NOVEMBER 2023

NATURE RISK IS BUSINESS RISK

THE BEST COMPANIES MANAGE BOTH

Every good CEO understands that risk presents opportunity, and nature-related risks are no different. Companies which pro-actively rethink and reshape their relationship with nature are future-proofing their business models, while helping create a more stable environment in which their business, and all businesses, can thrive. Managing nature and its risks is essential for building lasting value and it needs to be at the heart of your strategy. This paper will help you put it there."

Paul Polman, Systemiq Board member, a former CEO of Unilever and author of "Net Positive: how courageous companies thrive by giving more than they take"

No other global system is so deeply rooted in nature as our food and land use system. Awareness is growing that businesses need to better understand the physical and transition risks this involves - too many of our business models are on borrowed time. As this paper shows, global companies have an opportunity to approach this systemically and strategically, financialize risks and unlock the business opportunities in going truly nature positive."

Morgan Gillespy, Executive Director of the Food and Land Use Coalition (FOLU)

Over the past few years, nature has emerged as a critical industry topic. This is great news given the urgent need to address nature loss and the direct and indirect risks nature loss poses to companies. And yet, with regulation and standards evolving so rapidly, it can be daunting for companies to take on this topic, especially while keeping their focus on climate. This report paints a clear, concise picture of how companies can take on the challenge in a structured, methodical way."

Facundo Etchebehere, Senior Vice-President, Sustainability Strategy & Partnerships, Danone

In the context of climate change already having devastating effects on communities and ecosystems, this paper provides the necessary and comprehensive guidance to address these critical issues and provide a clear roadmap for actionable solutions.

Water, as the lifeblood of global value chains, plays a fundamental role in sustaining our food systems, industrial processes, energy production, and mining and cooling operations. With the world facing a 40% shortfall in freshwater availability by 2030, and the pressing need to safeguard our natural world and biodiversity, the call for urgent action has never been more evident. I am heartened to note that we are actively contributing to this vital cause through our Resilient Water Accelerator, dedicated to catalysing investment in the pursuit of enhanced water security.

Tim Wainwright, Chief Executive, WaterAid UK

EXECUTIVE SUMMARY

The health of our planet is in crisis – global warming, extreme weather events, land degradation, worsening air quality, ocean plastics and the steep decline in species diversity are increasingly widespread and visible. Communities and individuals around the world are affected: the decimation of the Dadia forest in northern Greece in Summer 2023 dealt a severe blow to local agriculture, even as residents of New York struggled to work through smog from Canadian wildfires.

With half of our world economy classed as being moderately or highly dependent on nature, large businesses are also more directly impacted, and worse is to come. This creates risk for business - and it creates opportunities. However, most businesses are not yet taking action commensurate to the risks they face.

This paper argues that, for businesses to act, we need to help them financialise the risk and monetise the opportunities. Even though the topic of nature is complex – it is multi-dimensional, it is location-specific, it is often hidden in supply chains – we believe progressive leaders should start to investigate this topic, to build future resilience and to stay ahead of investors, regulators, and the competition.

"Half of our world economy classed as being moderately or highly dependent on nature."

Guided by emerging frameworks – most notably the TNFD, SBTN and CSRD – we show how companies can, step by step, understand key nature related impacts and dependencies, debate the strategic and financial merits and drawbacks of different types of action, and decide on the path forward.

KEY MESSAGES

1) **The emerging crisis in our natural ecosystems poses direct, near-term risks to the majority of businesses.** Business leaders can no longer afford to treat nature as a side topic, confined to the technical sustainability community.
2) **There are two major categories of risk linked to the topic of nature. Transition risks relate primarily to non-compliance with emerging nature-related regulation and other changes in market demand. Physical risks relate to direct impacts on business of droughts, floods and the broader collapse of ecosystem services.** These risk categories sometimes overlap or interrelate, as we will describe in this paper.
3) **Emerging business frameworks for nature – including SBTN, CSRD and TNFD – are a helpful starting point. However, a robust nature-positive strategy must go beyond the simple implementation of these frameworks.**
4) **Businesses need to find mechanisms to financialise the risks they are likely to experience and monetise the commercial opportunities** that a transition to more nature-positive operation will inevitably create. Alternative strategies must be evaluated in much the same way as any corporate or business unit strategy, using different scenarios to test for risk exposure, opportunity availability, risk tolerance and access to necessary investment.
5) **We describe how a simple step-wise journey can help to understand key nature-related impacts and dependencies,** identify the financial risks and opportunities these create, debate the strategic and financial merits and drawbacks of different scenarios, and decide on the path forward.
6) **The nature topic is not a silo. Climate mitigation solutions can overlap with the management of nature risk and with the delivery of social co-benefits to individual communities in the areas impacted.** The creation of a stackable benefits hierarchy (climate + nature + social) at specific landscape level can crowd in funding from other parties – especially governments and philanthropists – and enable your strategy to deliver material systems change.
7) **Developing a nature-positive strategy requires a whole-business approach with C-level ownership and involvement across the different functions and business units.** A nature-positive strategy goes far beyond CSR or compliance: it requires ownership and steering from key business leaders across procurement, production, operations, innovation, sales & marketing and beyond.

"Business leaders can no longer afford to treat nature as a side topic, confined to the technical sustainability community."

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AUTHORS AND ACKNOWLEDGEMENT

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The Metabolic team of Brian Shaw, Christiaan Popma and Pauline Peek provided data for illustrations in section 2 and section 3, as well as the impact and dependency analyses for the illustrative "happydrink" example in section. We would also like to thank the Metabolic team for their overall input and proposed refinements to the narrative.

1 - INTRODUCTION

Awareness is increasing that nature loss and ecosystem collapse are serious issues that are accelerating in parallel with climate change. Businesses are taking note and are right to do so – the WEF estimates that over 50% of global GDP is highly or moderately dependent on nature.

At the same time, regulators, investors, and consumers are pushing for increased transparency on individual business impacts and dependencies on nature. As part of this broader push, the emerging frameworks of SBTN, TNFD and CSRD have evolved to help guide both disclosure/ reporting and target setting on the topic of "nature", see Figure 1.

As the context changes and evolves, forward thinking business leaders are realising that "Nature Risk is Business Risk". In other words - that managing nature impacts and dependencies is critical for future business viability and strategic advantage. However, nature is complex, and interactions between nature and business can be challenging to identify and manage, especially when companies operate in complex, multi-tiered value chains. The disclosure and target setting frameworks developed above are a very helpful first step in helping companies get to grip with this issue, but companies still need to go beyond information gathering for the purposes of disclosure to defining and implementing a viable nature risk identification and mitigation strategy. Finally, a strategy to manage nature risk, if integrated well with the other significant topics of decarbonisation and social impact that many times have natural overlaps and reinforcing dynamics, can help a company deliver significant systems change.

In this paper we propose an approach for how companies can do this.

