wbcsd

Guidance on the assessment of freshwater impacts

by food and agriculture sector companies

Contents

Foreword

Water is a fundamental resource enabling the production of nutritious food, with agriculture using 72% of all water withdrawals. As the world strives to achieve food system transformation – to one that provides healthy diets for all within planetary boundaries – a key concern is how to best ensure efficient supplies of water to produce nutritious food for all.

While water availability, access and quality impact the food system and its stakeholders, such as farmers and business, across the value chain, these same stakeholders also significantly impact water through pollution, inefficient water use and other actions. The consequences of these impacts are accelerating and evolving into a crisis.

Looking at this crisis through an economic lens show that the environmental, social and economic costs of the food system impacts is estimated at some USD $19.8 trillion a year.[1] A key lever in transforming the food system is to apply the right interventions to bring down external costs and ensure the creation of real value for business and society in a sustainable way.

Several businesses are now applying a multi-capital approach to their decision-making. But even though internationally recognized harmonized frameworks such as the Natural Capital Protocol exist, the application of concepts is not yet consistent, nor are practices that aim to measure and value impacts and dependencies and steer business. Sector-specific guidance materials that focus on major impact areas are therefore an important addition in driving further business action.

This guidance for assessment of freshwater impacts by food and agriculture companies aligns with existing initiatives and frameworks that support multi-capital accounting by business.

The alignment ensures that, within the available overarching guidance, businesses can take the next steps in accounting for and valuing their major freshwater related impacts and use this information as a basis for management actions.

This guidance provides a major contribution to World Business Council for Sustainable Development's (WBCSD) True Value of Food work and to the Capital Coalition's work on the Natural and Social & Human Capital Protocols and the associated food and agriculture sector guidance. Our aim is for it to be an invaluable tool for companies that have the greatest influence on our food systems. We also hope that this work will positively engage the value chain partners of companies and investors to improve performance.

Diane Holdorf
Executive Vice President, Pathways, WBCSD

Mark Gough
CEO, Capitals Coalition

Executive summary

The global food and agriculture system creates externalities that generate hidden social, environmental and socio-economic costs borne by different stakeholders. it has a large impact on freshwater through water consumption and effluent discharge by food system actors including businesses. The true cost of food must take into account these externalities and incentivize the flow of capital towards its greatest economic and societal value.

Businesses require practical tools to measure and value their freshwater impacts. This guidance on freshwater-related impacts by food and agriculture companies provides a standardized pathway for food and agriculture sector companies to understand, value and manage their major freshwater-related impacts.

The outputs of the guidance can provide decision-making support to companies as they navigate action to manage these impacts. The assessment and valuation of impacts is a key element of enterprise risk management that helps companies understand their risks and opportunities and compare options.

Companies can also use the outputs to report on and disclose freshwater-related impacts in line with various reporting and disclosure standards.

Companies can apply the guidance to a site or product, at the corporate level or across the value chain based on the amount of action aimed for. They can also apply it in combination with other developing or existing initiatives and frameworks, including the Science Based Targets Network – freshwater guidance. It is an application of the Natural Capital Protocol, with which it aligns both conceptually and in terms of terminology, and it provides specific guidance to food and agriculture sector companies on how to account for their impacts on society, set targets and manage the impacts.

The guidance can be effort- and resource-intensive for companies. It is therefore important for companies to conduct an initial screening of their sites for water risks and prioritize them for application.

The guidance provides a 5-step process for companies to understand, value and manage their freshwater related impacts: (1) measure the impact driver; (2) measure changes in the state of natural capital; (3) value impacts; (4) set targets; (5) manage impacts. For each of the five steps, it explains the key principles the companies should apply, the source of data and methodologies they should use and the key outputs they can expect to have. We provide a high-level water impact pathway in the report for companies to use as a starting point for their assessment and which they may customize to their situation and needs.

Freshwater-related impacts are highly contextual, so companies must conduct localized studies to understand the physical and hydrological parameters of the watershed in which they operate, as well as the activities of the other users in the watershed. Further, companies should account for both positive and negative impacts from activities in a watershed.

Quantitative measures are available for impacts companies cause on the environment, human health and other economic activities, while they lack for impacts such as geopolitical impacts and impacts due to the religious value of water bodies. Qualitative measures are a good starting point for such areas where clear quantitative measures or monetization factors are not available.

We also provide case studies from leading food and agriculture sector companies that demonstrate the different purposes for which companies have conducted impact accounting and valuation studies, the approaches they have taken, the challenges they have faced and the lessons they have learned in the process.

Companies have used freshwater impact accounting and valuation studies to inform long-term risks to their business and develop response strategies, and to help strategize collective action and engagement with their key stakeholders, such as farmers, suppliers and consumers.

A key barrier that companies face in conducting a robust assessment of freshwater impacts is the lack of localized data and valuation or monetization factors.

Companies should collect the best available data for their assessment and conduct sensitivity analysis as part of their assessment to take into account the uncertainty linked with the natural and social capital.

Further, a key feature of food and agriculture sector operations is that the various supply-chain actors share the value of freshwater related impacts. Food and agriculture sector companies must recognize this shared value and play their part in creating win-win solutions for all.

1 Introduction

1 Introduction

Water use has been growing globally at more than twice the rate of the population in the last century. While over 2 billion people worldwide are already experiencing high water stress, an increasing number of regions are reaching the limit at which it is possible to sustainably deliver water services. Business-as-usual scenarios project that more than half of the expected 9.7 billion people will live in water scarce areas by 2050.[2] The agriculture and livestock sectors use, consume and pollute an estimated 70% of all freshwater withdrawn on the planet.

Externalities of the global food and land-use system generate hidden environmental, health and socioeconomic costs. Estimates show that these costs add up to USD $19.8 trillion a year, which is greater than the total market value of the global food system of USD $9 trillion a year.[3,4] The natural, social and human capital interconnections of the food and land-use system mean that everyone, everywhere bears the burden of these externalities, but more so the poor and marginalized sections of society, which aggravates inequity. They also put large investments at risk and impact national and global economic growth and stability.

If market prices were to reflect the true cost of food, capital would be incentivized to flow where it would have the greatest environmental and social value. An illustrative example of a chocolate chip cookie and oatmilk porridge provided in Box 1 explains the concept of externalities of the food and agriculture system and the true cost of food.

Given the large water footprint of the global food and agriculture sector, it is important to understand the impact of the sector on freshwater in clear economic terms. Businesses operating in the sector require practical tools to measure and value their freshwater impacts.

The guidance on freshwater-impacts by food and agriculture companies provides a standardized pathway for food and agriculture sector companies to understand, value and manage their major water-related impacts. The aim is to generate conformity and harmonization among food and agriculture sector companies in measuring and valuing their impacts related to freshwater.

