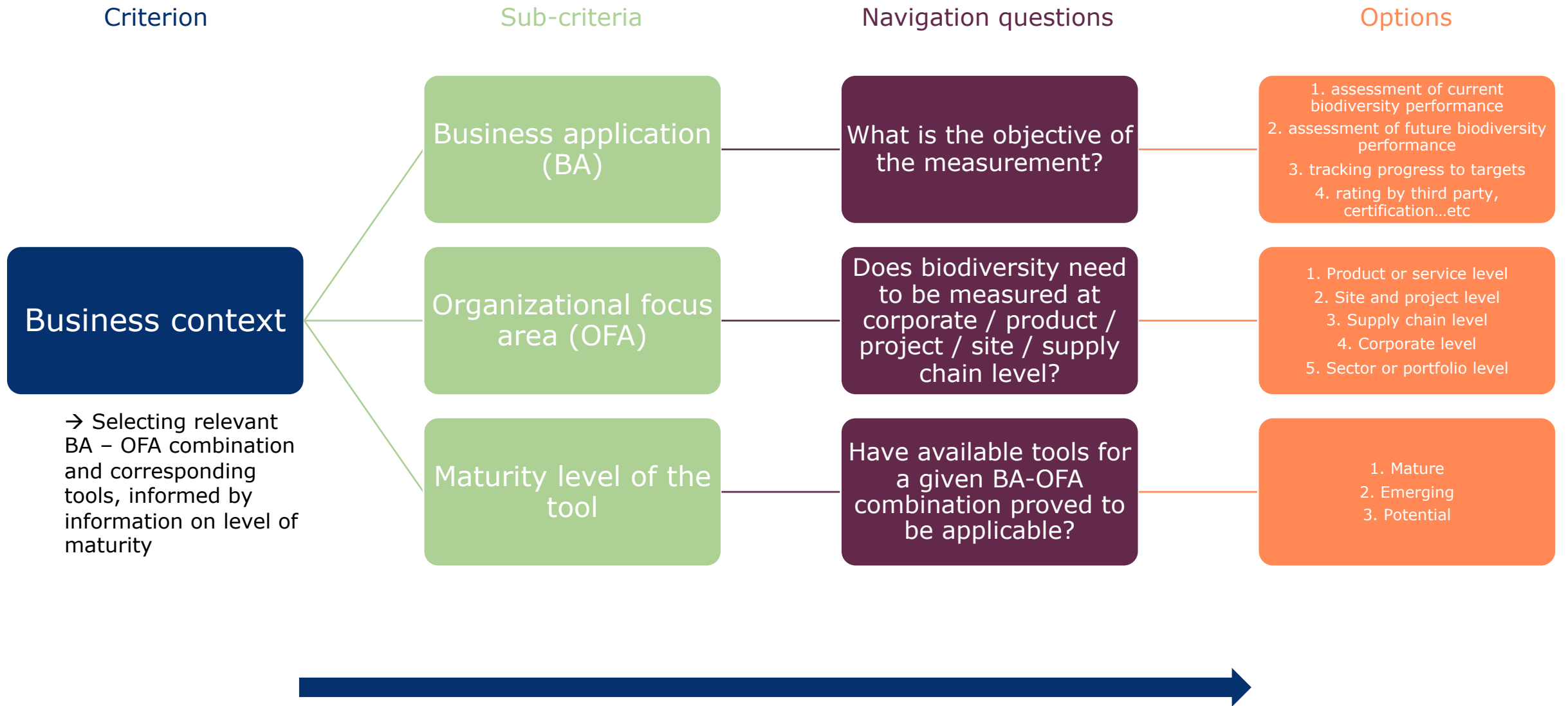
Source: European Commission 2022: Recommendations for a standard on corporate biodiversity measurement and valuation

Biodiversity Measurement Navigation for Businesses

- Based on a report by Lammerant et al. (2021): Assessment of Biodiversity Measurement Approaches for Businesses and Financial Institutions. EU Business @ Biodiversity Platform reports
- Based on six criteria that impact the selection of a measurement approach or tool by a business:
 - **Business Context**
 - **Biodiversity Pressures**
 - **Biodiversity Scope**
 - **Biodiversity Ambitions**
 - **Biodiversity Metrics**
 - **Level of Efforts**
- Navigation questions enabling systematic elimination of approaches that do not fit the business's preferred selection criteria aid decision-making
- Starting from the Business Context is recommended
- Helps in getting started and honing in on the desired approach



Note: this is not a completely exhaustive list of available tools! Different tools are being improved and developed constantly



Business applications (BA) supported

Organisational Focus Areas (OFA)

	Product / service	Site / project	Supply chain	Corporate	Portfolio / sector	Country / region
Current performance	ABDi BFM 3 4 BPT PBF 1 2 ReCiPe	ABD BD BFFI 8 BIRS 11 BISI 10 BMS BNGC 14	BPT CBF 5 GBS LIFE 7 PBF STAR 9	ABDi BD BFM 3 4 BIM 15 BMS CBF 5 6 EP&L GBS LIFE PBF 1 2 ReCiPe STAR	ABDi BD BFFI 8 BFM BIM 15 BISI BMS CBF 5 6 EP&L GBS 12 LIFE STAR	ABDi CBF BFFI GBS 13 LIFE STAR
Future performance	BFM 3 4 BPT PBF 1 2 ReCiPe	BD BPT BNGC 14 GBS	LIFE PBF STAR 9	BFM 3 4 BIM EP&L PBF 1 2 LIFE STAR	BD BIM CBF EP&L	GBS LIFE STAR
Tracking target progress	ABDi BPT PBF 1 2 ReCiPe	ABDi BD BFFI 8 BISI 10 BNGC 14	BPT CBF LIFE 7 PBF STAR 9	ABDi BD BIM BMS EP&L LIFE PBF 1 2 STAR	ABDi BD BFFI 8 BIM BISI CBF EP&L GBS 12 LIFE STAR	ABDi STAR
Comparing options	ABDi BFM 3 4 BPT PBF 1 2 ReCiPe 16	ABDi BFFI BIRS 11 BISI 10 BPT	CBF GBS LIFE 7 PBF STAR	ABDi BFM 3 4 BIM 15 BMS EP&L GBS LIFE PBF 1 2 ReCiPe 16 STAR	ABDi BFFI BFM BIM BISI CBF EP&L GBS LIFE	BFFI CBF GBS 13 STAR
Third party assessments / ratings		CBF 5 STAR	STAR	CBF 5 6 STAR GBS	BFFI CBF GBS 13 STAR	
Third party certification		BD BMS CBF	LIFE 7 STAR	BD BMS STAR	BD BMS CBF STAR	CBF STAR
Risk & opportunity assessment	BPT	ABDi BD BFFI 8 BISI 10 BNGC 14	BPT CBF STAR 9 LIFE	BIM 15 EP&L STAR	ABDi BD BFFI 8 BIM 15 BISI CBF EP&L GBS 12 LIFE	BFFI CBF GBS 13 LIFE STAR
Biodiversity accounting		BD BFFI 8 BIRS 11 BNGC	CBF 6 LIFE 7 STAR	BD CBF 5 6 STAR	BD BFFI 8 CBF 5 6 GBS 12 STAR	BFFI BIRS CBF GBS 13 STAR