[1] New Nature Economy Report (2020), World Economic Forum

Figure 1 - Overview of nature frameworks

ACRONYM	FRAMEWORK OR DIRECTIVE	SPONSORS	OBJECTIVES
TNFD	**Taskforce for Nature-Related Financial Disclosures**	• 40 Taskforce Members representing financial institutions, corporates & market service providers	• Deliver a risk management and disclosure framework for organisations to report and act on evolving nature-related risks and opportunities • Shift global financial flows from nature-negative to nature-positive outcomes • Build on the momentum of Taskforce for Climate-Related Financial Disclosures
SBTN	**Science Based Targets Network**	• 80+ network partners, including leading environmental NGOs, service providers, and institutions, hosted by the Global Common Alliance	• Deliver methods for companies to set integrated targets across all Earth systems (water, land, biodiversity, ocean) • Build on the momentum of science-based targets (SBTs) for climate
SBTi FLAG	**Science Based Targets Initiative – Forest, Land and Agricultural Emissions**	• Partnership between CDP, the United Nations Global Compact, World Resources Institute (WRI) and the World Wide Fund for Nature (WWF)	• Define and promote science-based approaches for companies to set emission reduction and net-zero targets in line with Paris Agreement's goal to limit global warming to 1.5°C • Focus of SBTi FLAG standard on companies in land-intensive sectors to set science-based targets that include land-based emissions reductions and removals.
GBF	**Kunming-Montreal Global Biodiversity Framework**	• Convention on Biological Diversity (CBD); Signed by almost 200 countries globally	• Set an ambitious pathway to reach a vision of the world living in harmony with nature via four goals for 2050 and 23 targets for 2030 (non-binding)
CSRD	**Corporate Sustainability Reporting Directive**	• European Union	• Set requirements for companies based in the EU (or with significant business in the EU) to disclose information on risks and opportunities related to their ESG practices • Strengthen legacy ESG reporting programs in the EU
ESRS	**European Sustainability Reporting Standards**	• European Union	• Define the technical rules on what and how to disclose for CSRD; includes topical standards related to nature (e.g., pollution, water, and biodiversity)
SFRD	**Sustainable Finance Reporting Directive**	• European Union	• Provide a comprehensive standard for financial market participants to disclose sustainability information • Allow stakeholders to properly assess how sustainability risks are integrated in the investment decision process
EUDR	**EU deforestation regulation**	• European Union	• Provides guidance for due diligence of large & listed companies preventing deforestation from 7 key commodities (soy, cattle, palm oil, timber, cocoa, coffee and rubber) entering the EU or being exported from the EU
CSDD	**Corporate sustainability due diligence**	• European Union	• Provides guidance for due diligence of large & listed companies to identify & mitigate the impacts of companies' activities on the environment & human rights

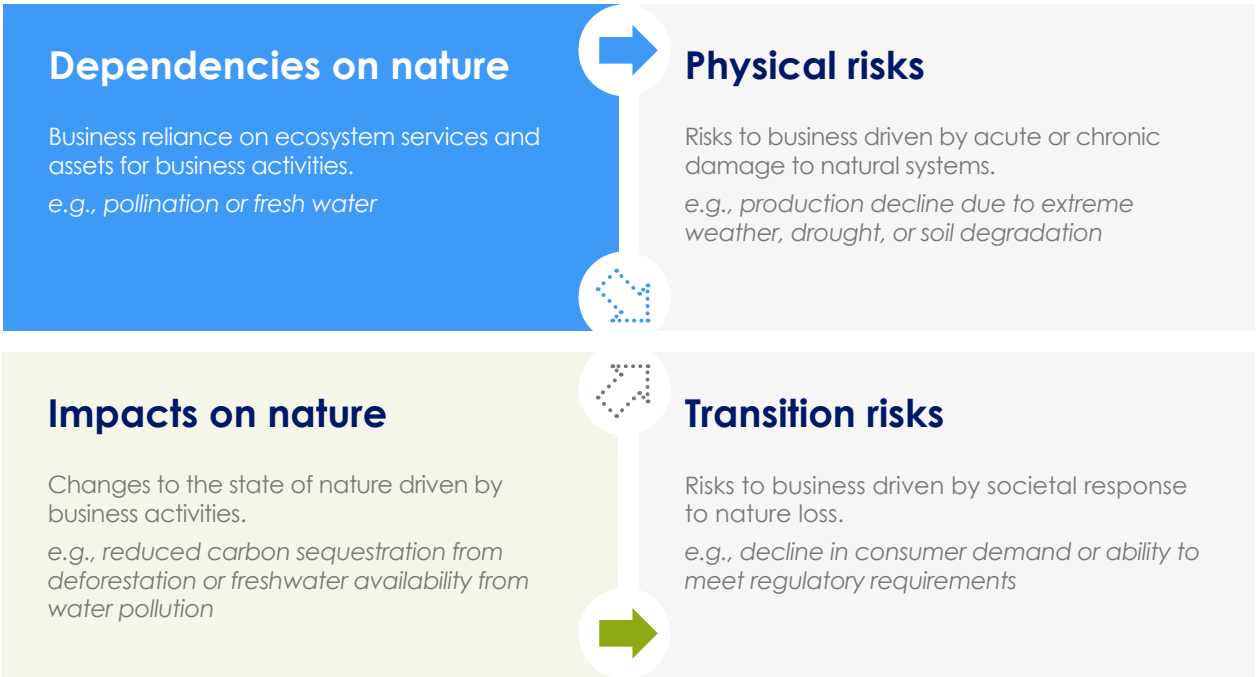
2 - WHY NATURE RISK IS BUSINESS RISK

First, a word on definitions. In this paper, we use two related but distinct concepts to understand and describe nature risk: business 'dependencies' on nature, and business 'impacts' on nature:

- A business has **dependencies** on nature when it requires a set of ecosystem services to function effectively – this can be anything from the pollination from bees for almond production, to the availability of fresh water for cotton production or the presence of pristine nature in tourist destinations. If nature fails to provide certain services, a business can encounter material continuity or viability risk – so called nature-related **physical risks**. These can be either acute (e.g., wildfires) or chronic (e.g., desertification). Some of these nature-related physical risks are, of course, directly caused by climate change.
- A business **impacts** nature when it effects changes to the state of nature and to its ability to provide services for people, be they economic, social, cultural or otherwise. Examples include mining-related deforestation, consumption of fresh water for crop production, or loss in ocean biodiversity from plastic pollution. Increasingly, governments, corporates, financial institutions and consumers demand that businesses reduce their impacts on nature – be it through legislation, adjustments in cost of capital, or changes to offtaking or purchasing requirements. If a business fails to manage these risks, it can face regulatory, legal, financial and reputational risks – so-called nature-related **transition risks**.

The relationship between dependencies and physical risk on the one hand, and impacts and transition risk on the other, is not always as simple as the definitions above. For example, an overuse of pesticides by a business can lead to both transition risk if it falls foul of regulation, and physical risk if it destroys local pollinator populations on which the business depends.

Figure 2 - Nature Impacts and Dependencies, and their Relationship to Physical and Transition Risk



Many businesses discover the connection between nature and business risk when challenging events occur. We illustrate a number of examples from our work below[2]:

Example 1 - Food

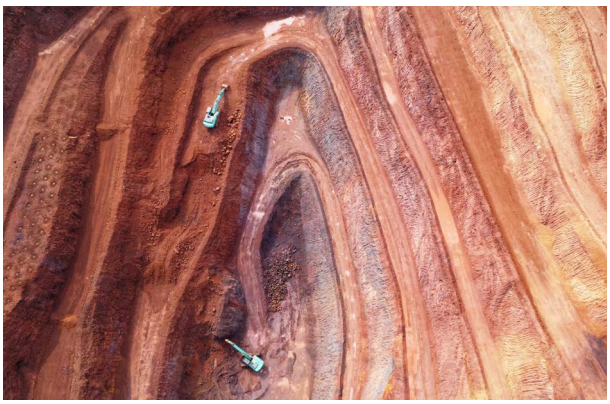
A global food company has a large production footprint in India and US. The combination of soil erosion, land degradation and the escalating frequency of droughts and extreme weather events has severely impacted natural resources in these regions. The interplay between these three factors results in a 15% decrease in agricultural yields, a 5% fall in price for affected products (as the quality of the crops has gone down), and a 20% decrease in annual revenue.

Example 2 - Fashion

A company with a large textile production footprint in India is impacted by widespread pest of pink bollworm, that damaged one-third of cotton production in India's Punjab. The intensity of pest attack is increasing, driven by heavy rains and increased moisture. This has led to cascading effects, where the company cannot meet its required offtake agreement to a fabric manufacturer, who in turn cannot meet its necessary quota for a prominent fashion brand. This has put the company's reputation on the line, and the longstanding offtake agreement has been discontinued.

Example 3 - Mining

A copper mining company in Chile has been dealing with multiple consecutive years of drought, clashing with the company's high-water demand for mining. The situation has led to production constraints, resulting in a 49.7k tonnes reduction in copper output and a 478M EUR revenue decrease, compared to the previous year. Moreover, the company faces reputational risks due to disturbance in a vital biodiversity hotspot.



[2] Examples are disguised but inspired by real-life examples and data points.