Box 1: The Food Systems Impact Valuation Initiative

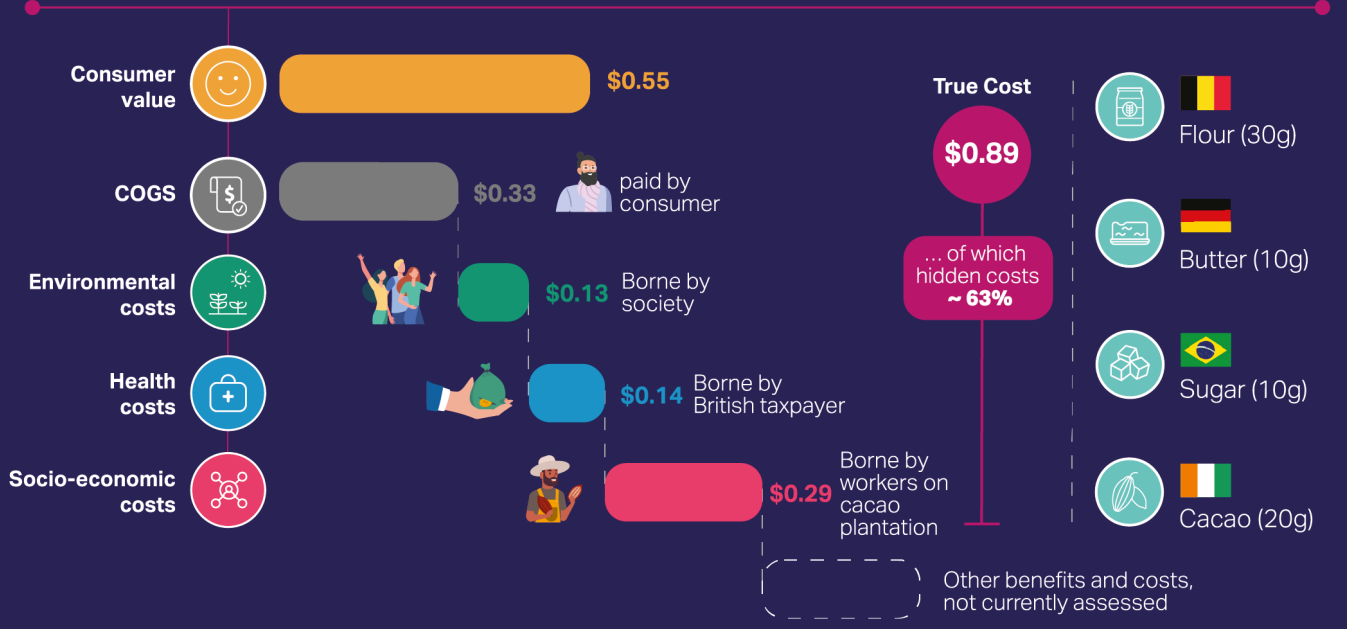
The Food Systems Impact Valuation Initiative (FoodSIVI)[6] is a multi-stakeholder initiative bringing together academia, businesses and civil society to improve impact valuation methods and promote the development of standardized and comparable valuations for food and agriculture system impacts. In its report Valuing the impact of food: Towards practical and comparable monetary valuation of food system impacts[7] it calls for a consortium of intergovernmental and institutional actors to develop a non-financial accounting standard for the food system to guide footprint accounting and allow for practical and comparable impact valuation across food system actors. Until common standards for the sector are available, FoodSIVI recommends developing global impact protocols to provide a means for food system actors to pragmatically value their impacts.

Box 2: Concept of externalities and true value of food explained with an example[5]

Exhibit 1 Approaching the True Value of Food for a cookie

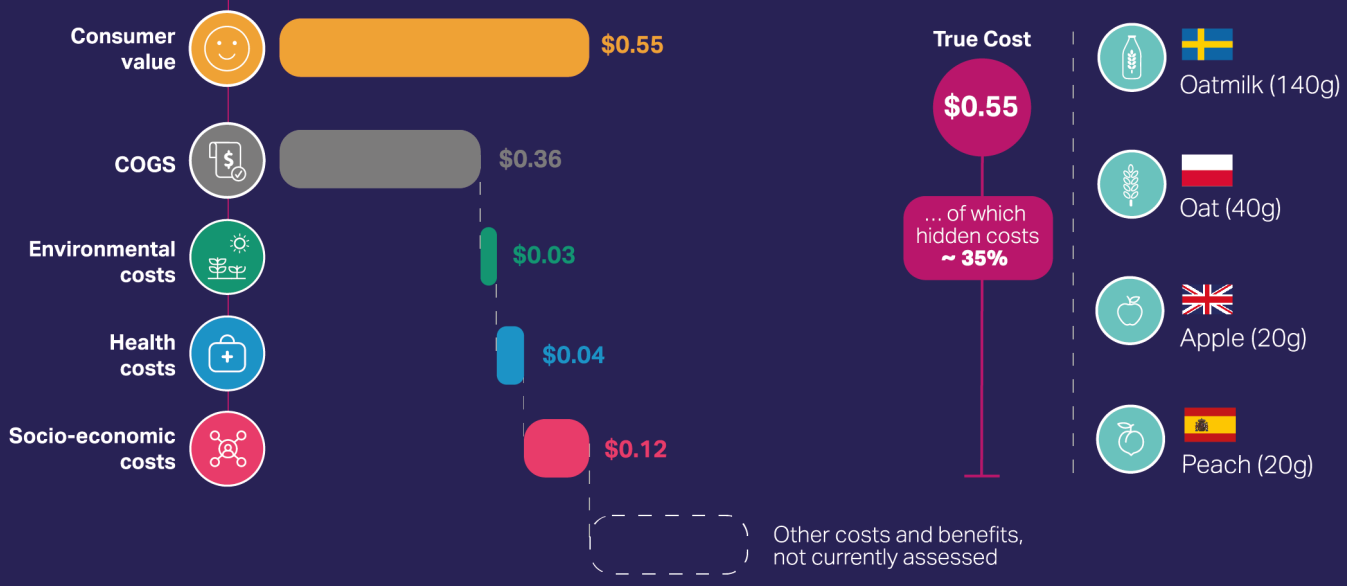
The consumer value assigned to a cookie in our example is roughly $0.55, paid for by the consumer. The cookie's True Cost depends not only on its cost of goods sold (COGS), but also on the externalities associated with its production and consumption…

Benefits and costs



At a similar consumer value, an oatmilk porridge could be chosen as an alternative. The comparison between cookie and porridge indicates a large discrepancy between their externalities

Benefits and costs



Key drivers for this discrepancy are the water-intensity per crop, nutritional value of the food, and working conditions in the production process

Exhibit 2 Breakdown of the externalities considered in this calculation example

Examples of actions to improve the True Costs of the cookie

Environmental

- Improve irrigation (e.g., underground system)
- Practice regenerative agriculture (e.g., crop rotation, use compost/ manure to avoid fertilizers)

Health

- Fortify with nutrients (e.g., calcium, fiber)
- Reduce sugar content
- Substitute butter for coconut oil
- Promote healthier consumption (e.g., micronutrient-rich food)

Socio-economic

- Pay farm workers a living wage
- Minimize waste through process optimization

2 About the use of the guidance

2 About the use of the guidance

WHO IS IT FOR?

The guidance is primarily for companies in the food and agriculture sector that intend to conduct an evaluation of their major impacts on freshwater. The outputs of the guidance can provide decision-making support to such companies as they navigate action on these impacts. Companies can also use the outputs to report and disclose water-related impacts in line with reporting and disclosure standards.

