

Study on the significance of biodiversity for the Finnish food industry

31.5.2023

Summary 1/3

Background and objective of the report

Halting the nature loss requires fundamental changes at different levels of society and in all sectors. The food sector has a key role to play in safeguarding biodiversity and reducing impacts on nature, as around half of all human-induced nature loss comes from food production and the food value chain. The challenge is immense - the food sector and the global food system should be able to feed a growing population while ensuring that it remains within the limits of nature's carrying capacity.

Biodiversity loss is a major sustainability challenge and risk that affects the entire food value chain. On the other hand, ambitious and determined biodiversity work offers new nature-positive business opportunities for the Finnish food industry, new ways to promote the competitiveness of the sector, and unique opportunities to contribute to building a more sustainable food system both nationally and globally.

The Finnish Food and Drink Industries' Federation (ETL) wants to act as a guiding and unifying force for the food industry, also on biodiversity issues. The study commissioned by ETL aims to serve as a study for the whole food sector and to support companies in starting off with biodiversity work by providing information on the key nature-related impacts and dependencies of the industry, the business risks associated with biodiversity and the opportunities offered by biodiversity work. The study also provides information on legislation relevant to biodiversity, frameworks and good practices relevant for biodiversity work, and tools for assessing biodiversity impacts. Further, the study suggests next steps for both companies and the industry as a whole to promote biodiversity work in the Finnish food industry.

The study examines the importance of biodiversity from the perspective of the food industry. However, a holistic view of the whole value chain will help to identify the most significant nature impacts along the whole food value chain, thus contributing to an efficient allocation of resources to the most effective biodiversity-enhancing measures. The study examines the importance of biodiversity for the food industry not only from the perspective of domestic value chains, but also from the perspective of the global value chains specific to Finnish food companies.

The study has been conducted by Gaia Consulting in close cooperation with ETL experts and the ETL Biodiversity Working Group, composed of ETL member companies, during spring 2023.

Summary 2/3

Key results

Food businesses are linked to biodiversity not only through their operations and processes, but also indirectly through their supply and value chains. The food industry is fully dependent on ecosystem services provided by nature, such as plant photosynthesis, soil formation, insect pollination, nutrient cycling, groundwater formation and water filtration in the soil, and naturally the plant, fungal and animal species that are processed for food. Given the sector's significant nature dependencies, safeguarding ecosystem services is crucial as they provide the basis for a functioning food system.

The biodiversity impacts of the food industry are examined through five key drivers of biodiversity: land and marine use and changes in use, direct exploitation of natural resources, global warming, invasive species and pollution. The food industry clearly has more indirect than direct impacts on biodiversity, as the most significant impacts take place at the upstream end of the value chain, particularly in the primary production of food. On the other hand, the activities of a single company can also have significant local impacts on nature, as biodiversity impacts are always site-specific. Influencing food raw material production practices in cooperation with primary production and biodiversity-friendly raw material sourcing are key and effective ways for food businesses to promote biodiversity in the value chain.

The direct environmental impacts of food industry's operations are largely related to the impact of production facilities and other infrastructure under the organisation's control, such as premises, warehouses and logistics, as well as the water and energy use required by production processes, the generation of food waste and other waste, and the potential pollution of terrestrial and marine ecosystems.

A number of best practices can be used to reduce impacts on nature, such as the mitigation hierarchy approach, whereby damage to nature is first avoided, then reduced, then potential restoration or management measures are used, and as a last resort, the remaining damage to nature can be compensated.

Summary 3/3

Key results

Identifying the most significant natural dependencies and impacts helps manage the risks to business. Such business risks may include, for example, the deterioration of the quality and availability of raw materials due to soil degradation, resulting in higher market prices, or various reputational and financial risks. On the other hand, biodiversity work offers companies new opportunities for value creation that benefit both business and nature. For example, business opportunities that reduce impacts on nature arise through new business models that improve biodiversity, and product innovations with a smaller biodiversity footprint, which are reflected in multiple business benefits such as operational efficiencies, supply chain resilience, cheaper financing and reputational benefits.

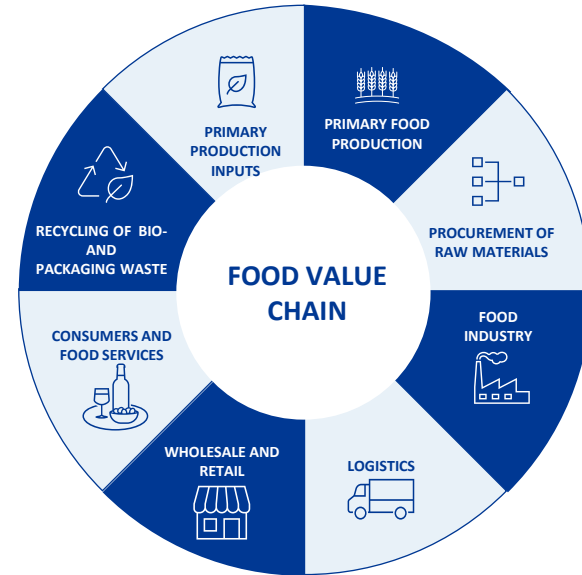
Various kinds of actions aiming to promote biodiversity have been carried out by businesses for a long time. However, these activities are often separate from the core business. Any action for nature is worthwhile and should be communicated to stakeholders. However, making an impact on nature requires a holistic change in business. In order to initiate and promote ambitious biodiversity work in the sector, there is a need for common approaches and closer cooperation along the value chain to assess biodiversity impacts in a comparable way and for better understanding concrete measures to promote biodiversity. Further, there is a need for understanding and bridging the gap between current biodiversity measures and set targets, as well as for a deeper understanding of biodiversity impacts, especially in relation to long and global value chains. Finally, there is a need for the identification and implementation of appropriate tools to measure biodiversity impacts.