BIODIVERSITY MEASUREMENT APPROACHES

- PBF:** Product Biodiversity Footprint
- BFM:** Biodiversity Footprint Methodology
- CBF:** Corporate Biodiversity Footprint
- LIFE:** LIFE Key
- BFFI:** Biodiversity Footprint Financial Institutions
- STAR:** Species Threat Abatement and Restoration
- BISI:** Biodiversity Indicators for Site-based Impacts
- GBS:** Global Biodiversity Score
- GBS BIA:** GBS – Biodiversity Impacts Analytics
- BNGC:** Biodiversity Net Gain Calculator
- BIM:** Biodiversity Impact Metric
- EP&L:** Environmental Profit and Loss
- LafargeHolcim**
- ReCiPe**
- ABDi:** Agrobiodiversity Index

- 1 PBF Salmon
- 2 PBF Shower gel
- 3 BFM Dutch dairy sector
- 4 BFM Tony's Chocolonely
- 5 CBF Mining company
- 6 CBF Portfolio agri-food companies
- 7 LIFE Posigraf printing company
- 8 BFFI ASN Bank
- 9 STAR Bukit Tigapuluh rubber project
- 10 BISI Anglo American mine
- 11 LafargeHolcim mine Spain
- 12 GBS Schneider Electric company
- 13 GBS BIA application with C4F
- 14 BNGC Alvalde Aluminium site
- 15 BIM Asda retail company
- 16 ReCiPe Hand drying systems

- Potential
- Emerging
- Mature

Criterion

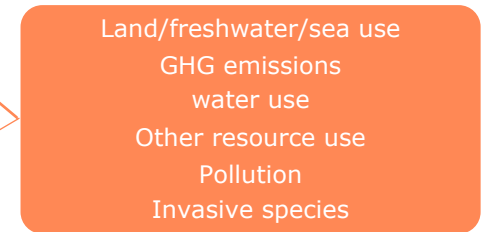
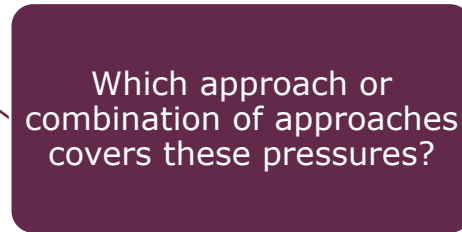
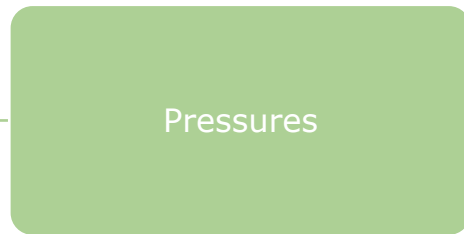
Sub-criterion

Navigation questions

Options



→ Selecting tools or combination of tools that cover the relevant pressures



Biodiversity pressures

Biodiversity measurement approach	Land/sea use change	Biological resource use	Water use	Invasive alien species	Atmospheric N deposition	Nutrient emissions to water	Climate change	Other
Biodiversity Footprint Financial Institutions (BFFI)	x	o	x	o	x	x	x	Terrestrial and marine ecotoxicity, terrestrial acidification
Biodiversity Indicators for Sitebased Impacts (BISI)	x	x	x	x	x	x	o	Noise and light disturbance, hunting
Biodiversity Impact Metric (BIM)	x	o	LUIF	o	o	LUIF	o	
Global Biodiversity Score® (GBS)	x	o	x	o	x	x	x	
LIFE Methodology (LIFE)	x	o	x	o	x	x	x	Impact of solid waste disposal
Product Biodiversity Footprint (PBF)	x	x	x	x	x	x	x	
Species Threat Abatement and Restoration metric (STAR)	x	x	x	x	o	x	x	Geological events
Biodiversity Footprint Methodology	x	o	x	o	o	x	x	

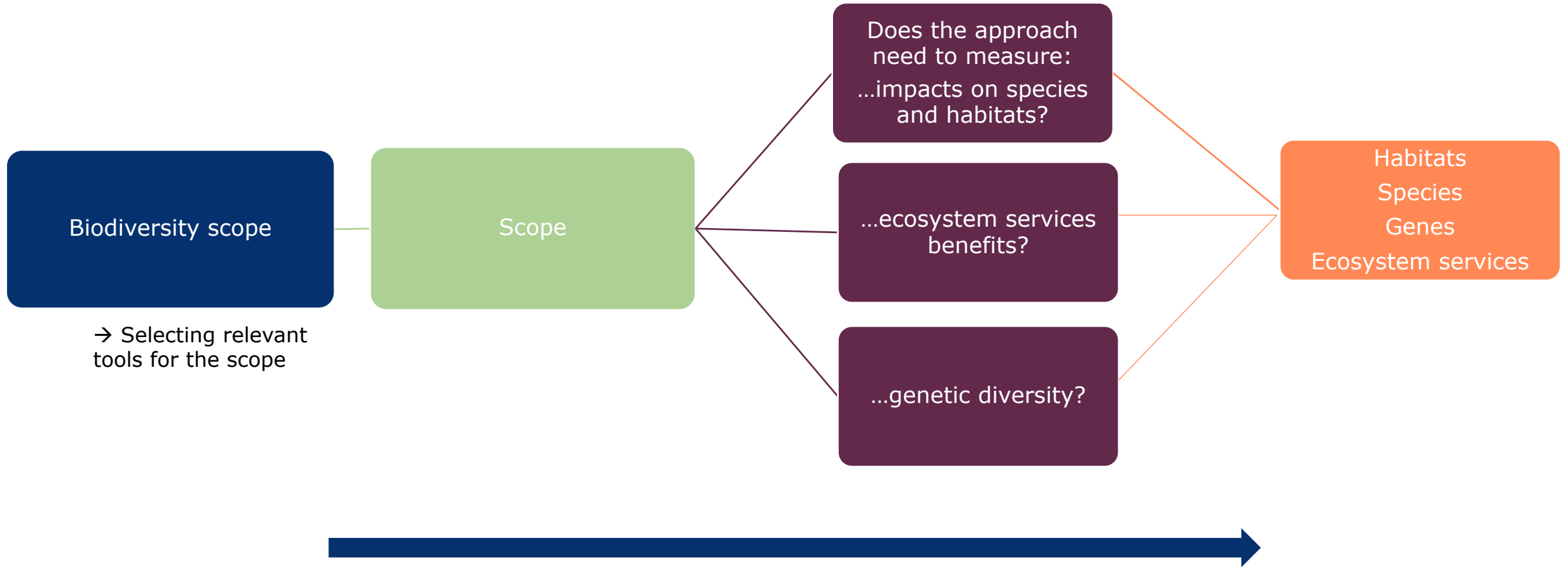
Biodiversity measurement approach	Land/sea use change	Biological resource use	Water use	Invasive alien species	Atmospheric N deposition	Nutrient emissions to water	Climate change	Other
Corporate Biodiversity Footprint	x	o	x	o	x	x	x	
Biodiversity Net Gain Calculator	x	o	x	x	o	x	o	Noise and light disturbance
BIRS and ES assessment (LafargeHolcim)	x	o	o	x	o	o	x	
ReCiPe2016	x	o	x	o	x	x	x	Terrestrial and marine ecotoxicity, terrestrial acidification
Biodiversity Performance Tool for Food sector (BPT)	x	o	x	x	o	x	o	Erosion, pesticide use
Biodiversity Monitoring System for the Food Sector (BMS)	x	o	x	x	o	x	o	Erosion, pesticide use
Kering Environmental Profit & Loss (EP&L)	x	o	x	o	x	x	x	Impact of solid waste disposal