The guidance can also be useful for investors to understand where major freshwater-related impacts lie across the operations and supply chains of a food and agriculture sector company and what is the true economic value at stake because of these impacts. Investors can use this information to inform their investment decisions.

WHY USE THE GUIDANCE?

Businesses face pressure from governments, investors, customers and civil society to demonstrate true value creation and, as part of this, to disclose information on environmental, social and governance (ESG) related impacts. Ongoing developments, in particular on standards for non-financial capital accounting, hold the promise of rewarding responsible companies through clear economic returns.

The large freshwater use associated with the food and agriculture sector means that companies in the sector clearly need to understand and address their impacts on freshwater. This can help companies demonstrate true value creation from their operations and value chain to their stakeholders. True value creation helps win stakeholder confidence, ensures better financial returns and maintains the social license to operate.

The assessment and valuation of impacts can be an important approach to enterprise risk management. Among others, it can help companies understand their risks and opportunities, compare options, understand impacts on different stakeholders.[8]

KEY OUTPUTS FROM THE GUIDANCE

In specific terms, the guidance helps companies to:

- Understand the key impact drivers across their operations and value chains that may lead to major impacts on society through freshwater;
- Arrive at an impact pathway for their company that helps them understand the key impact drivers, the changes in the state of natural capital and who is bearing the burden of the impact;
- Understand the key principles for valuing the impact in qualitative and quantitative terms;
- Learn about how some companies have conducted impact valuation for their freshwater-related impacts and for what purposes.

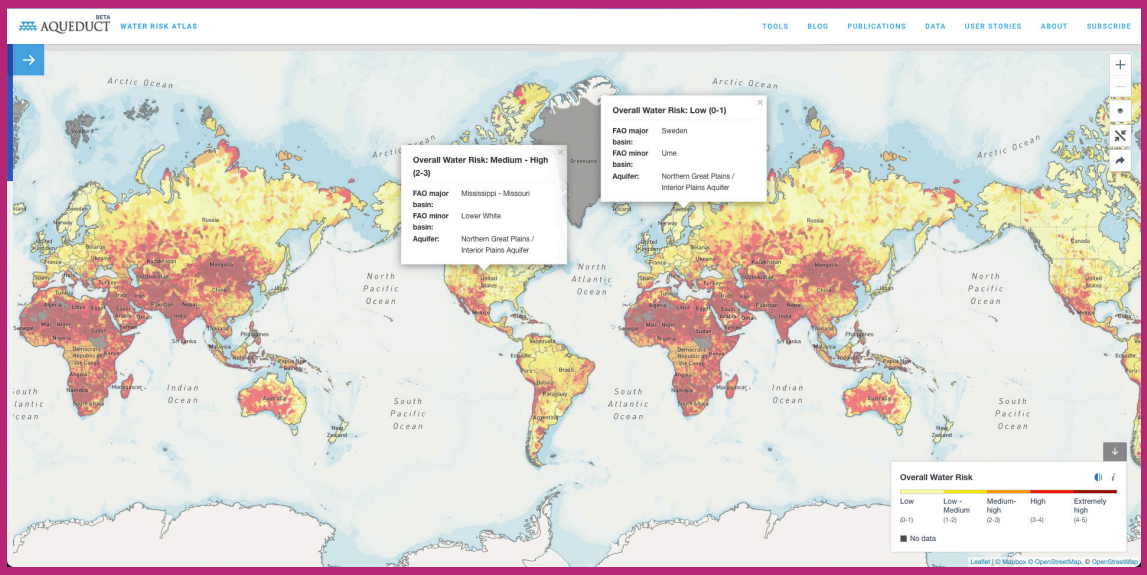
PRE-REQUISITES FOR USING THE GUIDANCE

Food and agriculture companies can apply the guidance after conducting an initial screening of water risks across their operations (and value chains if within scope) and conducting a prioritization of their sites for further analysis and action based on their internal business considerations.

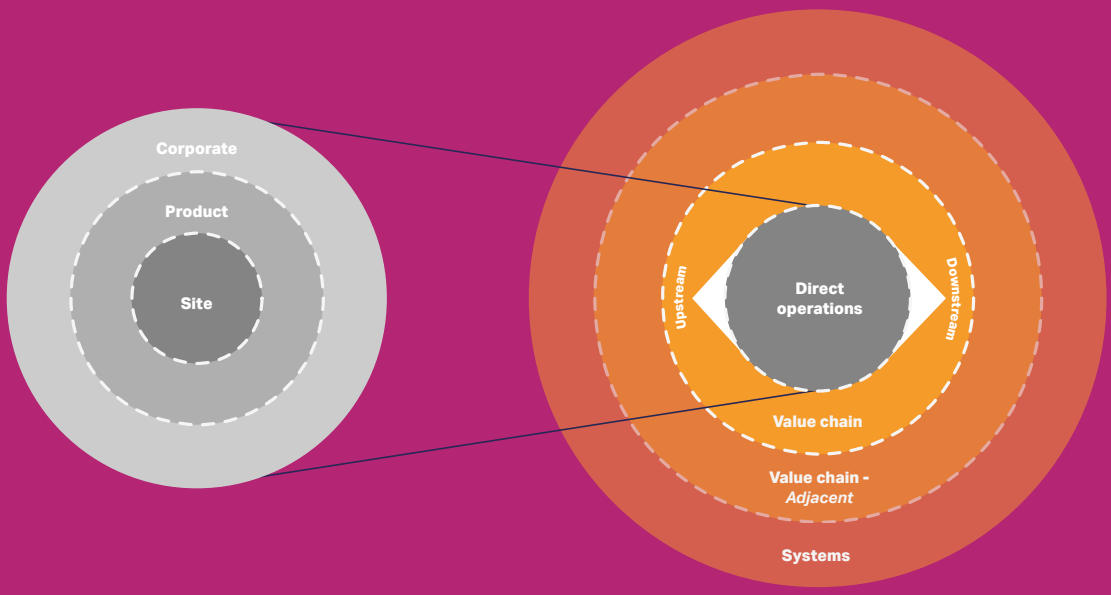
Box 3: Open-access tools

Companies can use some open-access tools, such as World Resources Institute's (WRI) Aqueduct Aqueduct Water Risk Atlas,[9] WWF's Water Risk Filter,[10] and WBCSD's India Water Tool for the initial screening for water risks based on a variety of parameters. For example, this illustration shows how companies can use the Water Risk Atlas to conduct an initial screening of their sites and supply chains for water risks.

Companies can apply the guidance at different scales depending on the level of action aimed for: at the level of a site or product, at the corporate level, or within upstream and downstream value chains. **In general, companies should take an informed approach based on the magnitude of water consumption and pollution across the various stages of their supply chain and in terms of practicality in determining the value chain boundary to apply the guidance.** As an example, we highly recommend that companies with value chains that have significant water consumption and pollution, such as rice or sugarcane processing companies (as their production processes are water intensive), apply the protocol to their upstream value chain.



Box 4: Levels to apply guidance



Companies can apply the guidance at the level of a site or product, at the corporate level or across the value chain.