Figure 3 - Summary table of examples of Nature Dependencies & Impacts and their related risks

	IMPACTS AND DEPENDENCIES ON NATURE		RISKS (PHYSICAL AND TRANSITION)
1 (FOOD)	**Dependencies**	• Soil health • Freshwater supply • Predictable weather patterns	• Decline in production volume from soil erosion, drought, and extreme weather; 20% reduction of revenues • Increased costs of production from regulations on pesticides and fertilizer • Reduced demand from off-takers
	Impacts	• Degradation of soil health and land intactness • Reduction in availability of clean water	
2 (FASHION)	**Dependencies**	• Control of pests • Soil health • Freshwater supply • Predictable weather patterns	• Decline in production volume from increase in pests, driving discontinuation and putting future of company at risk • Lower production at higher costs from increased restrictions on use of freshwater • Increased costs of production from increased scrutiny on pesticides and fertilizer
	Impacts	• Reduction in availability of clean water • Degradation of soil health	
3 (MINING)	**Dependencies**	• Freshwater supply	• Decline in production volume from droughts, leading to revenue loss • Decline in volume due to regulatory restrictions on permissible mining activities • Reduced demand from off-takers
	Impacts	• Disturbance of vital biodiversity hotspot	

3 - DOES YOUR COMPANY FACE NATURE-RELATED RISKS?

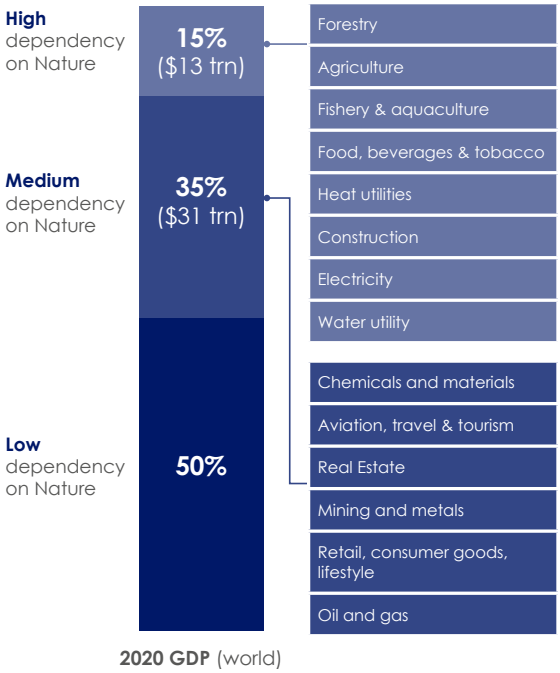
Not every sector is equally dependent on nature, not every region faces the same nature risks, and not every type of impact or dependency translates to the same magnitude of business risk for individual businesses. We offer a brief overview of which sectors and regions globally tend to be most affected by nature-related risk, and why these dynamics exist.

Question 1: Which sectors and regions are most dependent on nature and therefore face significant physical risks?

The World Economic Forum has estimated that approximately 50% of world GDP is generated by sectors with a high or medium dependency on nature – these sectors include traditional land or ocean-based economic sectors such as forestry, agriculture, fisheries and aquaculture, but also utilities and processing sectors, such as the food and beverage sector, that rely on land and ocean assets in certain parts of their supply chain. Dependencies on nature can either be in direct operations or in supply chains, the latter implying that dependencies can trickle down across sectors. An example is the electronics sector: the direct operations have limited dependency on nature, but as metals and mining are part of the value chain and highly dependent on local water supplies, their supply chain dependency is considerable.

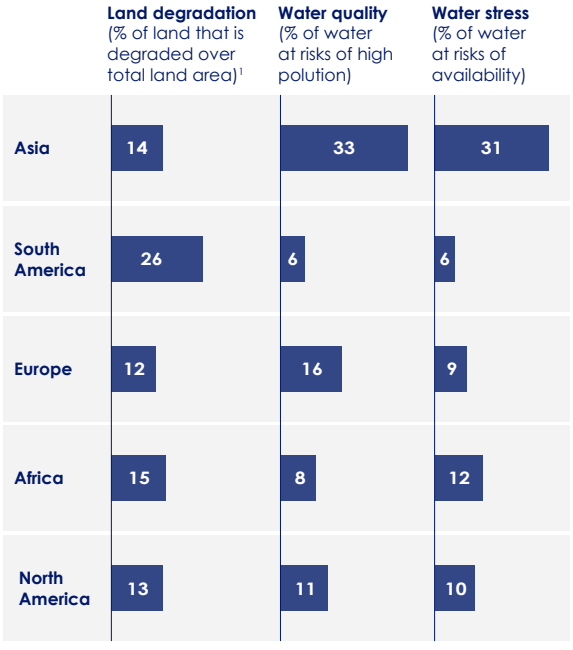
Nature dependencies are also unevenly spread geographically, due to specific environmental dynamics encountered in certain regions of the world. This also implies that companies which depend on the highest-risk regions – be it for their upstream supply, their direct operations or the downstream use of products – will be most exposed.

Figure 4 - Extent of Individual Sector Dependency on Nature



Source: World Economic Forum 'New Nature Economy Report' 2020

Figure 5 - Geography-specific Land and Water Related Risk Dynamics



Source: Trends.earth; WWF water risk filter – water quality, calculated as percentage of scores 4 and 5 for each continent; WRI Aqueduct 3.0 Baseline Water Stress, calculated as percentage of scores between 3 and 5 for each continent

Question 2: Which sectors create the most significant impacts on nature? Which regions have the most advanced regulatory frameworks?

There are numerous approaches to categorizing societal impacts on nature. The Stockholm Resilience Centre's nine planetary boundaries (recently redefined and renamed the 'Safe and Just Earth boundaries')[3] and IPBES's five key pressures on the state of nature are the most well known[4]. While the exact sectorial contribution to the state of nature varies by the dimension and metric being considered, some sectors play an outsized role. For example, the agriculture sector relies heavily on land and water use and thus is a leading contributor to biodiversity loss, forest cover loss, freshwater consumption and nutrient pollution. Meanwhile, the retail, food and FMCG sectors play a leading role in chemical and plastics pollution due to production and packaging.

As an illustration, we summarise in Figure 6 the types of economic sector that have the most significant impacts on nature across the dimensions of:

- land-use,
- blue water consumption,
- nitrogen pollution/eutrophication of water, and
- phosphorous pollution/eutrophication of water

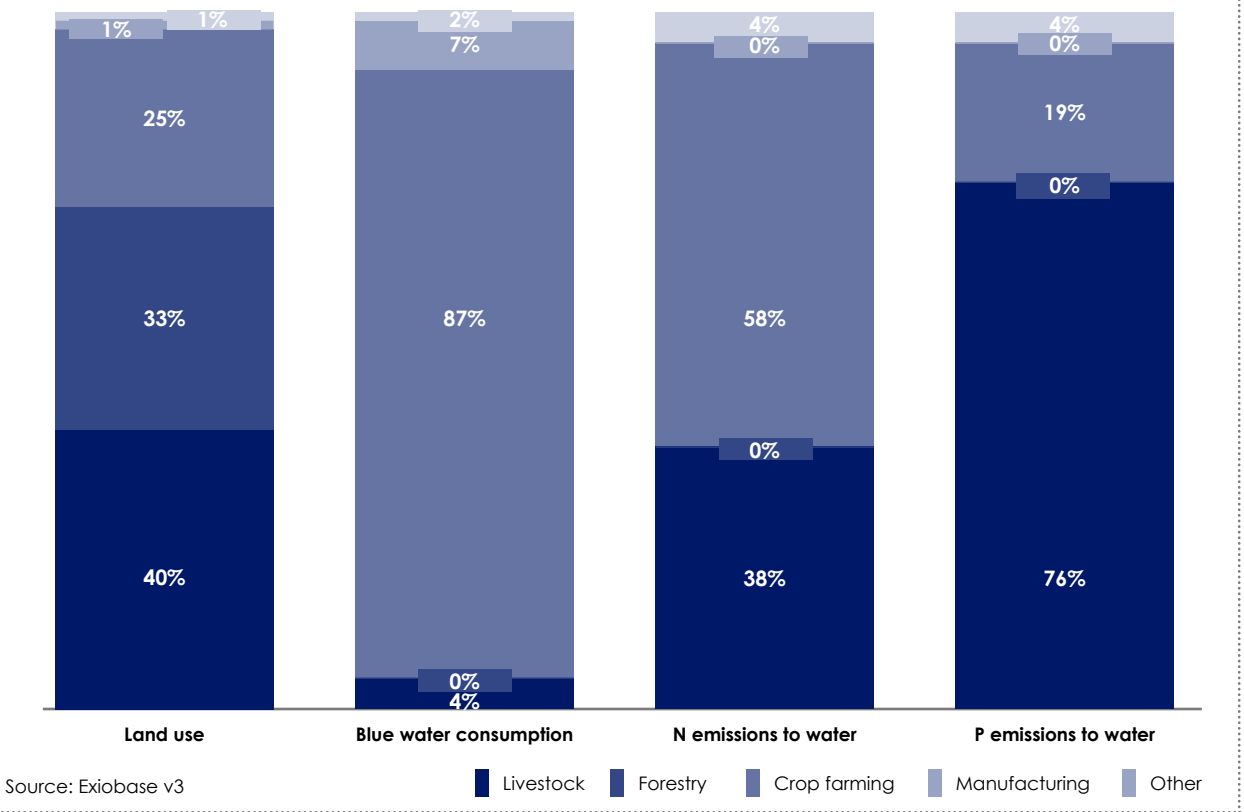
"Agriculture sector relies heavily on land and water use and thus is a leading contributor to biodiversity loss."