The aim of the study is to serve as a basis for promoting biodiversity work by identifying the key biodiversity impacts of the sector and the opportunities to halt biodiversity loss, and to provide initial guidelines for moving forward. The industry has demonstrated a willingness to play an active role in promoting national biodiversity work during the course of the study. ETL is determined to support the food sector's work on nature and the integration of biodiversity issues into the strategic decision-making of companies. ETL wants to encourage companies to be ambitious and to take voluntary action to reduce biodiversity impacts, while taking into account and ensuring the operating conditions of the food industry and the competitiveness of domestic companies in the short and long term.





Biodiversity impacts and dependencies of the food industry

Assessing biodiversity impacts and dependencies in the food value chain






- Humans and businesses depend directly and indirectly on biodiversity.
- All human activities have an impact on nature. These impacts can be both positive and negative. In nature-positive business, there are more positive impacts than negative ones.
- Businesses impact biodiversity not only through their direct activities, but also through the value chain, end-use of products and investment decisions. Food companies have an impact on biodiversity directly through their own activities and indirectly through their domestic and global value chains.
- Identifying biodiversity impacts in the value chain is one step towards increasing positive impacts and minimising negative impacts. In addition, identifying biodiversity-related dependencies and impacts helps to identify the most significant business-related risks and opportunities.



Biodiversity dependencies for the food value chain

Ecosystem services	Examples of biodiversity dependencies in the food industry
 Supporting services	Services enabling primary food production and natural regeneration: <ul style="list-style-type: none">• Plant photosynthesis and oxygen production, and carbon sequestration by organisms• Soil formation and soil dispersal services, and the effect of soil productivity on yields• Water, carbon and nutrient cycles
 Regulating services	Services that enable food production efficiency and resilience, and regulate ecosystem functioning: <ul style="list-style-type: none">• Pollination, pest and plant disease control and prevention• Groundwater formation and soil water retention• Erosion and climate regulation capacity, and prevention of floods, droughts and other extreme weather events
 Provisioning services	Services enabling direct exploitation of natural resources: <ul style="list-style-type: none">• Use of organisms such as fish, berries, mushrooms, game and plants in food, packaging materials• Utilisation of abiotic resources such as water, fertilisers, metals and sand in food grade equipment• Exploiting the genetic capital of species and populations, e.g. for species breeding
 Cultural services	Mental and intangible services provided by nature: <ul style="list-style-type: none">• The brand value of clean nature and traditional rural landscapes for food companies and brands• Developing innovations and knowledge enabled by nature• Promoting the well-being and health of human and other species

Biodiversity impacts of the food value chain

Drivers for biodiversity loss	Examples of adverse impacts on nature
 Land and sea use and changes in use	<ul style="list-style-type: none">• The land required by the food value chain takes away space from natural habitats.• The land use change of the natural environment causes habitat loss, such as deforestation.• High intensity farming methods improve efficiency by reducing the area required, but may cause, for example, soil compaction.
 Direct exploitation of natural resources	<ul style="list-style-type: none">• Overexploitation of biotic resources such as fish stocks or forests, or unsustainable practices, lead to species extinctions• Unsustainable exploitation of abiotic resources such as water and minerals (fertilisers, metals, etc.) can cause droughts, habitat changes and habitat loss.
 Climate change	<ul style="list-style-type: none">• The use of fossil fuels and fossil-based fertilisers produce climate emissions.• Ruminant digestion and manure, as well as bio-waste produce methane emissions.
 Pollution	<ul style="list-style-type: none">• Overuse of fertilisers causes eutrophication of water bodies.• Pesticides have harmful effects on pollinators and other organisms.• Solid waste and waste water can release harmful substances, antibiotics and microplastics into the environment.
 Invasive species	<ul style="list-style-type: none">• Logistics between different ecosystems and geographical areas can move invasive species to new areas where they would not naturally be able to spread.• Pathogens and pests can also spread to new areas through otherwise harmless species or organic raw materials.

Examples of biodiversity impacts of the food value chain



LAND AND SEA USE AND CHANGES IN USE

PRIMARY PRODUCTION INPUTS

- Land and sea area needed to produce feed, fertilisers and other inputs
- Fragmentation and loss of habitats resulting from the use of natural areas, and consequent loss of wildlife

RECYCLING OF BIO-WASTE AND PACKAGING WASTE

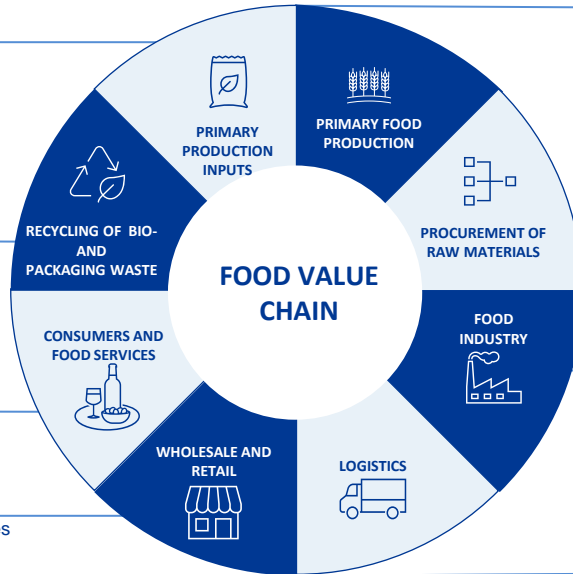
- Land required for recycling plants and consequent land use changes
- Poor reuse or recovery of materials and the resulting additional need for production areas