Source: Adapted from Science Based Targets for Nature - Initial guidance for Business

The guidance builds on and makes reference to the other ongoing initiatives in the area of corporate risk assessment and disclosure. Food and agriculture sector companies can apply it in combination with other initiatives.

Table 1: Other key initiatives and how the guidance relates to them

OTHER KEY INITIATIVES	HOW THE GUIDANCE CONNECTS
Natural Capital Protocol and TEEBAgriFood: Operational Guidelines	The guidance has the same purpose as the Natural Capital Protocol and TEEBAgriFood: Operational Guidelines and uses the standardized terminology as used by the two initiatives. While the Natural Capital Protocol and TEEBAgriFood: Operational Guidelines provide an over-arching framework for capital assessment, the guidance zooms in on impact accounting for food and agriculture sector companies and provides detailed guidance on the topic. The guidance does not address business dependencies and impacts on business.
Science Based Targets Network – freshwater (SBTN – freshwater)	The guidance refers to the principles recommended in the SBTN freshwater methodology. Companies setting science-based targets can benefit both from applying the Water Impact Protocol while setting their targets and as a next step while taking action to achieve the targets. Furthermore, the guidance can help in valuing science-based targets.
Transparent Standardized Natural Capital Accounting Methodology	The guidance uses the standard terminology and classification of impacts as those in the methodology from Project Transparent. It focusses on the food and agriculture sector and provides detailed guidance on the impacts from the sector.
Alliance for Water Stewardship (AWS) standards	The AWS standards provide a framework for companies to understand their own water use and impacts in the catchment context and work collaboratively towards sustainable water management. Companies can implement the guidance as a part of or as a next step in the application of AWS standards as it adds the valuation aspect to the understanding of impacts by users. The understanding of value of impacts helps companies evaluate their options and understand trade-offs in implementing solutions on the ground.
Climate Disclosure Standards Board (CDSB) framework on water-related disclosures	Companies can use the guidance as an input for water-related disclosures in alignment with the CDSB water guidance. Specifically, it will help companies from the food and agriculture sector identify their risks and opportunities, sources of environmental impact, and other elements that are specific to the sector and are the key requirements of the CDSB framework for water-related disclosures.
Taskforce for Nature-related Financial Disclosures (TNFD)	The TNFD will develop and deliver a risk management and disclosure framework for organisations to report and act on evolving nature-related risks, which aims to support a shift in global financial flows away from nature-negative outcomes and toward nature-positive outcomes. The guidance can contribute to companies preparedness for adopting the TNFD framework when finalized.

3 Scope of the guidance

③ Scope of the guidance

The guidance covers aspects of freshwater quantity, including withdrawal, consumption and use. Regarding water quality, it includes point and non-point source pollution from food and agriculture value chains, excluding the effect of nitrogen emissions in freshwater.

We are developing the guidance alongside guidance for food and agriculture sector companies on other areas, including impact due to nitrogen releases (in air, water and soil) and impact due to food consumption. Together, these highlight the key material areas of impact from the sector after climate effects and land-use changes.

Figure 1 provides an illustration of the key impact drivers associated with the food and agriculture system, capital changes they cause and the impacts that may result. The guidance on freshwater, nitrogen and food consumption together represents key material areas of impact from the food and agriculture sector after climate change and land use.

The guidance on freshwater does not cover the interconnections with other impact drivers, such as nitrogen and food consumption. Note that capital changes and impacts from key impact drivers may also overlap.

The points of intersection of water with other material areas of impact provided below reference the scope of this guidance.

IN SCOPE

Impacts of food and agriculture sector companies on ecosystems and society due to freshwater use, including due to water consumption and pollution by the company

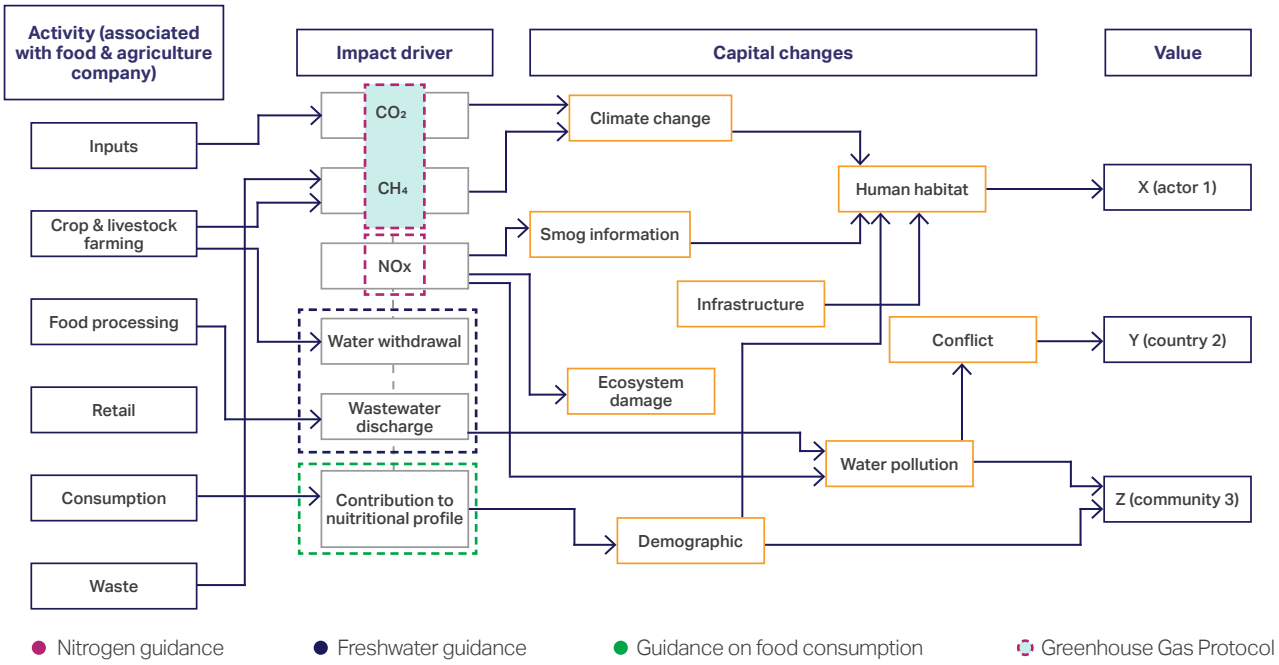
OUT OF SCOPE

Dependencies of food and agriculture sector company, such as shrinking water availability for the company due to climate change, and impacts on business such as effluent treatment costs borne by the company

Quality effects due to nitrogen emissions in soil, air and water, including emissions by food and agriculture system actors

Food consumption effects such as nutrient change due to water scarcity, including due to actions of food and agriculture system actors

Figure 1: Key impact drivers, capital changes caused and resulting impacts



4 The guidance

④ The guidance

In line with the conceptual basis laid out by FoodSIVI in its Valuing the Impact of Food report, the guidance covers the key steps for accounting and valuing the freshwater-related impacts by companies, as detailed in Figure 2.