The extent of transition risk for an individual business will also depend on the level of scrutiny and action from market actors, such as regulators, investors and consumers. Across the globe, we find that nature is moving higher on the agenda for market actors. Most notably, the 2022 Global Biodiversity Framework (the "Paris Agreement for nature") is setting the overarching framework for countries and businesses on how to increase conservation of nature and reduce nature loss. On the regulatory side, some geographies are more advanced when it comes to implementation than others – the Green Deal from the EU can be considered the leading regulatory framework to help businesses reduce impacts on nature. Other geographies are expected to follow. Figure 7 provides a high-level overview of the state of regulation across key geographies. Businesses operating in these geographies – either in terms of production or in terms of value chain activity - are hence more exposed to these transition risks stemming from regulation.

[3] https://www.stockholmresilience.org/research/planetary-boundaries.html (2009) and https://www.nature.com/articles/s41586-023-06083-8 (2023); within SBTN work is underway to translate these to local ecological thresholds

[4] https://www.ipbes.net/global-assessment (2019); the five key pressures identified are land and sea use, resource exploitation, climate change, pollution, and invasion of alien species

Figure 6 - Sector distribution of key nature impact categories



Source: Exiobase v3

Figure 7 - Extent of regulatory scrutiny by geography

Europe	**High** • Large set of specific nature-related directives and legislation (e.g., habitat conservation, air and water quality, waste management, fertilizer inputs) • Legislation impacts operations within Europe (e.g., fertilizer and pesticide use) as well as outside Europe (e.g., deforestation laws) • Increased scrutiny on disclosing company impacts and activities in line with CSRD, SFRD, and EU Taxonomy
North America	**Medium** • IRA increasingly focusing on ag-inputs and practices • Nature topics typically more bipartisan than climate topics • Key nature-related legislation in US: Endangered Species Act (1973), Clean Water Act (1972), Clean Air Act (1963)
South America	**Medium** • Export-focused countries like Brazil adjust regulation to demands from EU and US to ensure international competitiveness • Numerous environmental protection laws in place across countries (e.g., Brazil Forest Code, Colombia Environmental National System) • Costa Rica often cited as global leader in nature conservation management
Asia	**Low-Medium** • Large variation across countries; leaders in legislation include Japan, South Korea, Singapore, and Bhutan • China actively managing its natural resources and setting regulation accordingly for within-country operations
Africa	**Low** • Large variations across countries but many have wildlife conservation and forest acts in place (e.g., Kenya, South Africa, Tanzania)

No company or sector is immune from nature risks, but some sectors, regions and hence companies are much more exposed than others. Proper risk mapping that accounts for regional/local differences and that is supported by granular data can help companies to identify risk exposure and support the development of nature-positive strategies.

4 - MOVING BEYOND REPORTING COMPLIANCE

As business impacts and dependencies on nature become clearer, businesses are increasingly called to report and act on the resulting risks. As seen in Figure 1, there are frameworks, guidelines and directives emerging to help businesses disclose these risks and set nature-related targets, in particular the TNFD risk disclosure framework, the SBTN target setting framework, and the CSRD environmental and social reporting disclosure framework. The core of these frameworks focuses on compliance and disclosure, and these frameworks are greatly useful to businesses in the data-gathering and structuring phase of their work. Systemiq has been closely involved in helping to shape these frameworks.

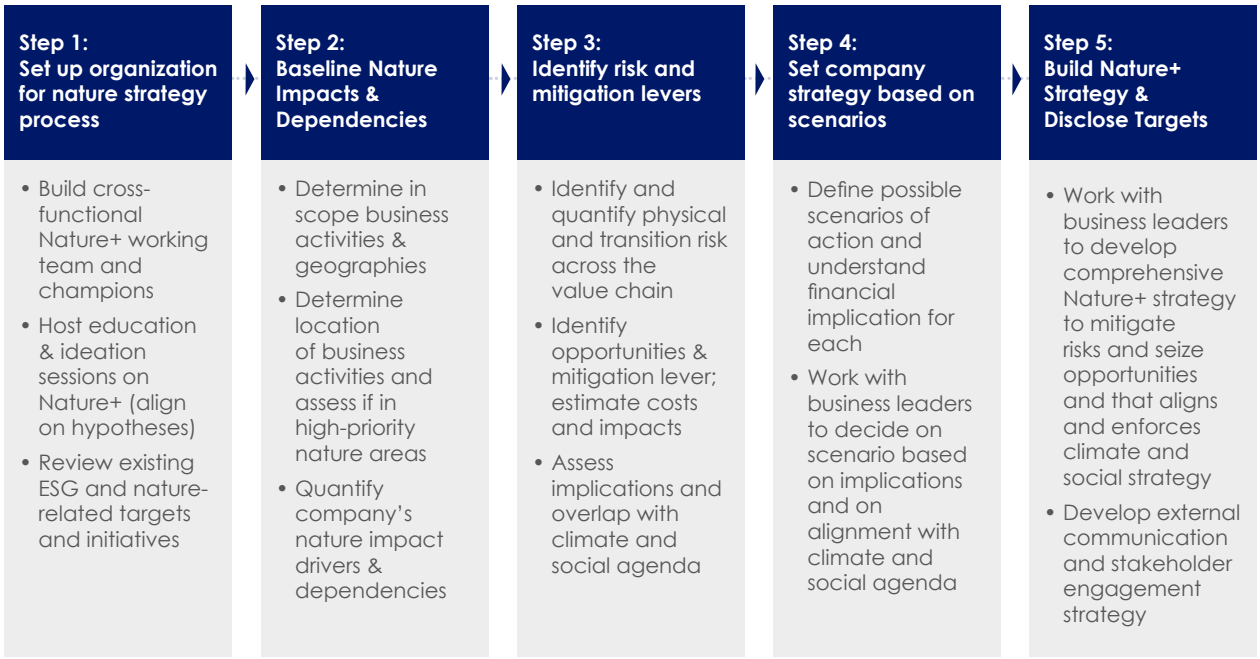
In the remainder of this paper, we propose an approach that uses these frameworks as a starting point, but also enables businesses to connect the 'nature' topic with conversations on core strategy, risk management and financial performance. Our experience suggests this is often the only way to ensure the topic gets the attention it deserves. It is our hope that these recommendations can help companies both to future-proof against physical and transition risks, and to seize new opportunities related to nature.

More specifically, we propose that businesses follow a five-step approach to nature-related business risks (see Figure 8). The approach ensures accurate measurement of all relevant risks (guided by the TNFD framework) and supports the initial scoping for target setting (as described by the SBTN guidance).