CONSUMERS AND FOOD SERVICES

- Extra demand for production areas due to food waste

WHOLESALE AND RETAIL

- Land required for buildings such as shops, offices, warehouses and other infrastructure and consequent land use changes
- Extra demand for production areas due to food waste in retail



PRIMARY FOOD PRODUCTION

- Land and sea area needed for the production of food and packaging materials
- Fragmentation and loss of habitats resulting from the use of natural environments, and consequent loss of wildlife
- Degradation of primary production habitats
- Soil compaction caused by mechanical tillage methods
- Drought and soil salinisation caused by irrigation

PROCUREMENT OF RAW MATERIALS

- Land required for buildings, such as warehouses
- Impacts of maritime cargo on underwater ecosystems
- Habitat fragmentation of land ecosystems caused by cargo and logistics

FOOD INDUSTRY

- Land required for buildings, such as factories, offices, warehouses and other infrastructure
- Fragmentation and loss of habitats resulting from building new infrastructure such as factories, and consequent loss of wildlife
- Extra demand for production areas due to losses in industrial processes

DISTRIBUTION LOGISTICS

- Impacts of shipping on underwater ecosystems
- Habitat fragmentation caused by the road infrastructure

Examples of biodiversity impacts of the food value chain



DIRECT EXPLOITATION OF NATURAL RESOURCES

PRIMARY PRODUCTION INPUTS

- Decreasing of the genetic biodiversity in species breeding
- Use of non-renewable resources in the manufacture of fertilisers, machinery and equipment
- Water resources exploited in manufacturing of primary production inputs
- Usage of peat as a growth medium in greenhouse farming
- Exploiting bio- and fossil-based energy sources

RECYCLING OF BIO-WASTE AND PACKAGING WASTE

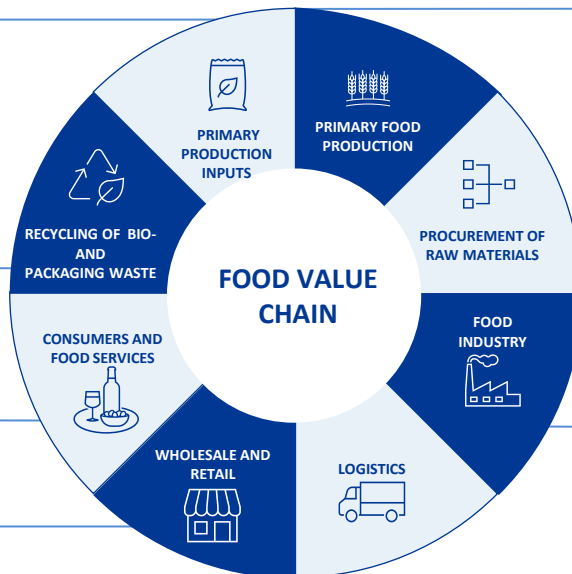
- Additional need for virgin natural resources due to poor reuse or recovery of materials

CONSUMERS AND FOOD SERVICES

- Additional need for natural resources due to food waste and non-recycled packaging materials

WHOLESALE AND RETAIL

- Exploiting bio- and fossil-based energy sources
- Natural resources used for infrastructure
- Additional need for natural resources due to food waste generated in shops



PRIMARY FOOD PRODUCTION

- Impact of over-exploitation of plant, fungal and animal species on species populations and their vitality
- Water resources exploited for primary production
- Depletion of the gene pool in species breeding
- Exploiting bio- and fossil-based energy sources

PROCUREMENT OF RAW MATERIALS

- Exploiting bio- and fossil-based energy sources
- Natural resources used for infrastructure
- Use of renewable and non-renewable resources in packaging

FOOD INDUSTRY

- Exploiting bio- and fossil-based energy sources
- Natural resources used for infrastructure
- Water resources used in production processes
- Excess use of natural resources due to unused side streams and waste

DISTRIBUTION LOGISTICS

- Exploiting bio- and fossil-based energy sources
- Natural resources used for infrastructure

Examples of biodiversity impacts of the food value chain



POLLUTION

PRIMARY PRODUCTION INPUTS

- Impacts of the manufacture of various chemicals, including pesticides, on air, soil and water
- Noise and light impacts to the surrounding environment due to manufacturing

RECYCLING OF BIO-WASTE AND PACKAGING WASTE

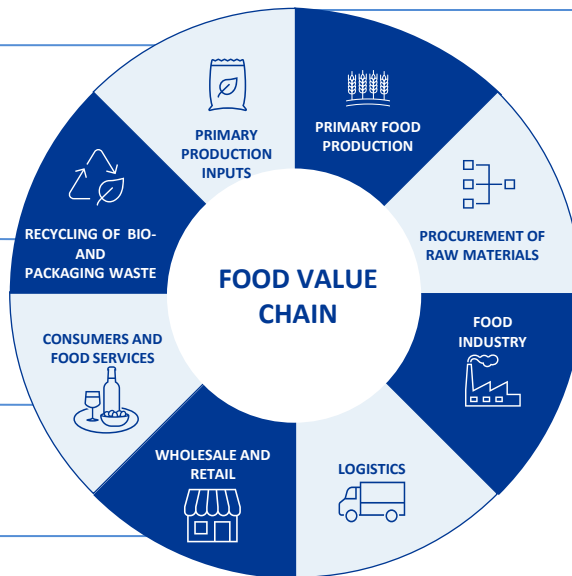
- Pollution of terrestrial and marine ecosystems due to poor or inadequate waste management