The steps align conceptually, as well as in terms of terminology use, with the Natural Capital Protocol and The Economics of Ecosystems and Biodiversity (TEEB) AgriFood: Operational Guidelines for Business.[11] "Measure and Value" (Stage 3) of the Natural Capital Protocol and TEEB AgriFood Operational Guidelines define steps 1-3. In line with the SBTN – freshwater methodology, steps 4 and 5 provide guidance for companies to set targets in order to limit the impact driver and the approach to manage the impacts.

Corresponding to steps 1-3, FoodSIVI uses the terminology footprint (measure the impact driver), attribution (measure changes in the state of natural capital) and valuation of capital changes (value impacts).

DEVELOPING THE IMPACT PATHWAY

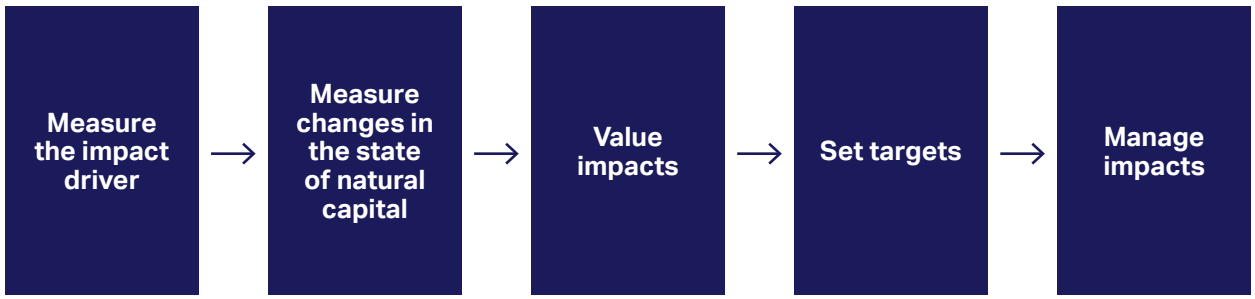
In line with the Natural Capital Protocol, the guidance uses the concept of impact pathways to illustrate how as a result of a specific business activity, a particular impact driver results in changes in natural capital and how these changes impact different stakeholders. Water consumption by a dairy factory, for example, can drive changes in the flow of water, resulting in reduced water availability to communities or industries downstream or to ecosystems.

Due to the interlinkages and multitude of actors and stages involved, food system impact pathways can be particularly long and complex.[12] To break down some degree of this complexity and capture the most relevant pathways, we have developed a high-level impact pathway diagram, as shown in Figure 3. **Companies using the guidance should customize this high-level pathway diagram to their own operations and scope and use it as the starting point in understanding freshwater-related impacts from their operations and value chains.**

The impact pathway diagram illustrates the generic food value chain stages and analyzes the various activities impacting freshwater resources through water consumption and effluent discharge.

It lists the major impacts caused by food and agriculture sector company activities. Annex II provides a more exhaustive list of impacts. **As companies customize the impact pathway diagram to their operations and scope, they should balance the need to be exhaustive in their analysis**

Figure 2: Key steps for accounting and valuing the freshwater-related impacts



of impacts with the need to be practical in accounting for major impacts and addressing them. Companies should take into account at least the major impacts listed in the impact diagram. In addition, we recommend that companies review the list of impacts in the annex and include them in their analysis based on the estimated magnitude of impact.

4.1 Measure the impact driver

Water is essential for all life forms and is a key resource for virtually every economic activity. Water consumption and effluent discharge activities by a company simultaneously happen with the other consumption and discharge activities by other actors in the same watershed or basin. Water consumption by a food and agriculture system actor may deplete the freshwater available in the watershed, which may have a negative impact on the life forms the watershed or basin sustains, or on other economic activities. On similar lines, effluent discharge from the company may deplete the water quality and impact human beings and other life forms.

Business operations may have both positive and negative impacts due to changes in natural capital. In a typical watershed, stakeholders may simultaneously carry out water consumption activities with water recharge and replenishment actions or collective water management actions such as making drinking water available to communities, thereby reducing demand from the watershed. Such actions have a positive impact and companies should account for them in a watershed.

Figure 3: High-level impact pathway diagram linking key activities of the food value chain with impacts through freshwater

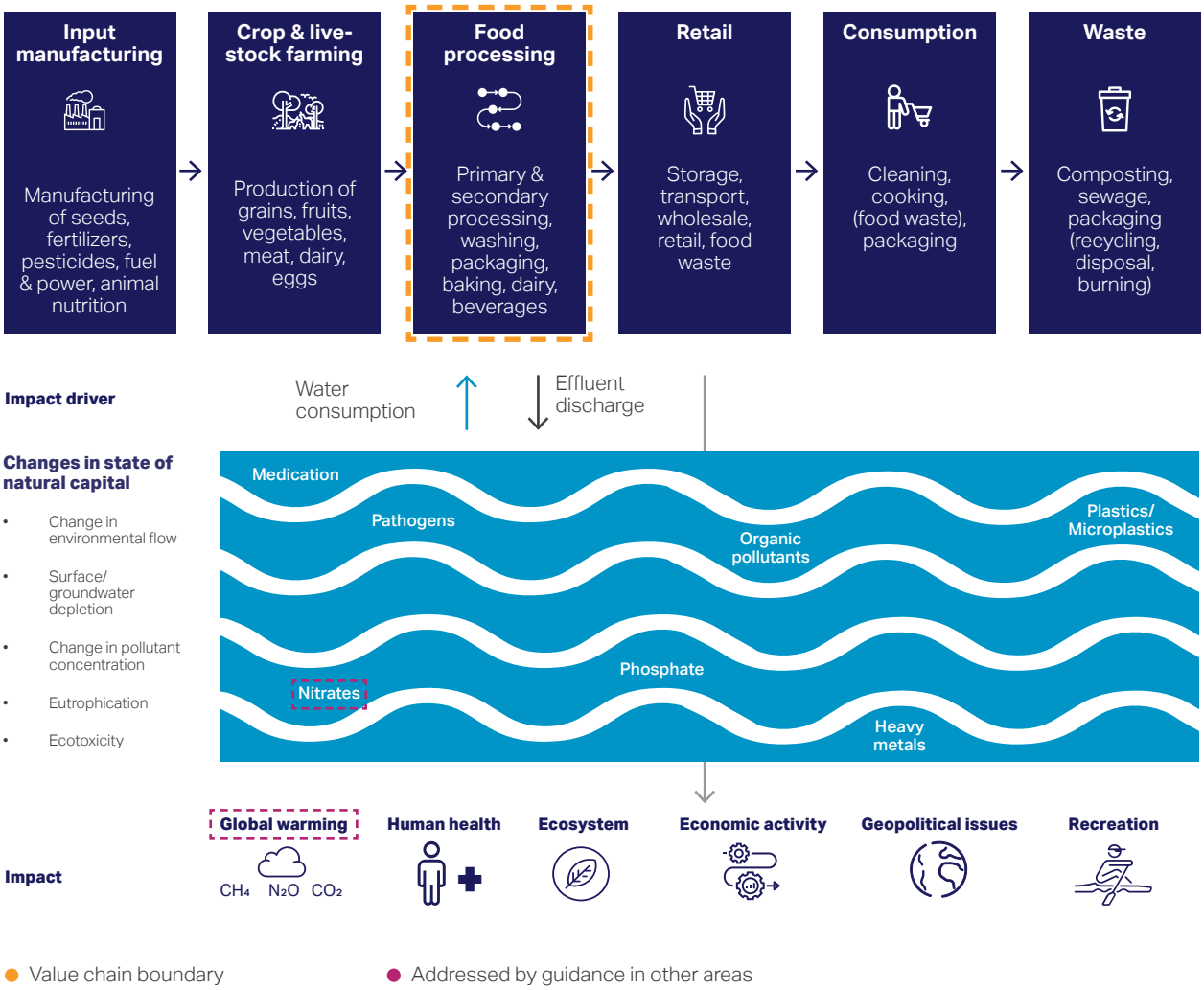


Figure 4: Schematic representation of a food value chain

Source: Adapted from TEEB for Agriculture and Food: Operational Guidelines for Business [13]

Each stage of the food and agriculture value chain may involve freshwater use and effluent discharge, leading to impacts.