We believe that eventually business will need to integrate Nature+ strategies with their net-zero and social strategies to identify overlap and trade-offs; the approach below starts with a nature-specific assessments of impact, dependencies, risks and opportunities, followed by a further integration of the outcomes into the (existing) climate and social strategies.

"We propose that businesses follow a five-step approach to nature-related business risks."

Figure 8 - Proposed approach



5 - HOW BUSINESSES CAN MAKE PROGRESS – HOW THIS CAN WORK IN PRACTICE

The section below describes each of the steps in more detail. For each step, we illustrate what this implies for an illustrative example we call "happydrink" - a beverage company.

Step 1 - Education and Stock Taking to Prepare the Organisation for the Strategy Journey.

It is important to ensure there is a good understanding in the business and with key internal stakeholders on why nature risk is business risk. Time should be spent with non-technical stakeholders outside the sustainability team (in operations, finance, procurement, sales, etc) communicating the core concepts and the business-wide rationale for focus on this issue.

This step can also be used to surface early management team hypotheses on key dependencies and key impacts that the company will need to measure and manage. Developing an overview of existing net-zero, social and nature-related strategies and initiatives will help in later steps to understand implications and evaluate different strategic options.

At the conclusion of this exercise, a cross-functional Nature Positive Strategy team should be formed to serve as a framing and steering group for the rest of the investigation and development of a Nature Positive strategy.

Step 2 - Understand Your Nature Baseline and Assess Location-Specific Risks.

The second step involves the creation of a quantified baseline of nature impacts and dependencies. In general, most companies at an early stage of development of this topic use expert nature data baselining companies. We asked Metabolic, our co-authors, to contribute to this step. A typical sequence of activities is:

A. **Determine the business activities in scope.** Decide which business activities are within scope – typically this covers the entire value chain, including upstream, direct operations, and downstream activities[5]. Then, decide what the 'unit of investigation' will be – for example, does the company want to understand nature impacts and dependencies at the level of product categories, business units, etc.

B. **Determine locations of business activities and assess whether they are high priority in terms of the existing state of nature.** For each of the business activities in scope, identify the specific location of the activity. Typically, this is relatively easy for direct operations but can be more complex for upstream or downstream activities (e.g., sourcing of raw materials via untransparent value chains). As needed, use secondary data to develop estimations of locations, e.g., based on typical production regions for specific products, or trade-based modelling of sourcing countries. A first scan of locations in high-priority areas for specific nature impacts can help to develop early hypotheses on location/activities most at risk[6].

C. **Quantify the company's impacts and dependencies on nature:** Following the distinction between impacts and dependencies in section 2 above, the company will then need to quantify both its impacts on nature and dependencies on nature for each of its business activities.

EXAMPLE - BEVERAGE COMPANY 'HAPPYDRINK'

We illustrate how this might work in practice, leveraging tools and methodologies from Metabolic. The business activities in scope are upstream sourcing of raw materials – barley, hops and yeast; their direct operations; and the downstream sales and use of their products.

The production locations for hops and yeast used by happydrink are in Germany, Ethiopia and China, the latter two being high-priority areas given the high levels of water stress and due to the existence of key biodiversity locations at the sourcing areas. The barley is sourced from a trader. The trader states that half of its barley comes from specific states within the United States (Idaho and Montana), with limited visibility on the origin of the other half. Hence, secondary data on typical barley production locations and trading data is used to develop a picture of most likely sourcing locations.

For each of the activities, the nature-related impact, dependencies and risks can be quantified based on company-specific data (e.g., in terms of sourcing volumes), and on aggregated public data that Metabolic has sourced and codified (e.g., average land use for barley cultivation in Ethiopia). Figure 9 illustrates some relevant outputs of this analysis.

On the basis of this analysis, it becomes clear that the biggest nature-related impacts come from barley procurement and from the operations; the largest physical risks are related to water pollution and land degradation. A further deep dive in the specific locations will help to further prioritize physical risks, as well as to analyse transition risks. The outcomes of this step will also help to prepare for SBTN target setting and CSRD reporting.

[5] In case the company has set SBTi targets, we recommend using the scoping from the SBTi analyses where possible.

[6] The TNFD list of high-priority areas can be used, including areas with a high-integrity ecosystem, with rapid decline in ecosystem integrity and with water stress.

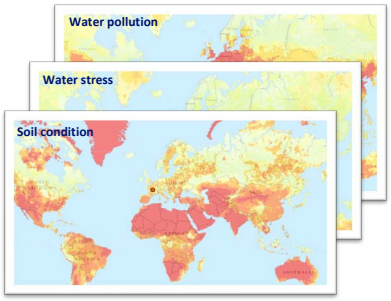
Figure 9 - Impact & Dependencies Assessment for happydrink

			Impact drivers					
Value Chain Step	Category	Quantity	Land Use (Ha)	Land Use Change (Ha)	Soil Pollution (KG SO2-EQ)	Freshwater Use (mln L)	Water pollution (KG P-EQ)	Solid waste (mln kg)
Upstream	Barley	38 mln kg	6,860	0.06	191,823	6,636	4,787	n/a
	Hops	0.3 mln kg	149	0.00	251	12	81	n/a
	Yeast	0.066 mln kg	0	0.00	0	4	0	n/a
Operations	Facility 1	80 mln liter	22	0.00	23,077	260	8,203	n/a
	Facility 2	70 mln liter	20	0.00	20,192	228	7,177	n/a
	Bottling	150 mln liter	35	0.00	5,511	206	923	n/a
Downstream	Brand 1	30 mln liter	10	0.00	0	20	9	2.7
	Brand 2	80 mln liter	15	0.00	0	54	24	7.2
	Brand 3	40 mln liter	12	0.00	0	27	12	3.6

Dependencies (5 = very high dependency, 1 = very low dependency)			
Water Availability	Soil condition	Water condition	Extreme weather (land-slides, heat waves, fire)
5.00	4.00	3.00	4.00
4.00	5.00	4.00	5.00
5.00	5.00	3.00	4.00
4.00	1.00	5.00	2.00
4.00	1.00	5.00	2.00
4.00	1.00	5.00	2.00
3.00	1.00	3.00	1.00
3.00	1.00	3.00	1.00
3.00	1.00	3.00	1.00

* Downstream includes end of life – recycling and waste

		Location-based risks averages (5 = very high risk, 1 = very low risk)						
Value Chain Step	Category	Water Stress Risk	Water Pollution Risk	Deforestation	Terrestrial Acidification	Land Degradation	Land slides	Wildfires
Upstream	Barley	3.00	4.00	4.00	4.00	5.00	2.00	3.00
	Hops	4.00	4.00	3.00	3.00	4.00	2.00	3.00
	Yeast	3.00	5.00	2.00	5.00	4.00	5.00	3.00
Operations	Facility 1	1.00	2.00	1.00	1.00	1.00	1.00	2.00
	Facility 2	1.00	5.00	1.00	1.00	1.00	3.00	1.00
	Bottling	3.00	5.00	1.00	1.00	1.00	1.00	1.00
Downstream	Brand 1	1.00	3.00	1.00	1.00	1.00	1.00	2.00
	Brand 2	1.00	2.00	1.00	2.00	1.00	3.00	1.00
	Brand 3	2.00	4.00	1.00	1.00	1.00	1.00	1.00



Step 3 - Quantify and Prioritise Risks, Understand Mitigation Levers & Opportunities

The baselining analysis is a great basis from which to do some smart financial quantification and prioritisation of key physical and transition risks that each company should focus on managing. Most companies will face both physical risks to their business activities, as well as transition risks from changes to regulation, changing demand from offtakers, and so on. Action to mitigate these risks can then be matched as well as related ideas on how risk mitigation can also be leveraged to create commercial opportunities (e.g., via the marketing of nature positive products, for example). Some of these opportunities will overlap with climate mitigation measures and could also create social co-benefits. Identifying these early on will help to develop effective strategies that enable rapid progression concurrently on nature, climate, and social agendas. The intention of this step is not to simply identify opportunities for risk mitigation and commercial upside, but to also quantify and financialise the discussion on nature so as to help businesses understand nature using a language they know. The quantification of physical risks will be based on most advanced insights from climate and nature science. The quantification of transition risks will be based on deep expert insights on how the future might evolve. We bring these ideas to life through the continuation of our happydrink example below.