CONSUMERS AND FOOD SERVICES

- Littering of the environment due to e.g. plastic waste, which over time degrades into microplastics

WHOLESALE AND RETAIL

- Noise and light impacts on the surrounding environment
- Generation of packaging waste and microplastics



PRIMARY FOOD PRODUCTION

- Effects of chemicals, such as pesticides, on pollinators and soil degraders, among others
- Eutrophating effects of fertiliser overuse on water bodies
- Noise, vibration and light impacts of primary production on the surrounding environment
- Impacts on organisms and ecosystems by materials, such as plastics and microplastics, and supplies ending up in the environment, such as fishing nets
- Effects of feed ingredients such as heavy metals and antibiotics on ecosystems

PROCUREMENT OF RAW MATERIALS

- Emissions from sea, air and land cargo
- Noise, vibration and light effects of cargo

FOOD INDUSTRY

- Industrial process emissions to air, soil and water
- Noise and light impacts of industrial production on the surrounding environment
- Impacts of industrial waste on terrestrial and marine ecosystems

DISTRIBUTION LOGISTICS

- Logistics emissions to air, soil and water
- Noise, vibration and light impacts of logistics on the surrounding environment

Examples of biodiversity impacts of the food value chain



CLIMATE CHANGE

PRIMARY PRODUCTION INPUTS

- Impact of land use and land use change related to cultivation of feed, reflected in both increased carbon emissions from soils, peatlands and forests, as well as reduced carbon sequestration
- Climate emissions from nitrogen fertilisers used in cultivation of feed
- Climate emissions from energy consumption in manufacturing

RECYCLING OF BIO-WASTE AND PACKAGING WASTE

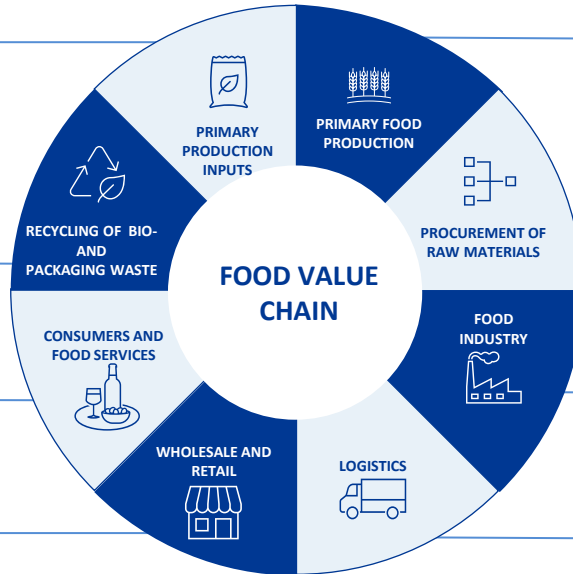
- Climate emissions from the decomposition of bio-waste
- Climate emissions from waste incineration
- Climate emissions from energy consumption

CONSUMERS AND FOOD SERVICES

- The carbon footprint of the product during its use
- Excess climate emissions from food waste

WHOLESALE AND RETAIL

- Climate emissions from energy consumption
- Additional climate emissions from food waste



PRIMARY FOOD PRODUCTION

- Direct climate emissions from the fields due to use of nitrogen fertilisers
- Climate emissions from ruminant digestion and rice cultivation
- Carbon emissions from soils, peatlands and forests due to land use and land use change, as well as decreased carbon sequestration
- Climate emissions from energy consumption

PROCUREMENT OF RAW MATERIALS

- Climate emissions from energy and fuel consumption of cargo

FOOD INDUSTRY

- Climate emissions from purchased energy and fuels used in industrial production
- Additional climate emissions from waste generated in industrial processes

DISTRIBUTION LOGISTICS

- Climate emissions from energy and fuel consumption of logistics

Examples of biodiversity impacts of the food value chain



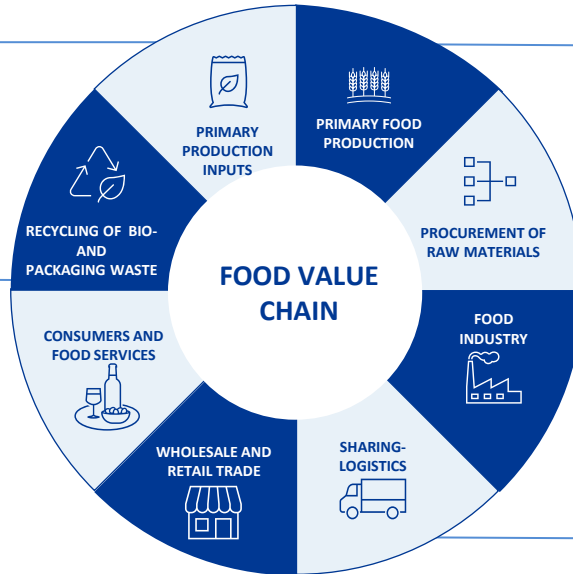
INVASIVE SPECIES

PRIMARY PRODUCTION INPUTS

- Cultivation of invasive and non-native species
- Transport of invasive species, pests and pathogens between regions and ecosystems through logistics

RECYCLING OF BIO-WASTE AND PACKAGING WASTE

- Invasive species entering the environment with bio-waste



PRIMARY FOOD PRODUCTION

- Cultivation and breeding of invasive and non-native species, including e.g. the introduction of invasive pollinators

PROCUREMENT OF RAW MATERIALS

- Introduction of organisms to new areas, e.g. in cargo, ship bottoms and ballast