Criterion

Sub-criterion

Navigation questions

Options



Biodiversity scope

Biodiversity measurement approach	Habitats/ species	Ecosystem services	Genes
Biodiversity Footprint Financial Institutions (BFFI)	x	o	o
Biodiversity Indicators for Sitebased Impacts (BISI)	x	o	o
Biodiversity Impact Metric (BIM)	x	o	o
Global Biodiversity Score® (GBS)	x	o	o
LIFE Methodology (LIFE)	x	(x)	o
Product Biodiversity Footprint (PBF)	x	o	o
Species Threat Abatement and Restoration metric (STAR)	x	o	o
Biodiversity Footprint Methodology	x	o	o

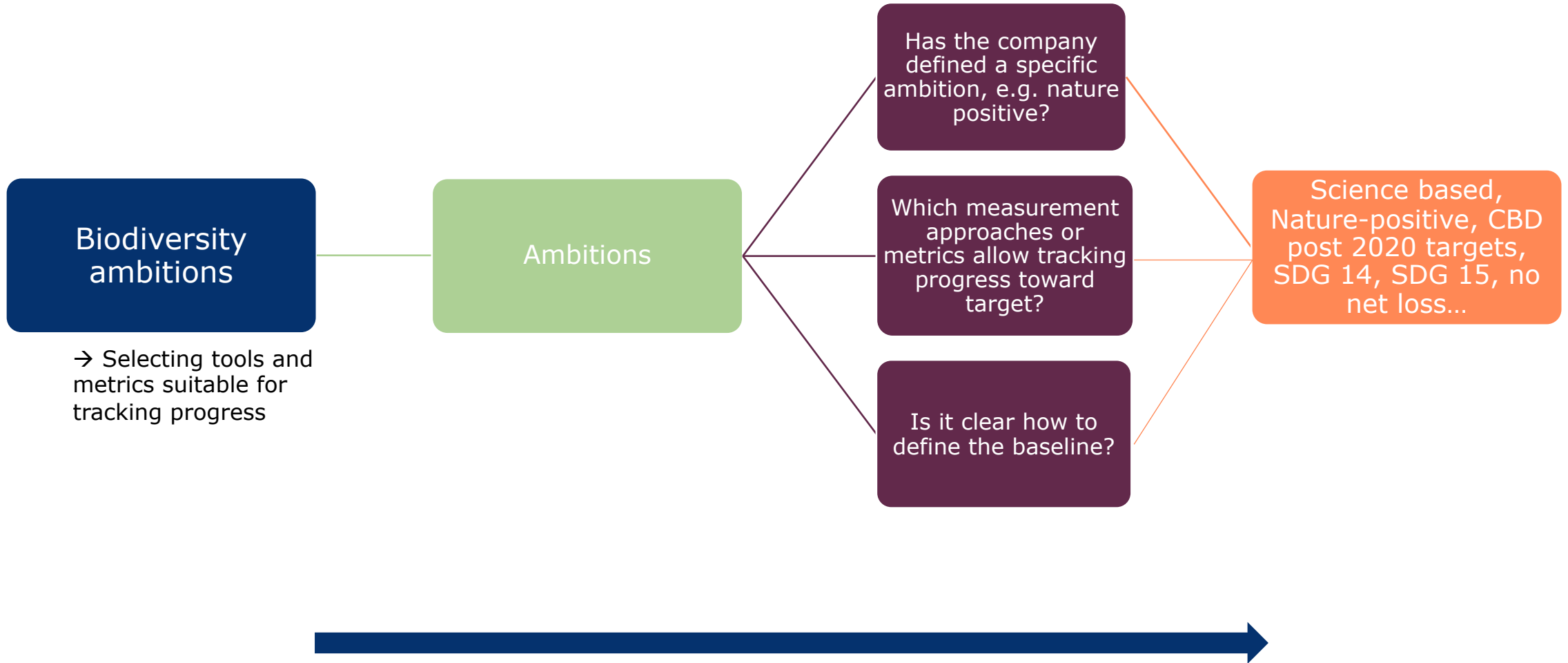
Biodiversity measurement approach	Habitats/ species	Ecosystem services	Genes
Corporate Biodiversity Footprint	x	o	o
Biodiversity Net Gain Calculator	x	o	o
BIRS and ES assessment (LafargeHolcim)	x	x	o
ReCiPe2016	x	o	o
Biological Diversity Protocol (BDP)	x	o	o
Biodiversity Performance Tool for Food sector (BPT)	x	o	o
Biodiversity Monitoring System for the Food Sector (BMS)	x	o	o
Agrobiodiversity Index (ABDi)	x	(x)	o