EXAMPLE - BEVERAGE COMPANY 'HAPPYDRINK'

See Figure 10 on the next page for an illustrative risk and opportunity assessment for 'happydrink'.

As expected, one of the biggest risks is an increase in costs of raw materials, driven by water scarcity and land degradation, especially in drought years. Most recent scientific insights show that across their raw materials and the different sourcing locations, the average annual risk of this occurrence is 20% (average occurrence of once every five years), and the expected impact on profits if these effects occur is estimated to be 107M EUR. New regulation, especially in the EU, on use of fertilizers and pesticides will likely also impact costs of raw materials. Based on current dynamics within the EU Commission, experts estimate a 60% likelihood that this will indeed happen over next years, in which case profits will be negatively impacted by 43M EUR.

To compare and combine the different types of risk, we express all risks as the average profit impacted per year – so, if there is a risk of losing 100M EUR once every five years, the average annual profit impact is 20M EUR. The fourth column in Figure 10 shows that the estimated total average impact on profits per year of all physical and transition risks combined is approximately 63M EUR, reducing profits by as much as 25% on average. Depending on the risk appetite and risk savviness of investors, at some point we anticipate the capital markets will also lower the valuation of the company, based on these type of risk profiles and margin impacts.

On the flip side, we find a plethora of opportunities to mitigate risks and create additional value for the company – for supply chains, this typically means working with suppliers/producers of raw materials to increase resilience to physical risks and reduce negative environmental impacts, for example, by the use of precision agriculture and / or via the deployment of regenerative agriculture interventions. On top of this, new 'Nature+' products can be developed that are less dependent on risky ingredients and that can be produced while benefiting nature; these can be marketed at a premium to nature-conscious buyers (e.g., nature-positive beverage products, building a regenerative barley story into the fabric of happydrink consumer brands).

Many of the identified opportunities have large climate or social impact as well. For instance, working with suppliers towards regenerative agriculture will make soils much more resilient to physical risks, reduce carbon emissions from production and enhance the likelihood of stable incomes and access to resources such as fresh water for local communities. Doing so at a landscape level creates 'stackable' nature, climate and social benefits, and could open up either carbon-credit sales opportunities or grant funding. Similarly, sourcing 'nature+' packaging materials also offers an opportunity to source products with a lower carbon footprint.

The outcome of this step should provide business leaders with a good overview of the relevance of nature-related risks for their bottom line, and of the types of opportunity to mitigate these risks and create additional company value.

Figure 10 - Risk & Opportunities Assessment for happydrink

VALUE CHAIN ACTIVITY	RISKS		
	Risks to the business	**Likelihood and impact of risk occurring**	**Average annual profit impact (est.)***
			• **Today's profit margin: 240 M EUR**
Upstream – Barley, Hops & Yeast	• Physical: Volatile supplies (volume, costs) from land degradation and water stress	• Half of sourcing volume at high risk of severe yield drops • 20% cost increase for volume at risk • Total costs increase of 107 M EUR if risk materializes • Likelihood est. once every 5 years	• 21M EUR/year
	• Transition: Regulation changes impacting fertilizer and pesticide use during production	• Half of sourcing volume at high risks of more stringent regulation • 8% costs increase for volume at risk • Total costs increase of 43 M EUR if risk materializes • 60% chance this will happen	• 26M EUR/year
Direct Operations (across sites)	• Transition: increased regulatory scrutiny on soil/ water pollution & waste	• High risks of more stringent regulation for half of production • 5% increase in operational costs • Total costs increase of 10 M EUR if risk materializes • 60% chance this will happen	• 6M EUR/year
Downstream – Products	• Transition: increased consumer demand for nature+ production	• 2% of sales at risk from conscious buyers moving • Total lost margin of 20 M EUR if risk materializes • 50% likelihood that this will happen	• 10M EUR/year

Cost of inaction: ~63M EUR profit impact per year (-1/4th of company profit)

VALUE CHAIN ACTIVITY	OPPORTUNITIES			
	Associated risk mitigation opportunities	**Financial impact (est)**	**Additional revenue upside opportunities**	**Financial impact (est)**
Upstream – Barley, Hops & Yeast	• Develop Nature+ supplier base through partnerships & offtake agreements ★	• Upfront investment: 30M EUR (spread over 3 years) • No impact on costs	• Work with supplier base in monetizing Nature+ outcomes via e.g., carbon/biodiversity/ nature credits/in-value chain insets/grants ★	• Upfront investment: 30M EUR • Annual revenues: 15M EUR
	• Shift sourcing towards less risky locations*	• No upfront investment • Annual costs increase: 10M EUR		
	• Develop Nature+ supplier base that meets fertilizer/ pesticide regulations ★	• Upfront investment: 25M EUR (spread over 3 years) • Annual costs increase: 2M EUR		
	• Publish Nature+ strategy to access lower cost of capital	• No investment • Reduction in annual capital cost of 20M EUR		
Direct Operations (across sites)	• Implement new pollution and waste management technology	• Upfront investment: 50M EUR	• Waste-valorisation and re-use	• Upfront investment: 30M EUR • Annual revenues: 10M EUR
Downstream – Products	• Market products as Nature+ products (e.g., made from Nature+ ingredients) ★	• No net impact (marketing costs equal gain in revenues)	• Develop new Nature+ products with ingredients with lower footprint ★	• Upfront investment: 60M EUR • Net annual profit impact: 20M EUR
	• Source new Nature+ packaging (e.g., recycled & circular materials) ★	• Annual costs increase: 15M EUR		

★ Potential overlap with climate and social opportunities

Step 4 - Explore Strategic and Financial Implications of Different Levels of Ambition

In our work with corporates on their net-zero journeys, we have learned that the development of financially modelled scenarios that represent different levels of ambition can be a helpful tool in taking the insight garnered from the previous steps and turning that into senior executive commitment to an integrated strategy.

The same type of thinking applies to the nature space: 3 to 4 distinct but coherent scenarios should be constructed at this stage of the work. The key here lies in teasing out integrated scenarios that represent different levels of risk tolerance, ambition, and level of upfront investment required, as well as alignment and potential acceleration of the net-zero (and social) strategies, while then facilitating a set of executive-level discussions about trade-offs and company risk tolerance set against its ambition to lead in the nature space. We illustrate what we mean in the continuation of the happydrink example below:

EXAMPLE - BEVERAGE COMPANY 'HAPPYDRINK'