DISTRIBUTION LOGISTICS

- Introduction of organisms to new areas, e.g. in cargo, ship bottoms and ballast

Business opportunities and risks for the food industry

Managing biodiversity impacts and dependencies means risk management



DEPENDENCIES AND IMPACTS ON BIODIVERSITY

Identifying the most significant dependencies and impacts on biodiversity helps to manage business risks

DEPENDENCIES

The company is dependent on certain ecosystem services provided by biodiversity

IMPACTS

The company contributes to ecosystem services that are important for both the company and its stakeholders



RISKS AND THEIR MANAGEMENT

The identification and management of the dependencies and impacts on biodiversity should be a part of **every company's risk management**

DIFFERENT RISKS

Operational risks

Legal risks

Regulatory risks

Reputational risks

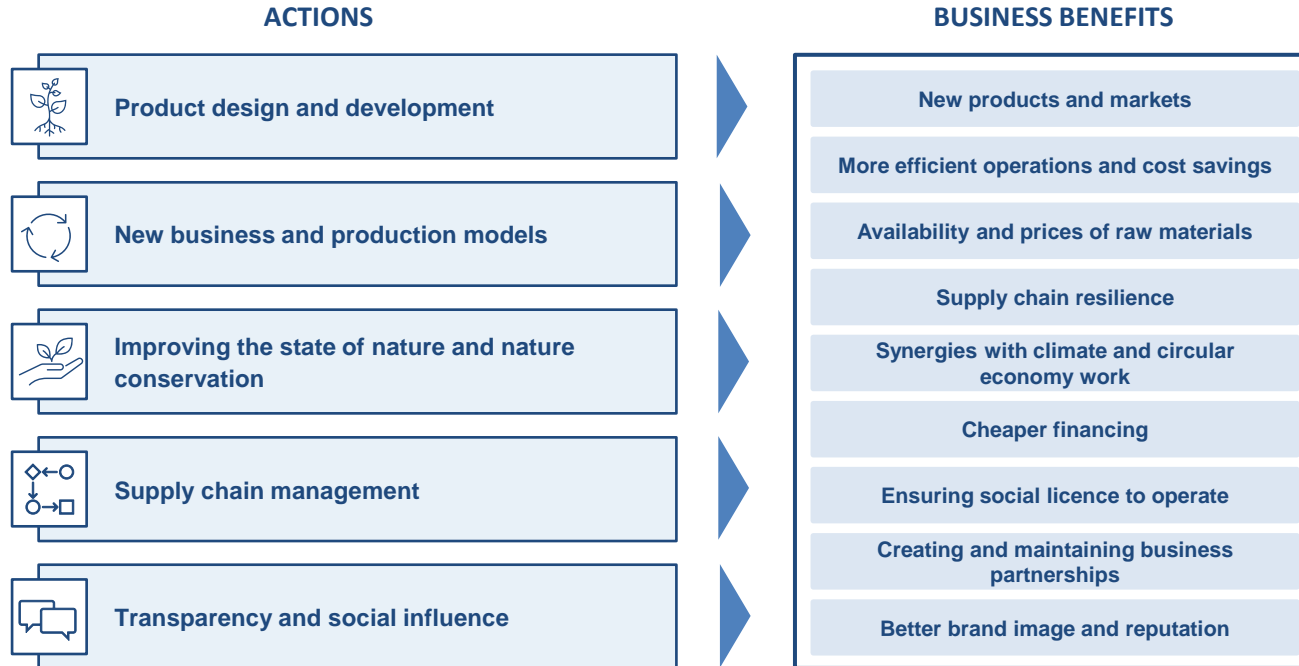
Financial risks

Transition risks

Various biodiversity-related business risks and possible future scenarios

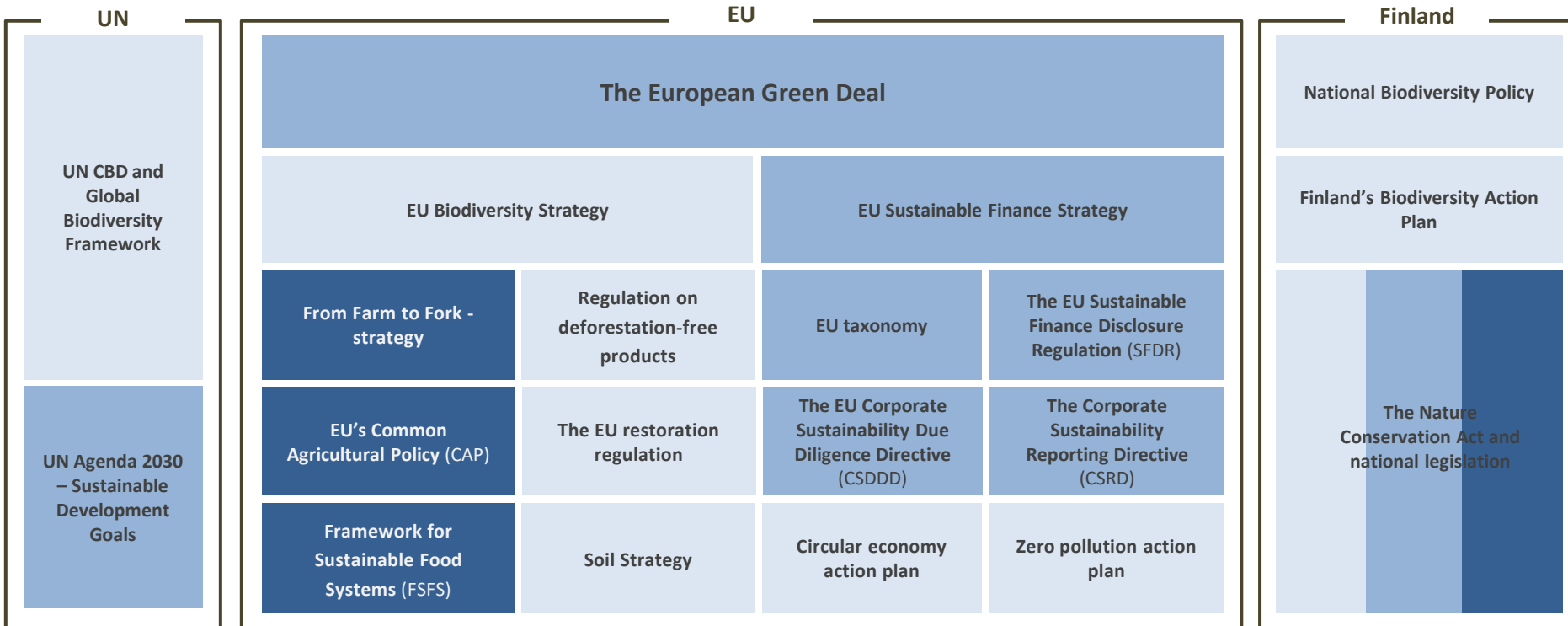
DIFFERENT RISK CATEGORIES	POSSIBLE EXAMPLES OF THEIR REALISATION
Operational risks	Soil degradation may reduce the quality and availability of raw materials, which is reflected as an increase in the market prices
Transition risks	Regulatory and market requirements can materialise as a business continuity risk if a company is not prepared to transition in time.
Regulatory risks	Changes in legislation may define some materials or products as harmful to nature, therefore putting the source of income at risk for the manufacturing company
Legal risks	Local residents affected by degradation of nature can seek compensation through legal processes from the company causing the damage