Criterion

Sub-criterion

Navigation questions

Options



Biodiversity ambitions

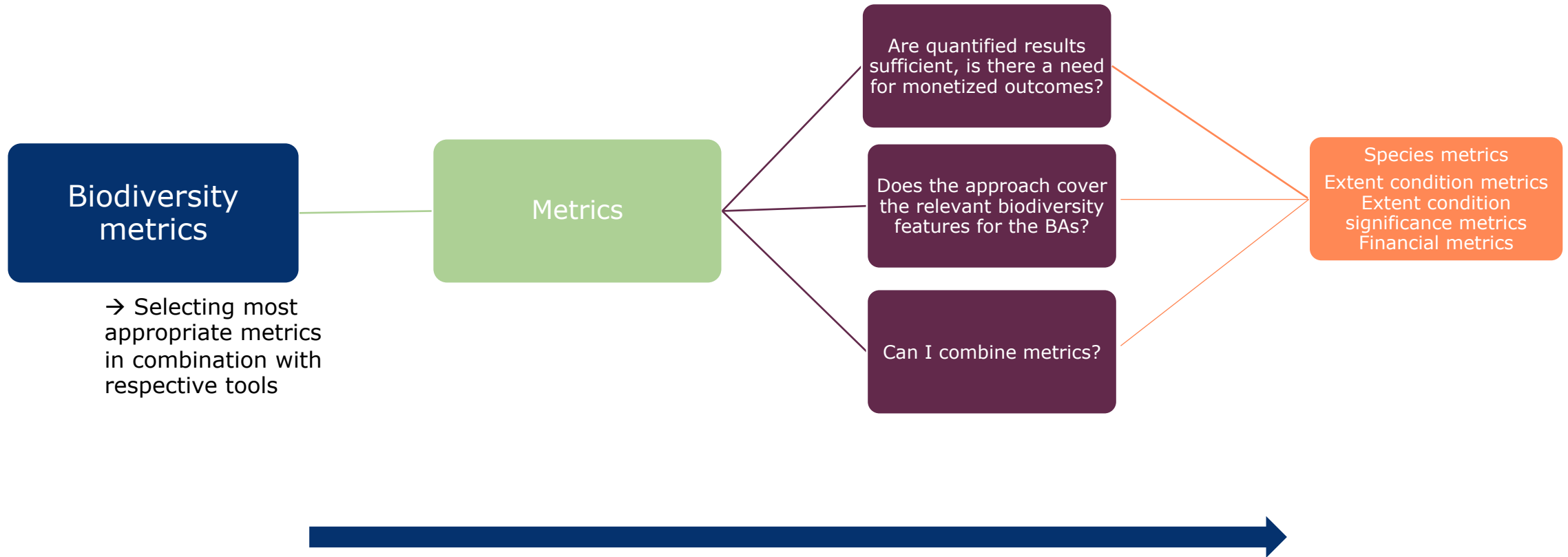
Biodiversity targets	Suitable tools
CBD post 2020 biodiversity targets	Need to be combined to cover: Impacts and dependencies; habitats, species, and ecosystems; all material pressures to biodiversity; the whole value chain; terrestrial, freshwater and marine; accounting approaches
Science Based Targets for Nature	Need to be combined to cover: Habitats/species and ecosystems; all material pressures to biodiversity; the whole value chain; terrestrial, marine and freshwater; impacts and dependencies
No net loss / net gain	Biodiversity Net Gain Calculator; Biological Diversity Protocol; all measurement approaches using No Net Loss metrics
Sustainable Development Goals	STAR; BNGC or BISI for invasive species
ISO 14001, EMAS	LIFE
Voluntary standards at sector or product level	Depends on specific requirements; e.g. BNGC
Voluntary biodiversity assessment and reporting frameworks	No preference
Voluntary biodiversity agreements	No preference
Regulatory and permitting requirements	No preference, but LCA based approaches for PEF and Green Claims
Financial institutions requirements	BISI
Site to landscape level commitments	Supply chain tools e.g. BIM; tools with involvement of stakeholders e.g. BISI, BNGC
Specific corporate-level biodiversity commitments or engagements	LIFE, CBF

Criterion

Sub-criterion

Navigation questions

Options



Biodiversity metrics

Type of metric	Commonly used metrics	Unit of biodiversity	Key points	Used for	Scale of analysis	Approaches relying on these metrics
	PDF Potentially disappeared fraction	All species	Local number of species (does not measure declines in species populations); all species weighted equally; based on regressions between the intensity of each pressure and their impacts on species persistence; impact data from a large and growing database of published studies;	Impact assessment and Life Cycle Analysis using ReCiPe model (e.g. Impact World +;)	Product, corporate or global scale	ReCiPe Product Biodiversity Footprint Biodiversity Footprint for Financial Institutions
Extent (or Area) * Condition (or Quality) * Significance metrics	BII Biodiversity Intactness Index	All species	Modelled (or expert-derived) species population densities in different land-use intensities, weighted by species richness for the ecoregion; all species weighted equally (so increased 'weedy' species can lead to a higher score); <u>only terrestrial</u>	Impact assessment and Life Cycle Analysis using PREDICTS model	Product, corporate or global scale	None of the assessed approaches
	BIM Biodiversity Impact Metric	All species	Uses MSA for the condition and 'range rarity' by ecoregion for the significance	Supply chain assessments and impact assessments	Product, corporate or global scale	Biodiversity Impact Metric (BIM)
	Site Biodiversity Condition Class	Habitats	Based on mapping and classification of habitats in mine areas. Classification based on extent, condition and uniqueness/ecological importance.	Monitoring progress of quarry rehabilitation	Site scale	Biodiversity Indicator and Reporting System (BIRS)
	BNGC score	Biodiversity value per m2	Based on field survey, biodiversity value scores are attributed to all polygons of a site. GIS based. Requires knowledge of local biodiversity.	Measuring losses and gains within the same ecosystem type. Can be used to refine modelled MSA scores. Can	Site or project scale	Biodiversity Net Gain Calculator (BNGC)

Type of metric	Commonly used metrics	Unit of biodiversity	Key points	Used for	Scale of analysis	Approaches relying on these metrics
				be used to underpin nature positive investments as offsets for achieving 'no net loss' or 'nature positive' ambitions		
Thematic metrics	Examples: deforestation free commodities or supply chains // surface of regenerated or restored land // palm oil fee // etc...	Km2 or %	Measures specific issues of biodiversity	To demonstrate compliance with specific biodiversity targets	Product, supply chain and corporate scale	None of the assessed approaches
Other types of biodiversity	Agrobiodiversity Index	Agro-biodiversity	Measures nutrition, agriculture and genetic resources - not conventional biodiversity	Sustainable agriculture	Site to corporate scale	Agrobiodiversity Index (ABDi)
Financial metrics	EP&L Environmental Profit & Loss accounts	Ecosystem services	Sum of the economic value of ecosystem services; biodiversity not directly included (only by proxies such as land use).	Life cycle analysis (e.g. used by corporates such as Arla and Kering)	Product, site, corporate or global scale	Kering's E P&L (product), LafargeHolcim's ES valuation (site)
Combined state, pressure and response metrics (dashboard)	No single quantitative metric, with score cards used to identify risk areas.	Habitat / species population / biodiversity management unit (BMU)	Measures state (one of above metrics) in combination with pressures and responses and presents this in one dashboard.	Monitoring progress to target	Site and project scale	Biodiversity Indicators for Site-based Impacts (BISI); LIFE Methodology

Criterion

Sub-criteria

Navigation questions

Options

Level of efforts

→ Selecting tools compatible with available time and budget

Required expertise

Do you have the required expertise to apply the measurement approach?

Available within company / external expertise required / training possible

Accessibility

Is the measurement approach open source or commercial?

Full open source / open source with support / commercial

Costs

What are we prepared to pay for software?

No cost/cost

Time investment

What time efforts are we prepared to invest (training, data collection...)?