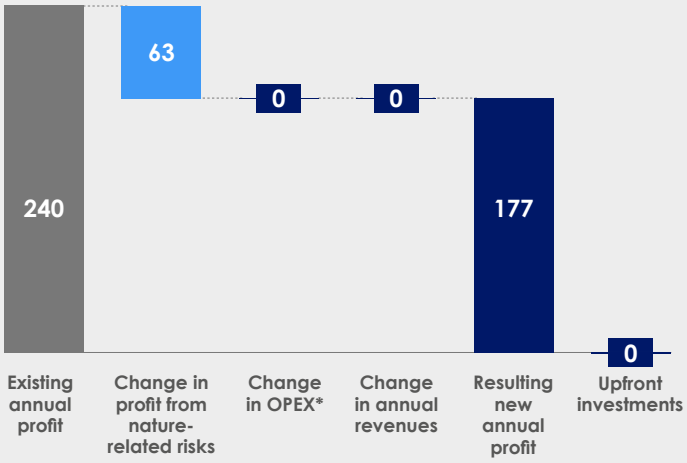
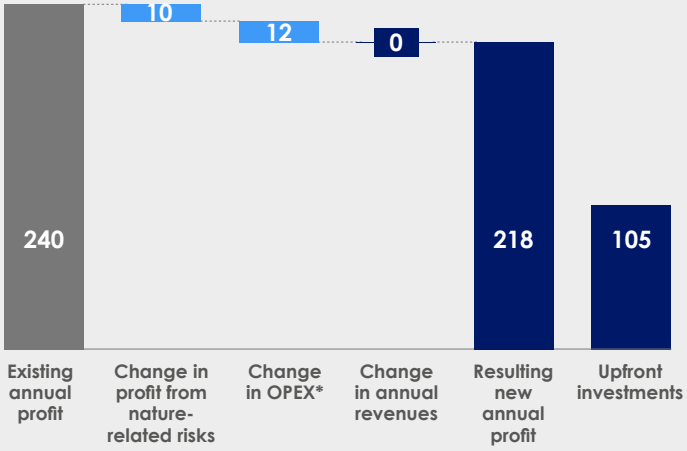
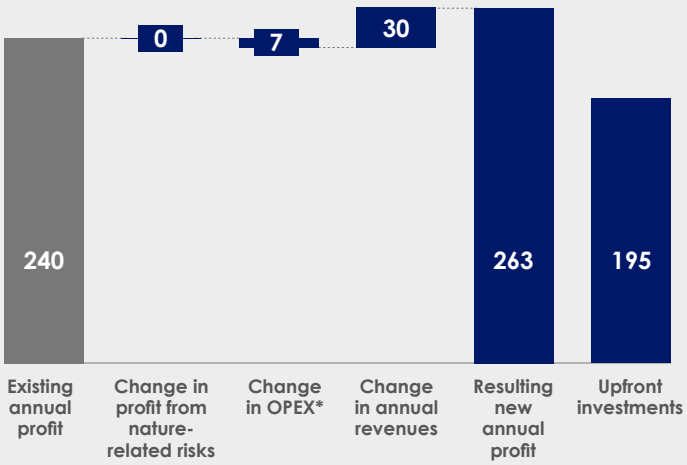
Happydrink considers three scenarios: *A. comply and wait, B. mitigate major risks in supply chains and operations and C. push on Nature+ industry leadership* (see Figure 11).

- **In scenario A**, none of the nature-related risks are mitigated, implying that the company makes the decision to "take the risk" that the potential physical and transition-related risks do not materialise.
- **In Scenario B**, the largest and most likely risks in supply chains and operations are mitigated, requiring significant upfront investment (105M EUR) but creating a situation where the estimated average losses from nature-related impacts and dependencies are reduced to 10M EUR per year (from 63M EUR).
- **In Scenario C**, all risks are mitigated and the company seeks to unlock additional value from a Nature+ strategy, in terms of:
  - new product offerings,
  - supporting suppliers to monetize positive carbon and nature outcomes, and finally,
  - integrating its nature-positive leadership story and using it as a wedge for reduced costs of capital/improved valuation multiples.

This strategy requires larger upfront investments (in the order of 195M EUR), but it eradicates all identified downside risks to margins, unlocks additional revenue flows and increases company value. Moreover, some of the implementation levers are already partly on the net-zero roadmap – especially in terms of sourcing of raw materials and packaging. Adding the nature aspect will further sharpen which solutions qualify and how to implement them, and can help to further accelerate the net-zero roadmap.

The optimal choice between these scenarios will depend on several factors: ambition level; the time horizon the business is really focused on; leadership alignment on how the future will evolve; funds available to invest; risk appetite; and alignment with (existing) climate and social strategies. In any scenario, it will be helpful to apply an ongoing review of how the risks evolve - especially as climate and nature risk manifestation accelerates, and as market actors continue to increase their expectations of businesses' action on nature.

Figure 11 - Illustrative scenarios and financial implications for happydrink

Scenario	Key implementation levers	Financial implications, MEUR
A. Comply and wait – Regulatory compliance	• No investments in risk mitigation • Publish CSRD reports and other mandatory reporting • Monitor evolution of risks; have plan in place to ensure rapid action in case risks materialize	
B. Mitigate supply and production risks – Invest to mitigate core physical and regulatory risks wrt supply and production	• Change sourcing strategy to mitigate physical risks and regulatory risks – work with supplier base and adjust sourcing locations • Implement new waste management technologies • Publish CSRD reports and other mandatory reporting; emphasize risk mitigation levers	
C. Nature+ industry leadership – Develop Nature+ products, create insights to other market actors while creating new company value and investing to mitigating physical and transition risks	• Change sourcing strategy to mitigate physical risks and regulatory risks – work with supplier base and adjust sourcing locations • Implement new waste management technologies • Work with supplier base to monetize Nature+ outcomes beyond sales of commodities, e.g., via carbon+biodiversity credits • Publish Nature+ risk mitigation strategy to reduce costs of capital • Innovate in Nature+ products and marketing to help shape market • Publish CSRD reports and other mandatory reporting; Set and share SBTN/TNFD targets and disclosure	

Step 5 - Align on Preferred Pathway + Share and Communicate Targets and Roadmap

Once alignment on a leading scenario and its implications is achieved, companies then essentially need to develop an operational delivery roadmap that is owned by senior leadership, like they would need to do for any other major cross-functional strategic or change related exercise. Given the type of implementation levers, typically this evolves cross-value chain and cross-industry collaboration. To the extent possible, the Nature Roadmap should be integrated with the Net Zero Roadmap. If companies are listed and keen to communicate their decisions externally, they of course also have the option of disclosing the elements of their nature strategy in more detail to the outside world. Many companies have done this in the net zero space as a way of bringing transparency and building investor confidence on the viability of their plans. We illustrate what an operational roadmap for our happy drink example could look like below.

EXAMPLE - BEVERAGE COMPANY 'HAPPYDRINK'

The board of 'happydrink' chooses Scenario C. *Nature+ Industry Leadership*. Figure 12 shows an illustrative roadmap for 'happydrink' how to implement this over the coming years.

Beyond alignment and monitoring progress of the strategy, this roadmap identifies actions for procurement, for direct operations and innovation and for the marketing and sales teams; some of these can be integrated with existing net-zero activities. A few of the actions require cross-value-chain collaborations, especially with respect to engaging with suppliers towards farming practices that reduce nature-related risks and enhance resilience, but also for e.g., ensuring that waste can be optimally monetised. It incorporates their external communication strategy, including a Nature+ positioning paper, SBTN target setting and TNFD reporting. They also plan for team and budget required towards implementing the strategy.