Reputational risks	Failure to reduce the negative impacts on nature can lower company's brand image in the eyes of clients and consumers
Financial risks	Risks arising from nature dependencies and impacts can increase the price and availability of the financing sought for the investments

Fostering biodiversity pays off



Starting off with biodiversity work

Policy initiatives and regulation



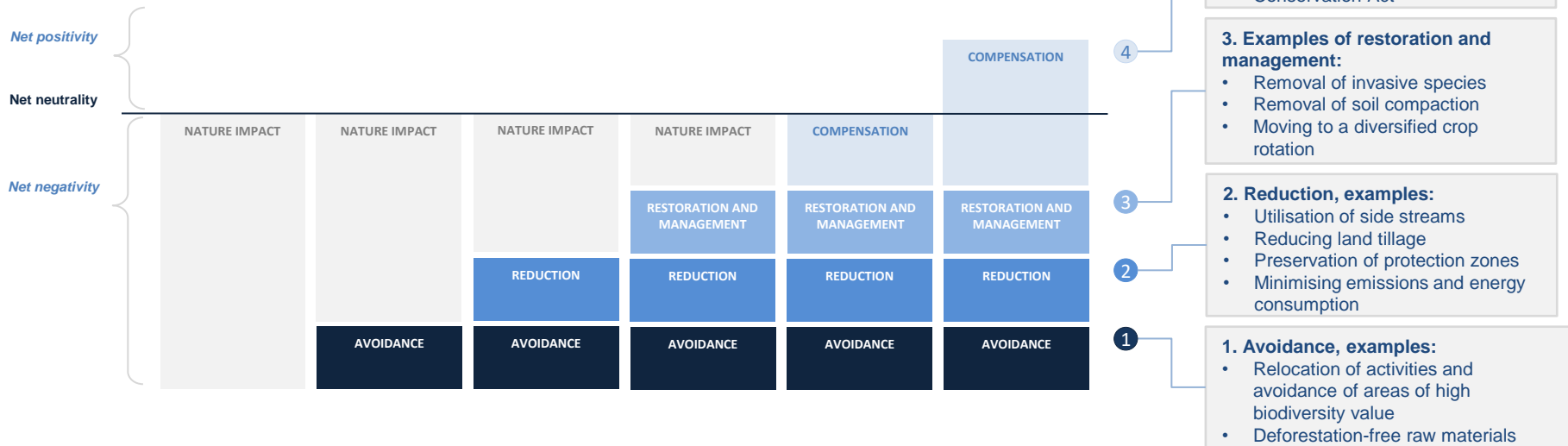
Explanation of colours:

- Light:** Multi-sectoral initiatives that promote biodiversity
- Medium light:** Multi-sectoral initiatives to promote sustainable development
- Dark:** Initiatives specifically targeting the food sector and including biodiversity objectives

Best practices for biodiversity work

The mitigation hierarchy is a key approach to managing the natural impacts of business activities. The mitigation hierarchy sets out a sequence of actions to reduce environmental damage:

- ① First to avoid
- ② After that, reduce
- ③ Then utilise possible restoration or management measures
- ④ As a last solution, compensate the remaining damage to nature



Biodiversity-related guides, initiatives and frameworks

These information packages will get you started and increase your understanding of the topic

- *Natural Capital Protocol framework*
- *The Biological Diversity Protocol Reference Framework*
- *Sitra's study Mitä luonto merkitsee liiketoiminnalle? and the framework of the the 12 nature steps for businesses*



These methods you can use to implement the work

- *Science Based Targets for Nature, or Science Based Targets for Nature*
- *Task Force on Nature-related Financial Disclosure*