To measure the impact driver for freshwater-related impacts, companies should measure the following for the activities or processes within the value chain boundary:

1. The volume of water consumed, to understand water quantity-related impacts
2. The quantity of pollutant discharged, to understand water quality or pollution-related impacts.

A simple water balance equation can help determine water consumption.

water consumption = total water withdrawal (from all sources) – wastewater discharged

Various secondary sources, such as the Water Footprint Network, provide water withdrawal values associated with individual commodities. Companies can derive water consumption from water withdrawal using standard consumption rates from the literature. These consumption rates vary significantly even within the same type of operations or agricultural product depending on the technology used, local climate and other parameters. For example, water consumption rates associated with irrigation can vary significantly depending on the type of technology (drip, sprinkler, field flooding, etc.) and climate.

Box 5: Key definitions related to freshwater[14]

Water withdrawal or use describes the total amount of water withdrawn from its source for use. Measures of water use help evaluate the level of demand from industrial, agricultural and domestic users.

Water consumption is the portion of water use not returned to the original water source after withdrawal. Consumption occurs when water evaporates into the atmosphere or is incorporated into a product or plant and is no longer available for reuse.

Water scarcity: Depleting water from a system generally leads to water scarcity, which is the lack of available water to meet demand, where demand can be both from humans and the natural environment.

Box 6: Specific water accounting tools

Some water accounting tools are available for specific sectors or activities. Companies can apply them as they gain understanding of their water consumption across their operations.

- The Cool Farm Tool Water metrics developed by the Cool Farm Alliance allow an estimation of irrigation requirements and blue and green water footprints of a variety of crops grown in different geographies worldwide.[15]
- Companies in the beverage sector can refer to the Beverage Industry Environmental Roundtable for a water accounting methodology[16] tailored to the beverage industry.
- Companies in the livestock sector can refer to the Food and Agriculture Organization of the United Nations (FAO) LEAP guidelines for assessment of water use in the livestock production systems and supply chains.[17]

Various types of pollutants may form part of the wastewater discharged from food and agriculture sector operations.

- Organic pollutants such as sugars, oils
- Inorganic pollutants such as heavy metals, chemical compounds
- Nutrients – nitrogen and phosphorus
- Plastics and microplastics
- Medication such as antibiotics
- Pathogens.

Companies can use direct in-line measurements for effluent discharge or indirect estimates from the use of standard life-cycle assessments (LCA) to calculate the pollutant load that results from these activities.

Temperature of wastewater is also a factor that determines the impact that wastewater has on ecosystems and should be included in the measurement of the impact driver. Higher temperature of wastewater can have significant ecosystem implications.

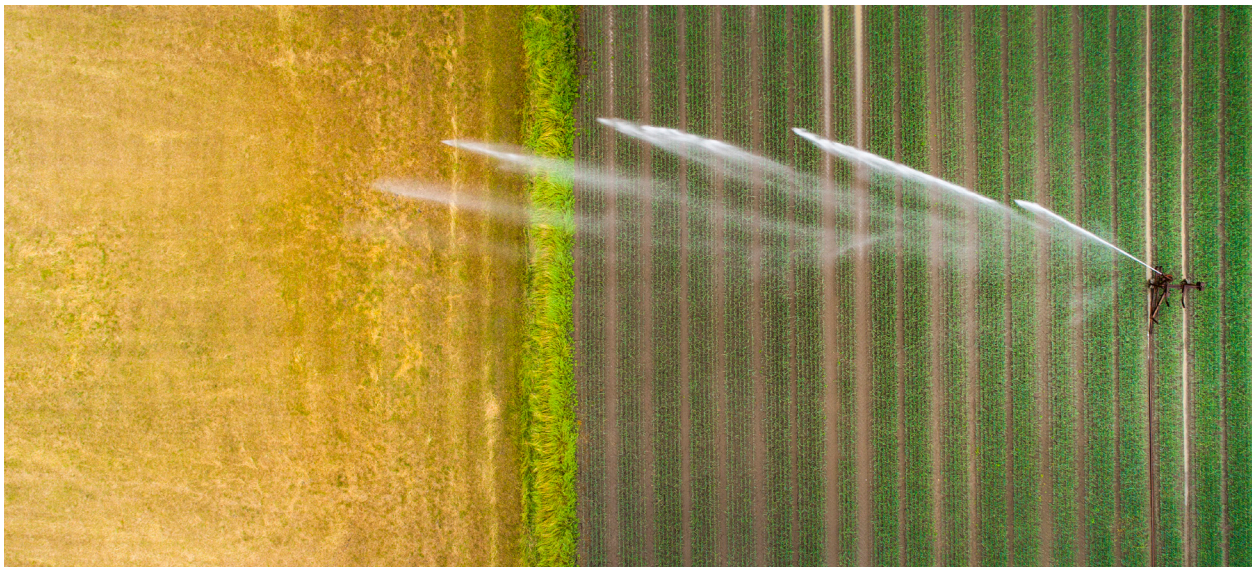
Annex I of the guidance provides high-level matrices with relative estimates of water withdrawal and quality for key food products across the sector value chain.

4.2 Measure changes in the state of natural capital

The key changes in natural capital, such as changes in environmental flow or eutrophication due to nutrient discharge, all depend on the local condition of the watershed, including its physical and hydrological parameters and the other water users operating in the watershed. It is therefore critical for companies to understand the local context of the watershed in which they operate. Publicly available resources exist to support this process; but companies will gain the greatest understanding by engaging with local stakeholders who work within the catchment.[18] Companies should use the following indicators and databases to inform their understanding of the condition of the watershed:

- Baseline Water Stress by Aqueduct Water Risk Atlas,[19] water depletion from WWF's Water Risk Filter,[20] and Blue Water Scarcity[21] defined by the Water Footprint Network for water availability status;
- Surface water contamination risk indicator from WWF's Water Risk Filter[22] and Global Assessment of Nutrient Water quality by McDowell et al.,[23] and Coastal Eutrophication Potential by Aqueduct;[24]
- IUCN's Red List of Threatened Species[25] and River Fragmentation Status from WWF's Water Risk Filter[26] for the ecological status of the basin or watershed.