High/moderate/low



Level of efforts

Biodiversity measurement approach	Accessibility (full open source / open source with support / commercial)	Required expertise (INT = probably available within company; EXT = external required; EXT-T = training is possible)	Costs (COST EXT = cost of external expertise; COST Other = other costs; H = high, M = moderate, L = low)	Efforts (H, M, L)
Biodiversity Footprint Financial Institutions (BFFI)	Open source with support	EXT-T	COST EXT H/M, COST Other L	H-M
Biodiversity Indicators for Sitebased Impacts (BISI)	Open source	EXT	COST EXT H/M/L	H-M
Biodiversity Impact Metric (BIM)	Open source with support	EXT	COST EXT H/M/L, COST Other M	H-M-L
Global Biodiversity Score® (GBS)	Commercial	EXT-T	COST EXT H, COST Other M	H
GBS® for financial institutions	Commercial	EXT	COST EXT L, COST Other H	L
LIFE Methodology (LIFE)	Commercial	EXT-T	COST EXT M, COST Other L	H-M
Product Biodiversity Footprint (PBF)	Commercial	EXT	COST EXT H/M	M
Species Threat Abatement and Restoration metric (STAR)	Open source with support	EXT	COST EXT H/M/L, COST Other L	L
Biodiversity Footprint Methodology	Open source with support	EXT-T	COST EXT M/L	L

Biodiversity measurement approach	Accessibility (full open source / open source with support / commercial)	Required expertise (INT = probably available within company; EXT = external required; EXT-T = training is possible)	Costs (COST EXT = cost of external expertise; COST Other = other costs; H = high, M = moderate, L = low)	Efforts (H, M, L)
Corporate Biodiversity Footprint	Commercial	EXT-T	COST EXT L, COST Other H	L
Biodiversity Net Gain Calculator	Commercial	EXT	COST EXT M/L	L
BIRS and ES assessment (LafargeHolcim)	BIRS: open source, ES: company tool	EXT	COST EXT H	M
ReCiPe2016	Open source	EXT	COST EXT H/M	L
Bioscope	Open source	INT		L
Agrobiodiversity Index (ABDi)	Commercial	EXT	COST EXT H/M, COST Other L	M
Biological Diversity Protocol (BD Protocol)	Open source	EXT-T	COST EXT L	M/L
Biodiversity Performance Tool for Food sector (BPT)	Open source	INT/EXT-T	COST EXT L, COST Other L	L
Biodiversity Monitoring System for the Food Sector (BMS)	Open source	INT/EXT-T	COST EXT L, COST Other L	L
Kering Environmental Profit & Loss (EP&L)	Open source	INT?		H

Questions?

Break 10 min

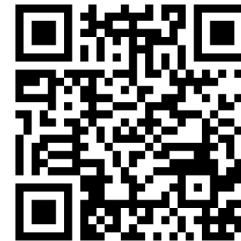


Workshop: Navigation questions & choosing the right tool

Workshop: Navigation questions + choosing the right tool

The aim of this workshop is to practice the use of navigation tree and its usage for tool selection

- Answer navigation tool questions from your organization's point of view (15mins)
- Let's go through each question from the navigation tree
 - Answer based on your independent work in Menti
 - **Go Menti.com and use code 6460 2685**
 - Commenting the answers together
- Based on the results, let's review which tool does the navigation tree suggest to use



55 min



Independent working time
15min



Mentimeter 30 min



Results 10 min

Workshop template, Navigation questions

What is the business applications?	What is the organizational focus area on biodiversity?	What do you need to measure?	What is the level of measurement?	What kind of outcome you need?	What is your company ambition level in biodiversity?	What are available the resource and efforts?
<ul style="list-style-type: none"> What is the objective of the measurement? E.g. measurement of current performance, tracking progress towards target... 	<ul style="list-style-type: none"> Does biodiversity need to be measured at corporate, product, project, site, or supply chain level? 	<ul style="list-style-type: none"> Which are the pressures on biodiversity that need to be covered by the measurement approach? 	<ul style="list-style-type: none"> Does the tool need to measure biodiversity at species or habitat level? 	<ul style="list-style-type: none"> Are quantified results sufficient, is there a need for monetized outcomes? 	<ul style="list-style-type: none"> Has the company defined a specific ambition, e.g. nature positive, no net loss? Which measurement approaches or metrics allow tracking progress toward target? Is it clear how to define the baseline? 	<ul style="list-style-type: none"> Do you have the required expertise to apply the measurement approach? What are we prepared to pay for software? What time efforts are we prepared to invest (training, data collection...)?

Break 10 min



Biodiversity measurement: LCA based tool presentation



Biodiversity measurement: LCA in biodiversity assessment

Life Cycle Impact Assessment

Life Cycle Assessment (LCA) evaluates the potential environmental impacts throughout the entire life cycle of a product or a service.

Life Cycle Impact Assessment (LCIA) supports the interpretation of LCA studies by translating emissions and resource extractions into a limited number of environmental impact scores by means of so-called characterization factors.

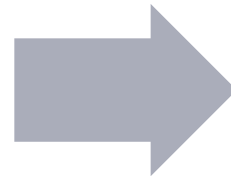
- Characterization factors reflect the relative contribution to the environmental impact. Characterization factors are based on cause-effect pathways, which show the causal relationship between the intervention and its potential effects.

1. Classification:

connections between types of environmental pressures and their impacts are identified

LCA results → impact categories

Example:
CFC and CO₂ → climate change



2. Characterization:

the amount of impact a product or service has in each impact category is quantified

Example:
kg CO₂ x *relevant characterization factor for climate change* = climate change ecosystem damage (yr/kg CO₂)

Life Cycle Impact Assessment

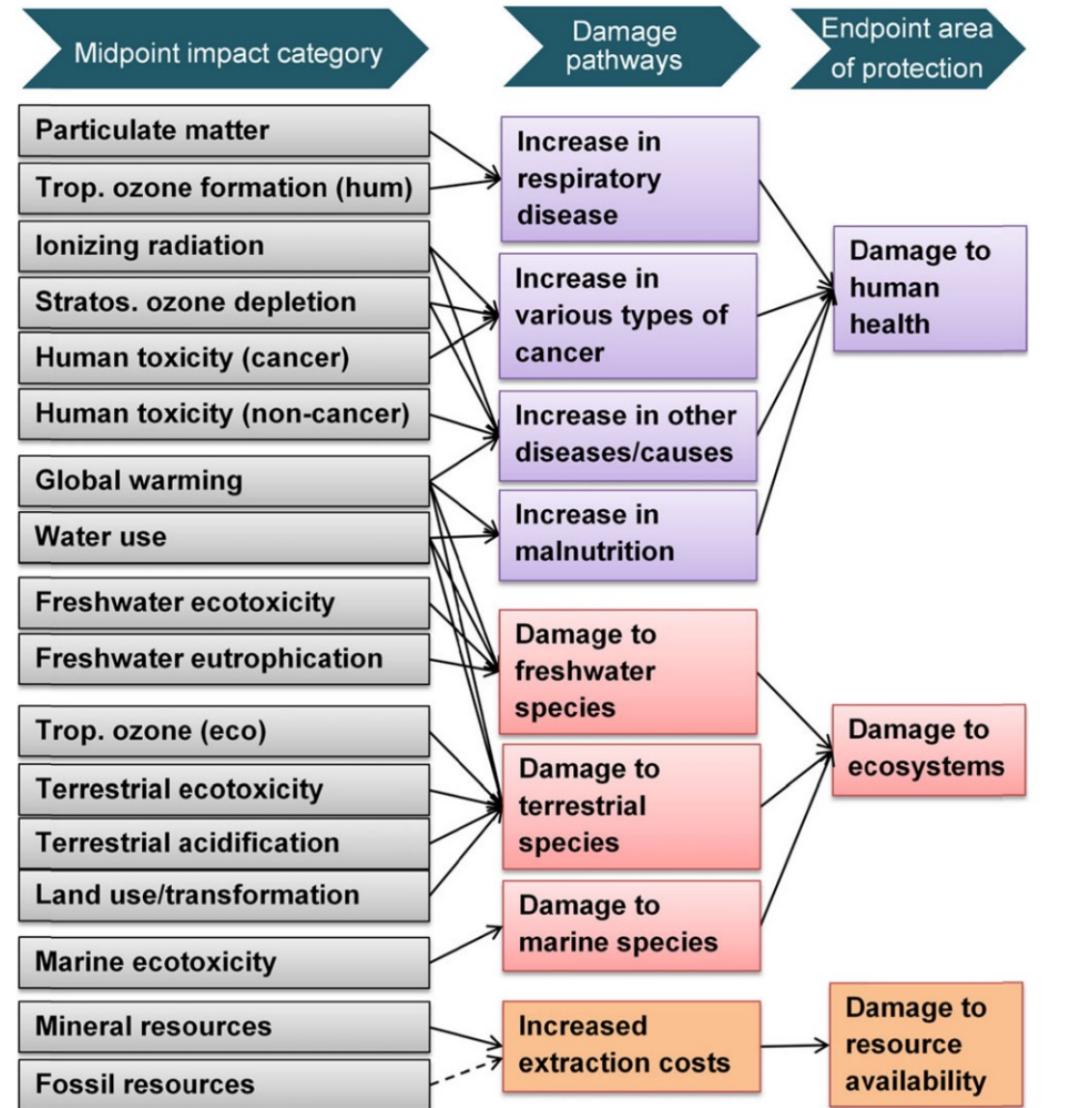
Characterization can be done at *midpoint* or *endpoint* level:

- **Midpoint** = focus on single environmental problems, such as *climate change* or *acidification*
- **Endpoint** = shows the environmental impacts on three higher aggregation levels: *human health*, *ecosystem quality* and *resource scarcity*

Midpoint level has lower uncertainty, but endpoint level results can be easier to interpret.

Characterization factors are derived from best estimates available in scientific publications at the time.

Biodiversity impacts are measured at endpoint level.



Example unit:
kg CO₂

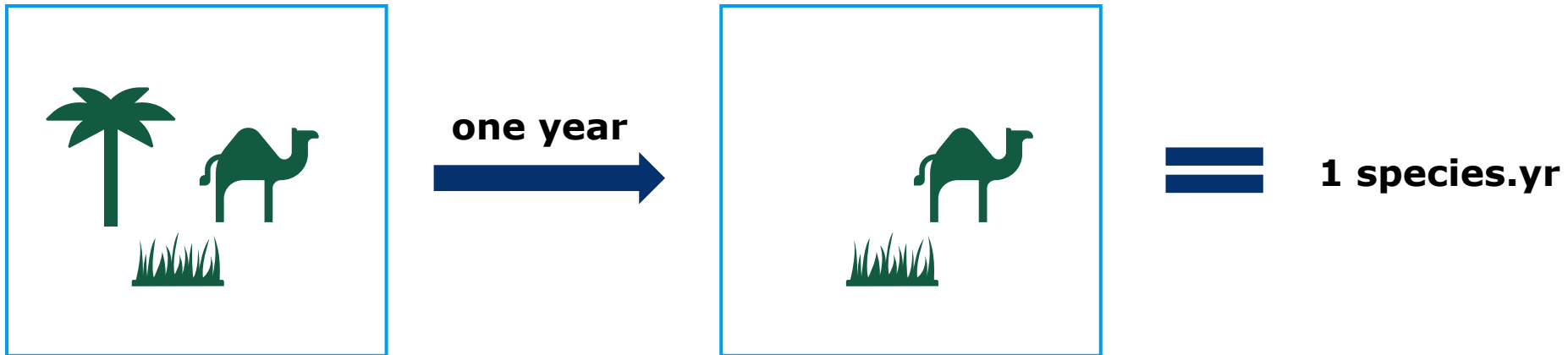
Example unit:
species.yr

Biodiversity metrics in LCIA

Current LCIA methods use **species richness** to quantify potential impacts on biodiversity.

species.year = number of species lost during one year from the affected area.

(**not** number of species gone *extinct* during one year)



Biodiversity metrics in LCIA

Species.yr can be translated into **PDF**:

PDF (Potentially Disappeared Fraction of Species) = a fraction of species richness that may be potentially lost due to an environmental pressure.

10 **PDF.m².yr** can be interpreted as:

- 10 m² has lost all its species during a year
- 100 m² has lost 10% of its species during a year
- 10 m² has lost 10% of its species during 10 years



PDF = 1

PDF = 0

Biodiversity metrics in LCIA

Covering **existing or additional impacts** (such as overexploitation of resources, invasive species) or **different aspects of ecological concern** (functional diversity, landscape fragmentation)

AREA	METRIC	RELATION TO ESSENTIAL BIODIVERSITY VARIABLES (EBVs)
1. Operational models and methods	PDFs, Biodiversity Adjusted Hectare Year (BAHY)	Community composition
2. Not yet operational models and methods – midpoint	Average renewal time, Lost potential yield, Depleted stock fraction, Functional Diversity Index, Free net primary production in primary carbon equivalent, Hemeroby	Ecosystem function, Species populations, Ecosystem structure, Species traits
2. Not yet operational models and methods - endpoint	PDFs, Potentially Affected Fraction of Species (PAFs)	Community composition

Not yet operational models and methods: examples

At midpoint level, focusing on aspects related with biodiversity:

Biotic resource use

Fisheries-related (Langlois et al. (2014), Hélias et al. (2018), Emanuelsson et al. (2014), Langlois et al. (2015))

General framework for natural occurring biotic resources (Crenna et al. (2018), Beylot et al. (2020))

Hemeroby indicator degree of 'naturalness' of a landscape (Geyer et al. 2010)

Functional diversity indicator middle point between the impact on biodiversity and the damage caused to ecosystem quality, in terms of functions lost (de Souza et al., 2013)

At endpoint level:

Land-use intensity 3 intensity levels (minimal, light and intense use) (Chaudhary and Brooks 2018)