These guides support policy making and choices

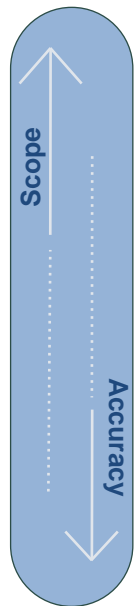
- EU food procurement criteria
- EU Business @ Biodiversity Platform evaluation report on approaches for measurement
- WWF guide to nature conservation tools



Remember to also take future legislation into account when constructing your approach
e.g. CSRD and CSDD requirements on biodiversity

Tools for business and value chain impact assessment

Tool	Purpose	Method
ENCORE - Exploring Natural Capital Opportunities, Risks and Exposure	Examining the nature dependencies, impacts and risks of business activities	Qualitative data on sectoral impacts on nature and ecosystem services
Exiobase	Sectoral and regional environmental impact assessment	A multinational database of production chains that takes into account emissions and resource consumption
Bioscope	Visualising the biodiversity impacts of the value chain on a map	Assess the impacts of different products and production chains, as well as investments on biodiversity
STAR - Species Threat Abatement and Recovery metric	Local assessment of the nature impact of investments	Assess the impact of human activities on the risk of species extinction, using species and habitat classifications of threatened species and habitats
AFi - Australian Farm Institute	Transparency of agricultural value chains, and the design of agricultural certification	Best Practice guidelines based on research and interviews
High nature value (HNV) farmland	Agricultural environmental impact assessment	Helping to identify areas of high natural value that are under agricultural use and to assess the impact of land use and land use change
Cool Farm Tool	Environmental impact assessment of farming methods	Numerically calculates the impact of on-farm measures on biodiversity, and helps monitor the evolution of the farm
ReCiPe	Life cycle analysis for biodiversity impacts	Identify the cause-effect relationships of human impacts, and use them as a basis for assessing impacts on nature



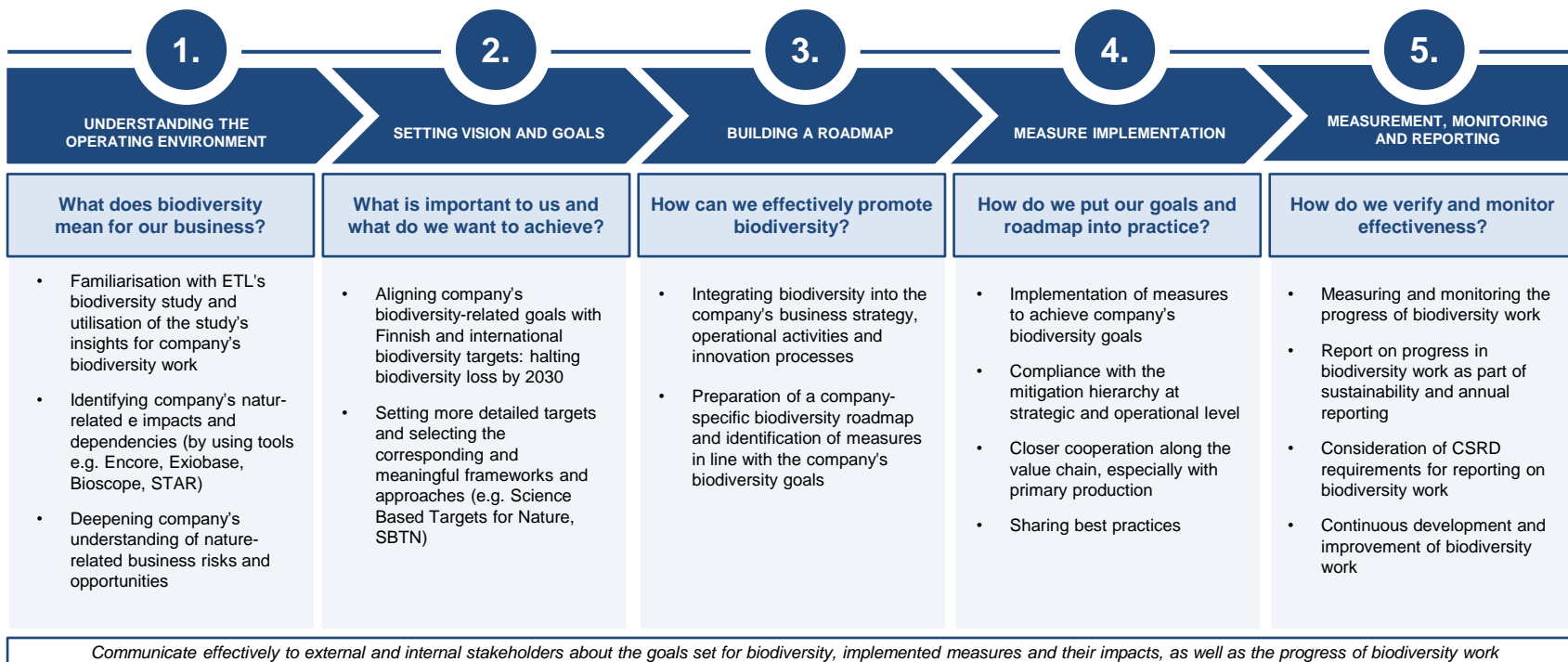
Tools to assess the current state of the environment and nature dependencies