Companies should use modelling approaches to measure the change in natural capital. Pre-exiting hydrological models that take into account local environmental conditions, or standardized life-cycle inventories or similar data sources that provide characterization factors for a set of pre-defined conditions can allow measurement of the changes in natural capital. Examples of such models and sources of pre-existing datasets include AWARE (Available Water Remaining),[27] the Water Scarcity Index[28] and the MIT Shift Capital Toolkit.[29]



4.3 Value impacts

Freshwater-related impacts are difficult to value as pathways are long and interconnected and environmental goods like water or water rights seldom trade on markets.[30] Often, the real value of freshwater for different stakeholders is beyond what typical valuation measures can account for. Certain limitations, such as a lack of accurate baseline data or uncertainty in the measurement of natural capital, may also limit the effectiveness of valuation methodologies and approaches.

Despite the increasing focus on water-related risks, understanding of the financial value linked to industry-related impacts on water is incomplete. However, this topic is increasingly receiving interest from businesses and from other stakeholder groups, including investors. Some large companies, including those in the food and agriculture sector, have conducted impact valuation for freshwater as part of their enterprise-wide and holistic capital accounting exercises based on their specific needs and objectives.

Quantitative valuation measures are available for some impacts caused by companies on ecosystem services, human health and other economic activities in local watersheds. However, other areas of impact, such as geopolitical impacts or impacts on the religious value of freshwater bodies, often lack clear valuation measures. Qualitative valuation measures in such cases are a good starting point in understanding the value linked to these impacts.

Broadly speaking, two steps can help companies value their freshwater-related impacts:

1. **Quantitative valuation of impacts**

As an example, water scarcity leading to a lack of sufficient water available for domestic users can cause health issues, such as from people switching to lower quality drinking water sources. Companies can measure the associated burden of disease or mortality in DALYs (disability adjusted life years), where one DALY represents the loss of the equivalent of one year of full health. Standard characterization factors from life-cycle assessments can help companies understand the quantitative value of such impacts.

2. **Monetary valuation of impacts**

Table 2 lists some direct and indirect impact valuation approaches for various impacts. In general, techniques like replacement costs (cost of replacement of the original water source for a particular use or function, including desalination and transport costs), economic opportunity costs (value lost due to the water not being diverted to its most productive use, considering the public value linked to the use of water) and shadow price (an estimated price for something that is not normally priced or sold in the market) are useful in understanding the monetary value of impacts caused due to the company's actions.

Box 7: Ceres

Ceres, a sustainability non-profit organization that works closely with investors and businesses, is leading the Valuing Water Finance Initiative in collaboration with the Global Institute for Water Security and institutional and other partners. The initiative aims to identify industry-related impacts on water resources and highlight the potential financial value that companies can preserve by appropriately valuing water.[31]

Table 2: Recommended valuation approaches to use to understand the value of key freshwater-related impacts

IMPACT CATEGORY	QUANTITATIVE INDICATORS AND USEFUL RESOURCES
Ecosystem services	Application of standard valuation factors for ecosystem services associated with the basin. Companies can refer to the Ecosystem Services Valuation Database (ESVD) developed by the Ecosystem Services Partnership for standard valuation factors
Human health	• Direct medical expenditures for illness treatment, such as from consumption of unsafe drinking water • Indirect costs resulting from illness: o Value of time lost from work (earnings lost) o Expenditure for caregiving • Measures of social cost of water available for the watershed
Economic activities	• Agriculture: o Change in value (or market price) of crops due to varying yields as a function of low water availability and poor quality o Added value of crops due to irrigation when compared to lack of irrigation • Industrial output: output value lost in shutdowns, disruption of operations • Tourism: lost economic value due to no tourism • Fisheries: lost incomes of fishing communities operating in the catchment
Recreation and aesthetics	Willingness to pay for the environmental good; for example, for an aquatic site, the cost of travel to the site or a survey to know the willingness of the community to pay to use the site for recreational purposes

The Volumetric Water Benefit Accounting (VWBA) method developed by the WRI, LimnoTech, Quantis and Valuing Nature provides a set of practical methodologies that correlate the volumetric water savings of companies with the key water impact-related indicators that can lead to social, economic and environmental impacts.[32] The methodologies determine in volumetric terms how companies can reduce their impact and generate benefits for watersheds in which they operate through activities such as reducing water use or improving discharge practices. We recommend these methodologies based on published literature, practitioner experience and best practice.

Companies can apply them to food and agriculture sector operations.

Valuation methods and approaches are only as robust as the data that underlines them. It is therefore critical for companies to ensure that they collect the best data available, both for measuring baseline and current conditions. Also, given the uncertainty linked to the nature of natural and social capital, a sensitivity analysis is a key part of impact accounting and valuation.

An interesting feature of food and agriculture sector operations is that the various sectors share the value of freshwater related impacts. The value of impacts, both positive and negative, can cascade down value chains.

For example, better water management by farmers can reduce their input costs, thereby impacting the financial bottom-line of the company sourcing from the farmer and positively impacting the economic output from the individual watershed. Equally for costs, for example, a rise in global food prices often stems from droughts and poor water management in specific geographical locations. **Food and agriculture sector companies must recognize this shared value and play their part in creating win-win solutions for all.**

Box 8: The special case of irrigation[33,34]

Irrigation is the largest consumer of freshwater withdrawals in almost all water-scarce regions of the world. Irrigated agriculture contributes to 40% of the calorie production of the world. While irrigation has long been known to be a success factor for crop production and improving crop yields, its real impacts require a closer look through the local context in which the company is viewing its impacts from irrigated agriculture.

Irrigation often leads to increases in overall water demand in local watersheds and therefore reduces future water availability. Further, it may disrupt the balance of crops grown in a particular area by encouraging the production of higher-value crops, such as sugarcane, at the cost of lower value – often indigenous – crops such as legumes. Within the smallholder context, irrigated agriculture can also aggravate social inequity since it is only accessible to farmers who can afford it, who often choose to grow higher value crops. Substantial scientific evidence now exists showing that higher irrigation efficiency delivered through advanced technologies delivering more crop per drop often fails to free up water for other uses, such as cities and the environment. It is also worth noting that micro-irrigation systems are often more complex and have higher impact compared to large irrigation systems in terms of the behavioral aspects of the individual farmers they link to.

Companies should analyze such issues of net value addition/reduction from irrigation through robust basin-level water accounting measures, an assessment of uncertainties and a better understanding of the behavior of irrigators. Farmers can realize real water savings from irrigation through better agronomic practices, such as mulching and regenerative agriculture that allows for the better use of freed-up water in the system.

4.4 Set targets

The EAT Lancet Commission on healthy diets from sustainable food systems has defined 2,500 km3 per year as the scientific target for consumptive water use for the global food system, keeping in view the integrated human health and environmental sustainability agenda. It also defined the target of 8 teragrams (Tg) of phosphorus per year as the scientific target for phosphorus application for the food system. However, it is necessary to develop local and regional targets for water use in the food system.

Business activities co-exist with activities of other users in the catchment, each of which have an impact. Companies should therefore understand who the other major water users in the catchment are, the role they play and the other collective action projects in place in the watershed. Companies should allocate impact and create the target accordingly based on the fair share of their responsibility.