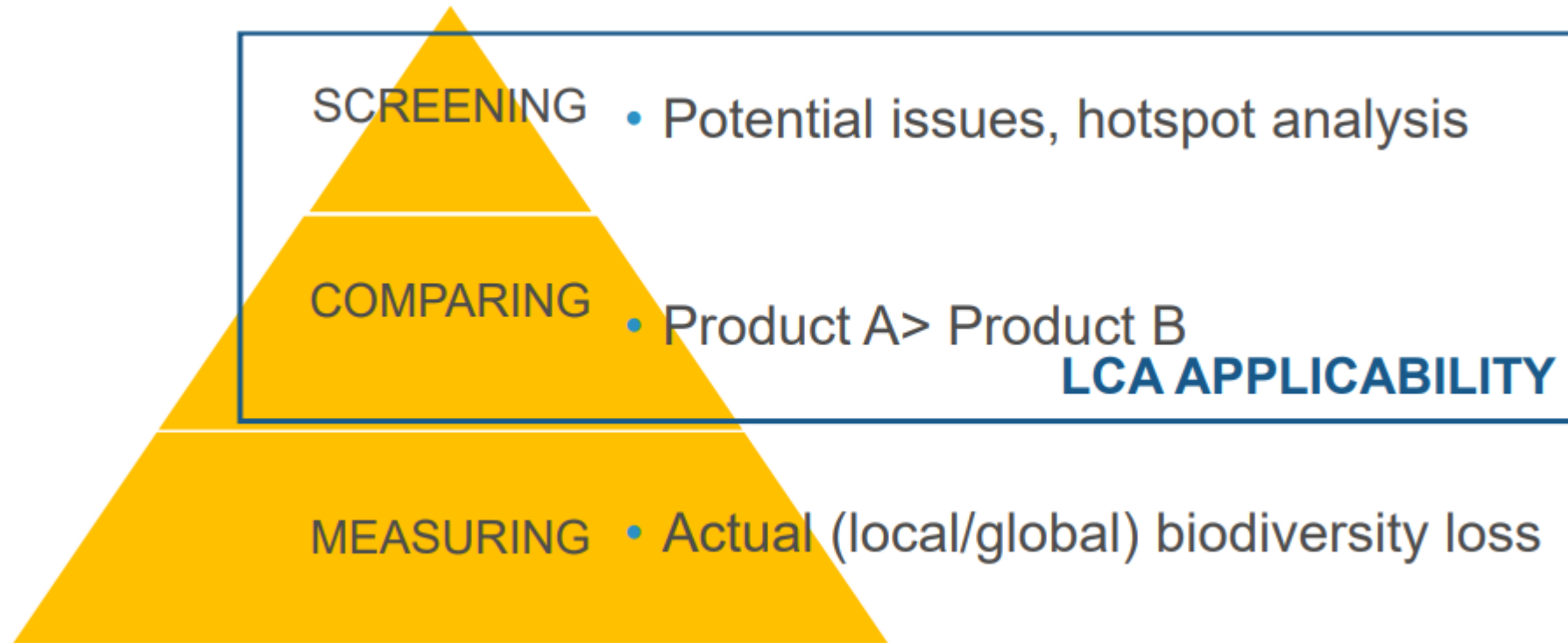
Land fragmentation for bird species and forest ecoregions (Larrey-Lassalle et al., 2018)

Species richness and habitat evenness biodiversity impact potential (Geyer et al. 2010)

Invasive species Introduction of exotic fish species related to the transport of goods (Hanafiah et al. 2013)

Effect factor for marine macroplastic entanglement impact for marine species (Woods et al., 2019)

Hierarchy of complexity in measuring biodiversity impacts



Weaknesses of using LCA for biodiversity impact assessment

Common problems

- Spatial resolution of impact assessment models vs spatial resolution of inventory data
- Only three drivers for biodiversity loss: pollution, land use, climate change
- Regarding habitat change linked to land occupation and land transformation: only six (out of 16) different land categories are characterized: primary forest, secondary forest, annual crops, perennial crops, grass land and urban land
- Site-specific analyses not possible with LCA data (e.g. sourcing raw material X from location A vs. from location B)

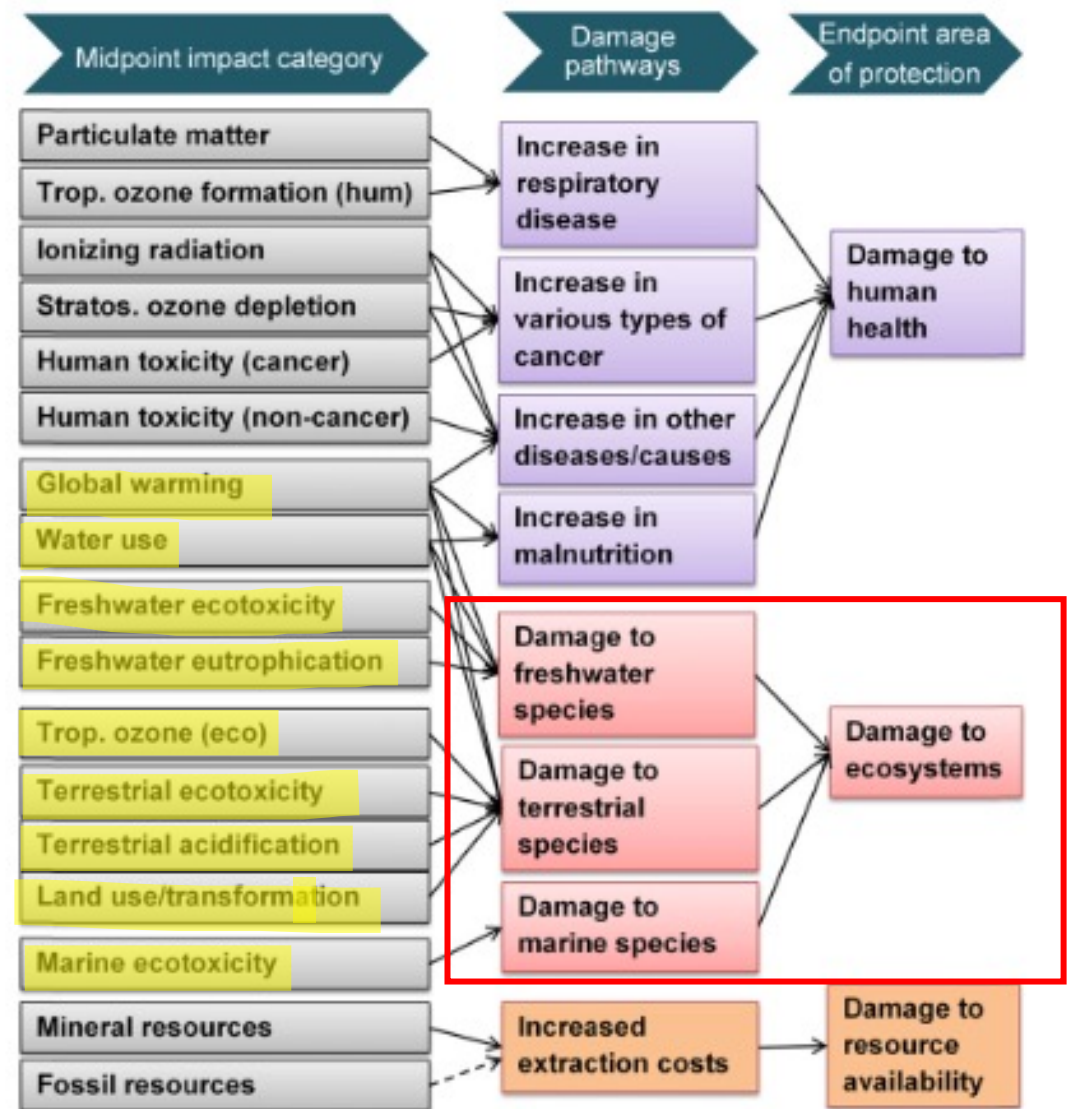
What should be improved

- Expanding the meaning of biodiversity to not only mean richness of species but also genetic and ecosystem diversity
- Inclusion of all five biodiversity loss drivers
- Including ecosystem services
- Allowing implementation of positive impacts related to biodiversity

➡ More specific analyses become possible as more LCA inventory datasets become available

Method review: ReCiPe (2016)