Tool	Purpose	Method
IUCN RedList of Ecosystems	The state of ecosystems	Helps to identify key drivers of ecosystem degradation and the risk of loss of individual ecosystems
Local Biodiversity Intactness Index	Assessing the impact of human activities on ecosystem integrity	Global database of biodiversity survey data combined with land use data
Living Planet Index	Regional biodiversity and its change	Measure change by changes in land and marine vertebrate numbers
WWF - Risk filter	Identifying biodiversity risks	A company- and portfolio-level tool for prioritising measures
Ecolab Water Risk Monetizer	Regional water risk assessment	Helping to identify and predict trends in water availability and other water-related risks
SoilGrids	Global soil and land quality	Combines soil and other environmental data, and uses machine learning to determine the state of the soil
Sustainacraft	Impacts of land use change	Assess the impact of companies on biodiversity based on satellite data
Biodiversity Indicators for Site-based Impacts (BISI)	Selection of biodiversity indicators	Produce local biodiversity indicators at business level
Biodiversity Net Gain Calculator	Regional biodiversity values and land use	Calculates the current and potential biodiversity value of the area

Scope

Accuracy

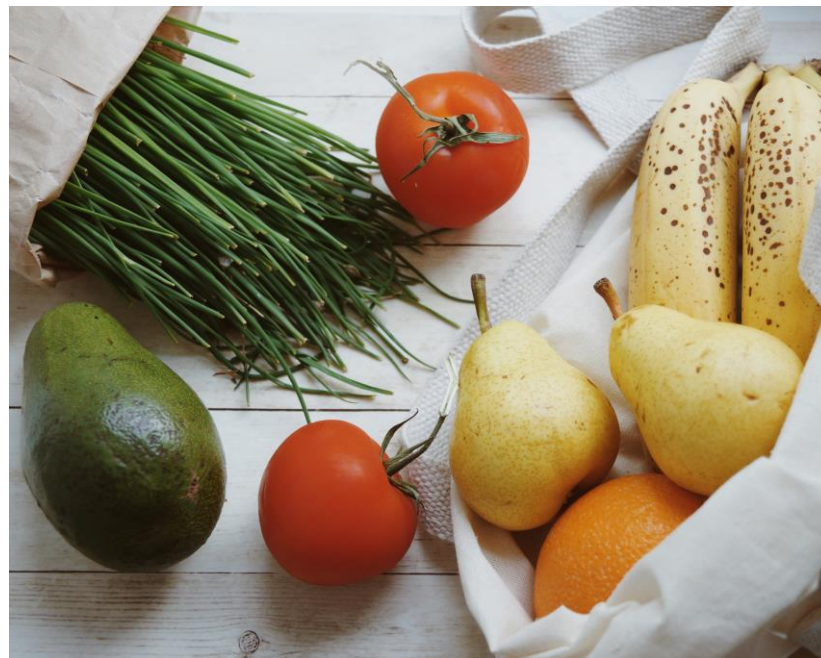
Progress model for food companies' biodiversity work



Sector policy for promoting biodiversity

Promoting biodiversity in the Finnish food industry

- While conducting the study, the ideas, challenges and needs of companies in the field in relation to biodiversity work have been heard.
- Based on the discussions, the aim is to strengthen cooperation between the sector and **propose a common policy for the sector to promote biodiversity work** at the strategic, operative and societal level.
- **The aim of sector policy** is to agree on a common approach to ensure continued cooperation across the food sector.
- To support the food sector's sustainability image, it is important to **communicate to stakeholders**, such as consumers, **about biodiversity work** and the added value it brings.



Common sector policy to promote biodiversity in the Finnish food industry

STRATEGIC



Encourage and support food businesses to consider nature dependencies and impacts, and biodiversity-related risks and opportunities in strategic decision-making.

OPERATIVE



Increase and intensify cooperation across the food value chain to reduce the negative impacts and to increase positive impacts on nature, as well as to promote the introduction of common methods for measuring biodiversity. Further, actively communicate biodiversity work to consumers and other stakeholders.

SOCIETAL



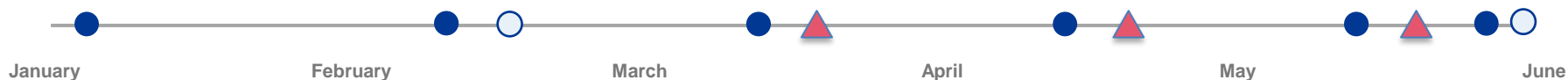
Actively participate in national biodiversity work and contribute to its joint planning and implementation. Support and encourage voluntary actions by businesses, and commitment to international biodiversity targets.






Thank you!

Work plan and timetable

STEP 1. The operating environment	STEP 2. Opportunities and risks in the food sector	STEP 3. Measures and measurement	STEP 4. Finalisation and reporting
<p><i>What is expected of us to promote biodiversity?</i></p>	<p><i>Why we should take biodiversity into account in our business?</i></p>	<p><i>What measures can we take to enhance biodiversity?</i></p>	<p><i>How do we communicate the findings of the study to the industry and stakeholders?</i></p>
<ul style="list-style-type: none"> • Key terms related to biodiversity • Description of the food chain as an operating environment • International and national policy initiatives and regulation to halt biodiversity loss • Expectations of key stakeholders 	<ul style="list-style-type: none"> • Key biodiversity dependencies and impacts of the food industry • Key biodiversity dependencies and impacts in the value chain • Key opportunities and risks for the food industry 	<ul style="list-style-type: none"> • Best practices for biodiversity work • Biodiversity-related guides, initiatives and frameworks • Methods and tools for measurement 	<ul style="list-style-type: none"> • Industry benchmarks from other countries • Progress model for food companies' biodiversity work • Sector policy for biodiversity work • Final report in Word format including executive summary • PPT presentation material
<p><i>Project management and quality assurance throughout the project</i></p>			



-  Project team meeting
-  Steering group kick-off and final meeting
-  Steering group workshop