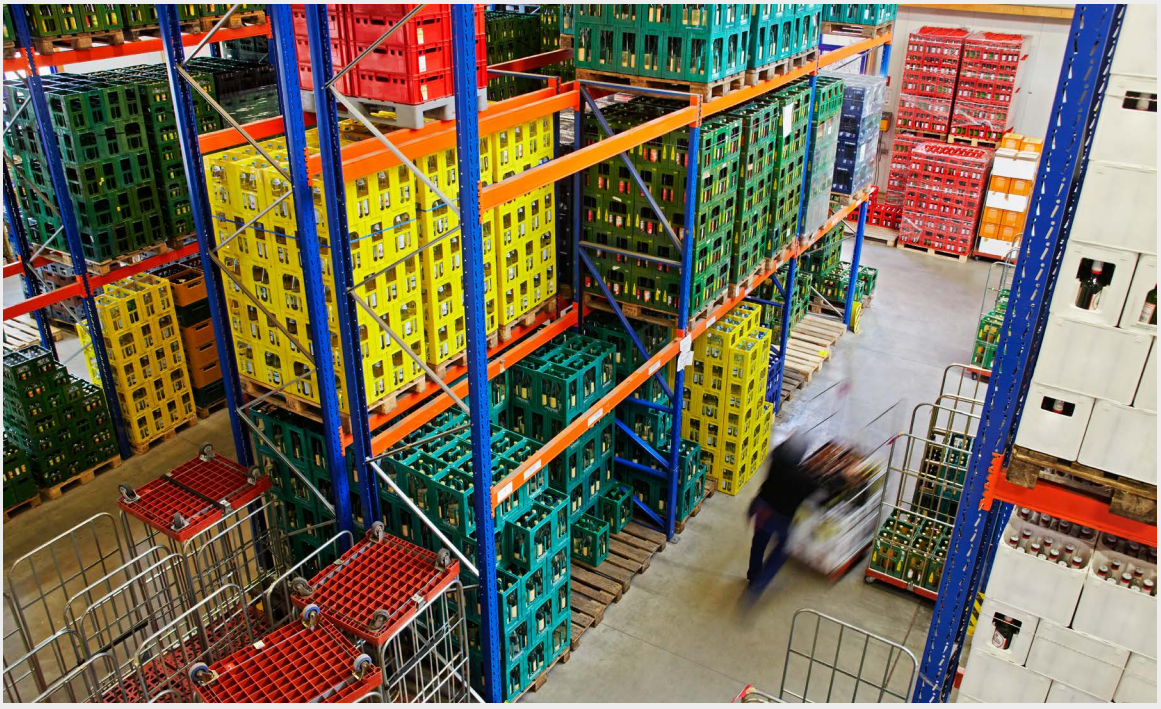
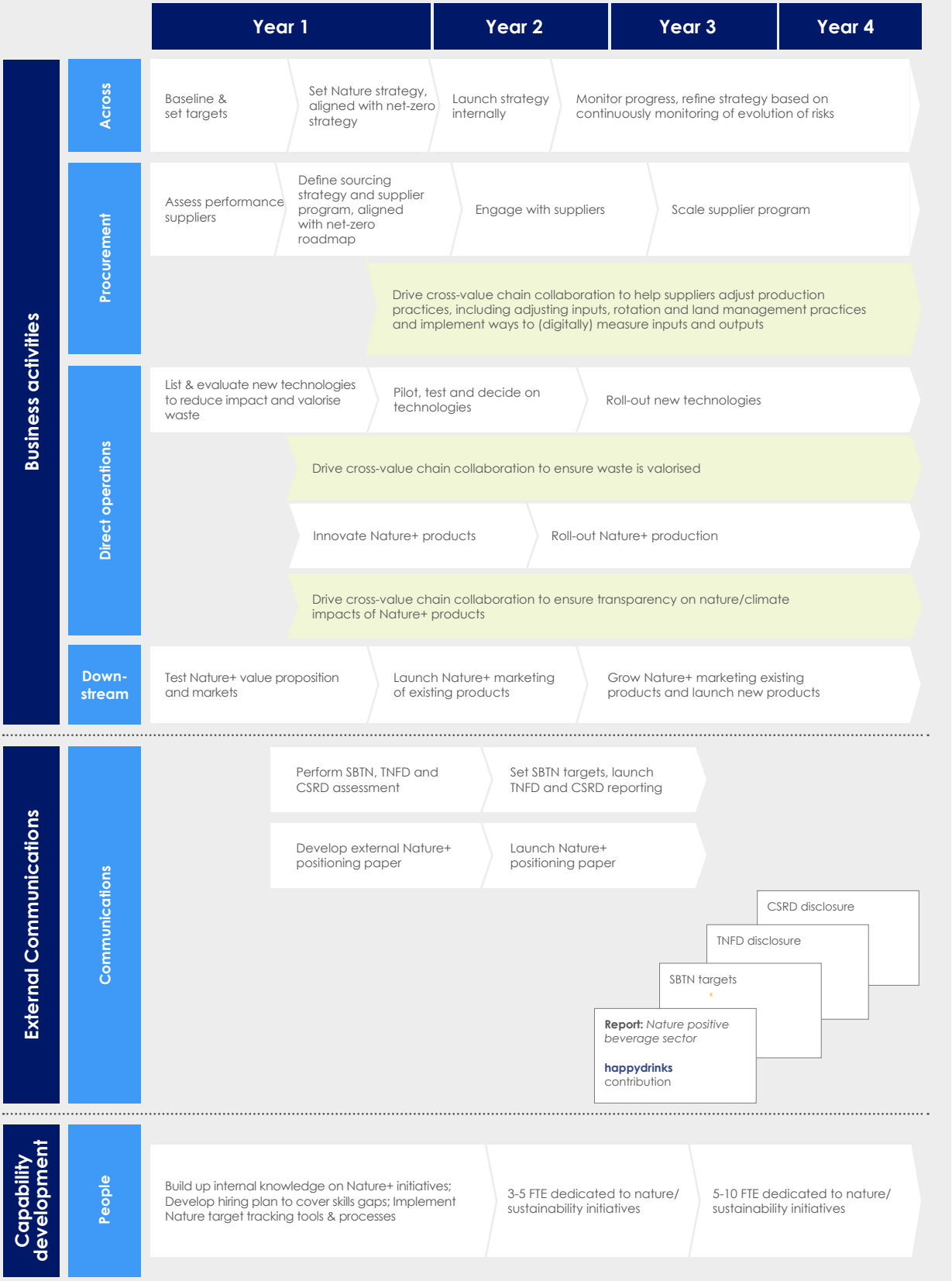


Figure 12 - Roadmap to achieve nature targets for happydrink



6 - SUMMARY AND CONCLUSIONS

Nature Risk is Business Risk. While net zero and climate mitigation strategies receive a lot of attention, most of our world's vibrant economic sectors exhibit a significant reliance and impact on nature. Both of these types of connections create significant strategic and financial risk for corporates, risk that needs to be actively managed.

The TNFD and SBTN risk disclosure and target-setting frameworks have evolved to help bring focus into this discussion. Systemiq has been involved in the development of these frameworks.

In this paper, we have argued that an approach which brings nature risk closer to the conversations around strategy, risk management and financial performance can ensure the topic gets the organisational attention it deserves. We have proposed a gradual way of doing this, which leverages Systemiq's deep understanding of nature-related risk mitigation, the best in nature impact and dependency mapping from Metabolic, and some simple and structured ways of financialising the discussion.

By integrating the outcomes with existing net-zero (and social) journeys, it enables a business to effectively coordinate action, actively manage trade-offs and develop an integrated perspective on the future value creation drivers for the business. We hope it serves as a useful starter for senior audiences - both technical and non-technical – who are keen to make real progress on this issue.

7 - ABOUT SYSTEMIQ AND METABOLIC

ABOUT SYSTEMIQ

Systemiq, the system-change company, was founded in 2016 to drive the achievement of the Sustainable Development Goals and the Paris Agreement, by transforming markets and business models in five key systems: nature and food, materials and circularity, energy, urban areas, and sustainable finance. A certified B Corp, Systemiq combines strategic advisory with high-impact, on-the-ground work, and partners with business, finance, policy-makers and civil society to deliver system change. Systemiq has offices in Brazil, France, Germany, Indonesia, and the Netherlands.

Systemiq works with corporates across food, mining, fashion, ag-inputs, hospitality sectors and beyond. Systemiq works on a 1:1 basis with corporate clients in these sectors to define, quantify, and implement nature strategies. Systemiq has supported the development of the SBTN, TNFD and SBTi frameworks.

Find out more at www.systemiq.earth

ABOUT METABOLIC

Metabolic is a systems change agency striving to transition the global economy to a fundamentally sustainable state where people and nature thrive. We guide public and private-sector decision-makers and implement real-world projects that bring ambitious ideas to life. We conduct leading research, develop future-facing strategies, build software tools, scale impactful ventures, and empower communities on the ground. Metabolic has been contributing to the SBTN both in technical development and piloting with companies since 2019, and contributes to the TNFD through piloting as well as sitting on the advisory council of the Capitals Coalition.

In 2023 Metabolic launched Link, a world-first software product for automated Nature impact and risk assessment. Link is the science-based sustainability impact and risk assessment platform to support your organization's nature and biodiversity strategy. It enables companies to understand the impact they have on nature and identify nature-related risks to their business across their supply chain. Link's reports and visualizations help build and communicate a compelling business case and are aligned with the most important frameworks expected by regulators, investors, and customers.

Find out more at www.metabolic.nl

SYSTEMIQ

Metabolic

E: contact@systemiq.earth

A: SYSTEMIQ Ltd
110 High Holborn,
London
WC1V 6JS

W: www.systemiq.earth

E: info@metabolic.nl

A: Klimopweg 150
1032 HX
Amsterdam
Netherlands

W: www.metabolic.nl