- Developed in collaboration between the Dutch National Institute for Public Health and the Environment (RIVM), Radboud University Nijmegen, Norwegian University of Science and Technology, and PRÉ
- Based on LCIA, translating emissions and resource extractions into a limited number of environmental impact scores through characterization factors indicating the environmental impact per unit of stressor (e.g. per kg of resource extracted)
- Quantifies biodiversity impacts at endpoint level
- Robust, scientifically sound, internationally approved
- Mature: many case examples exist
- Open source, but requires LCA software e.g. GABI / Simapro, and access to databases e.g. ecoinvent, which require licences
- Requires understanding of LCA

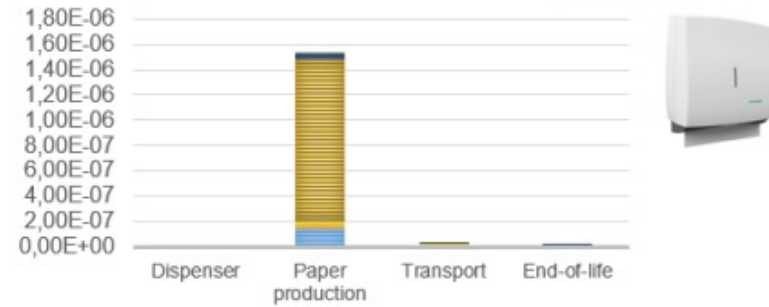


Method review: ReCiPe 2016

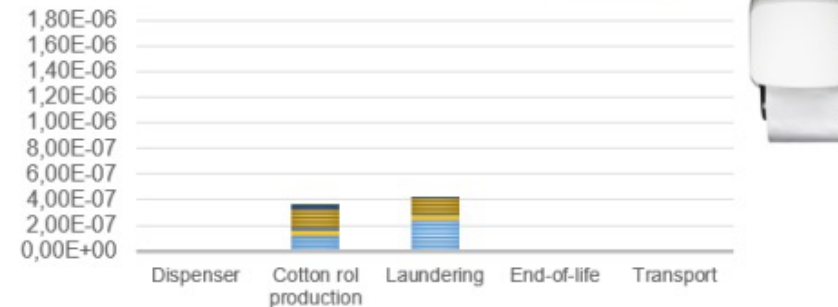
- Output biodiversity metric: **species.year** (= species loss over time) or **PDF** (=potentially disappeared fraction of species)
- Includes three different value choices, i.e., visions to account for the societal and cultural influence on environmental impacts according to the "Cultural Theory" (Thompson et al 1990):
 - **Individualist** = short-term interest, undisputed impact types, technological optimism
 - **Hierarchist** = based on scientific consensus in time frame and impact mechanisms
 - **Egalitarian** = most precautionary: long time frame, all available impact pathways
 - The three value choices provide different midpoint to endpoint factors and give different results for ***climate change*** and ***terrestrial acidification***.

ReCiPe case example: environmental impact of hand drying solutions (commissioned by the Dutch Ministry of Internal Affairs)

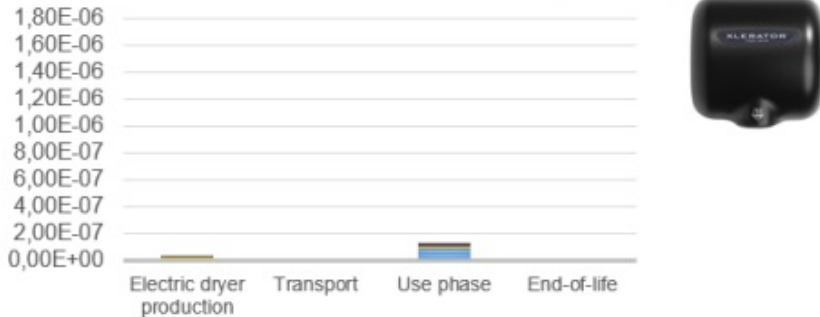
Biodiversity impact of paper towels expressed in species.yr



Biodiversity impact of cotton roll expressed in species.yr



Biodiversity impact of electric dryer expressed in species.yr



- Global warming, Terrestrial ecosystems
- Global warming, Freshwater ecosystems
- Ozone formation, Terrestrial ecosystems
- Terrestrial acidification
- Freshwater eutrophication
- Marine eutrophication
- Terrestrial ecotoxicity
- Freshwater ecotoxicity
- Marine ecotoxicity
- Land use
- Water consumption, Terrestrial ecosystem
- Water consumption, Aquatic ecosystems

mineral and fossil resource extraction. Endpoint characterisation factors (CF_e) are derived from midpoint characterisation factors (CF_m) with a constant mid-to-endpoint factor per impact category:

$$CF_{e,x,a} = CF_{m,x} \times F_{M \rightarrow E,a} \quad (1)$$

Where a denotes the area of protection, i.e. human health, (terrestrial, freshwater and marine) ecosystems or resource scarcity, x denotes the stressor of concern and $F_{M \rightarrow E,a}$ is the mid-to-endpoint conversion factor for area of protection a . These mid-to-endpoint factors are constant per impact category, because environmental mechanisms are considered to be identical for each stressor after the midpoint impact location on the cause-effect pathway.

Figure 2: Biodiversity impact

Case example: company from the energy sector

- Assessment of nature impacts in upstream, direct operations and downstream of one value chain
- Combining qualitative and quantitative methods:
 - ENCORE for materiality assessment
 - **ReCiPe 2016** to calculate the biodiversity footprint (species.yr) of upstream and direct operations
 - Qualitative assessment of downstream impacts (literature review, impact assessment expertise)
- Output:
 - Information on which raw materials and which parts of the value chain have the greatest biodiversity impacts
 - Information on impact pathways
 - Hotspot map of where the greatest impacts occur geographically
 - Checklist for suppliers: what requirements to set
- Process aligned with the SBTN framework



Method review: ReCiPe (2016)

Strengths

- Robust, scientifically sound and internationally approved, produces reliable results
- Can systematically assess the impact of a product across the entire value chain
- The use of impact assessment methods covers a range of environmental issues which prevents burden shifting
- Output metric measures impact on lower-level organisms. Although not all species are impacted in the same way, they serve as a good proxy for the health of ecosystems
- Open source

Weaknesses

- Does not cover the impact of invasive species and overexploitation
- Requires an in-house sustainability specialist with LCA experience or an experienced LCA consultant
- If LCA inventory data is needed, a licence to access commercial databases is required
- The output metric **species.yr** or the derived **PDF.m2.yr** can be difficult to understand due to the complexity of the unit – a multiplication of a factor (PDF range from 0-1), an area (in m²) and a time element (year)
 - other units such as MSA.m2.yr exist – there is still no consensus within the scientific community on which unit to use
- Results depend on available databases: site-specific analyses not possible

Questions?

Voluntary homework

Voluntary homework

- Present and discuss the navigation tree results with your colleagues and answer the following questions together.
- Prepare to discuss about these questions in the next event 29.11 and please bring your remarks from the discussion.

Which tools are recommended for your organization?

Which tools are the most interesting?

Do you see these tools are relevant and usable in your organization?

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