In general, they should determine the allocation of their fair share based on one or more of the following principles:

- The proportion of pressure/ impact created by the various users, including businesses;
- The capacity of the users (such as economic capacity) to address the impact;
- The users' priorities and ambitions to address impact.

Companies should set targets for the impact driver based on a pre-determined allowable level of change in natural capital. The pre-determined level of change in natural capital is the amount of pressure the freshwater catchment can take while remaining in the desired state. Companies should follow this approach for both water quantity and quality indicators. For example, the company should define its target in terms of the volume of water that it can withdraw while maintaining the minimum environmental flow requirements of the catchment.

Technical guidance document number 2 for Sustainable Development Goal (SDG) 6.3.2 for Clean Water and Sanitation[35] expands on the target value concept for water quality and provides guidance on how to set meaningful water quality targets. Water quality depends on measurement location and conditions, and target values should take both ecosystem and human health into consideration. The guidance document provides optional target values for key water quality parameters that are often close to target values that countries report on. For phosphorus for example, the optional target value for rivers is 20 micrograms per liter for total phosphorus and 10 micrograms per liter for orthophosphate.

4.5 Manage impacts

The Science Based Targets for Network (SBTN) provides an action framework (AR³T) for companies to take relevant actions to address the impacts they have identified.[36] The framework is based on well-known conservation and mitigation hierarchies and applies to the case of freshwater. The hierarchies require that companies prefer actions to eliminate pressure over those to reduce pressure, and that they prefer those over actions that offset pressures.

1. **Avoid** implies eliminating pressure entirely, thereby preventing the impacts from happening. This is the most preferred set of actions, keeping in view that some impacts from human activities are irreversible and humans at best should avoid them. Actions related to avoidance are also often more cost-effective than remedial actions. Avoiding water withdrawals and discharges of individual pollutants using technology or other approaches by companies are examples of avoidance.
2. **Reduce** implies the reduction of pressure, thereby reducing the level of impacts caused. Reductions in water withdrawals by food and agriculture sector companies through the adoption of efficient water use qualify as "reduce" actions.
3. **Regenerate and restore** implies using remedial measures to deal with impacts that it is not possible to avoid or reduce. Regeneration refers to ecosystems that improve the state of nature without changing the use classification, while restoration targets changing the system from a degraded state to a more natural state. Managed aquifer recharge or the restoration of natural channel morphology are examples of regeneration and restoration.
4. **Transform** implies acting on the fundamental drivers of impacts through technological, economic, institutional and social factors and changes in underlying values and behaviors. Policy engagements and collaborative institutional efforts to promote sustainable water management are examples of transformative actions.

It is important to note that companies that conduct impact valuation may already be implementing some water stewardship or management actions within their operations. Companies should integrate or implement the management actions that they identify from using the guidance jointly with the existing water stewardship actions. In accounting for cumulative impacts from these actions, however, companies should ensure the aggregation of impacts and not impact drivers.

The continuous monitoring and evaluation of the actions to address impacts is key to tracking the progress of the company against the targets set.

5 Summary of the guidance

5 Summary of the guidance

Table 3 provides a summary of the five steps of the guidance, including the data and information required, tools available for companies, and outputs expected at each step. Companies need to understand the applicability of the tools to specific situations.

Table 3: Summary of the data and information required, tools available and outputs expected at each step of the guidance

1	Measure the impact driver	**Data and information required** - Value chain boundaries - Total water consumption/total water withdrawal - Total water discharged
		Tools - Water Footprint Network - The Cool Farm Tool Water metrics - Water accounting methodology by Beverage Industry Environmental Roundtable - FAO LEAP Guidelines
		Outputs - Total water consumption - Quantity of effluent discharged
2	Measure change in state of natural capital	**Data and information required** - Total water consumption - Quantity of effluent discharged - Hydrological and geological information on the watershed - Competing water users in the watershed
		Tools Standardized life-cycle inventories or hydrological models, such as - AWARE (Available Water Remaining) - Water Scarcity Index - MIT Shift Capital Toolkit Volumetric Water Benefit Accounting (VWBA)
		Outputs - Water quantity-related change: change in environmental flow, surface water depletion, groundwater depletion, water scarcity - Water quality-related change: eutrophication, algal growth, ecotoxicity
3	Value impacts	**Data and information required** - Measures of change in state of natural capital - Characterization factors for quantitative and monetary valuation of impacts
		Tools Life-cycle assessments and specific monetary measures based on type of impact. Refer to Table 2.
		Outputs Monetary or economic value of impacts on ecosystem services, health and society
4	Set targets	**Data and information required** - Other major water users and collective action projects in the watershed - Measures of maximum allowable level of change in natural capital in the watershed
		Tools Science Based Targets Network guidance
		Outputs - Maximum allowable water consumption by the company/value chain activity - Maximum allowable effluent discharge by the company/value chain activity
5	Manage impacts	**Data and information required** - Target values of water consumption and effluent discharge - Impact from existing watershed management interventions
		Tools Science Based Targets Network guidance
		Outputs - Key management actions that reduce impacts - Monitoring and evaluation plan to track progress

6 Case studies

I. OLAM'S WATER IMPACT VALUATION AS PART OF AN INTEGRATED IMPACT ASSESSMENT

About Olam

Olam International is a leading food and agriculture business supplying food, ingredients, feed and fiber to over 17,000 customers worldwide and with a value chain spanning over 60 countries, including farming, processing and distribution operations, and a sourcing network of 5 million farmers. Through its purpose to "Re-imagine Global Agriculture and Food Systems", Olam aims to address the many challenges involved in meeting the needs of a growing global population, while achieving positive impact for farming communities, the planet and all its stakeholders.

Key driver for impact accounting

Water, a critical natural capital, is fundamental to Olam's operations across the value chain – from plantations, concessions and farms, to processing and manufacturing. Understanding the value of water – and its stewardship and risk mitigation – is essential to ensuring its long-term availability as a natural resource so Olam can continue to put food and fiber on tables and feed in troughs.

Olam embarked on its journey to develop methodologies to estimate the cost of associated environmental and social externalities – including water use – in 2018 through its Integrated Impact Statement (IIS). The IIS puts a monetary value on Olam's impacts and dependencies on key non-financial capital, providing a holistic picture for corporate decision-making.

Approach to water impact accounting and valuation

Olam valued and accounted for the externalities arising from its water use through its IIS framework, underpinned by an academic valuation methodology. To capture a snapshot, Olam first determined the scope, then carried out a materiality assessment primarily at impact driver and impact levels.

Based on the assessment, Olam identified three areas that it believed had the most significant influence on the natural capital value of freshwater:

1. Ecosystem quality cost from water use;
2. Human health cost from water use;
3. Economic cost of water based on the replacement cost of water use.

To calculate the **ecosystem quality cost from water use**, Olam first used the watershed ID of each farmer group to trace the amount of water withdrawn from known watersheds. This enabled it to evaluate the land area that would suffer a reduction in ecosystem quality for each cubic meter of water used. Multiplying this value by the company's total water use, then by the biodiversity proportion of ecosystem services value of each given land type helped Olam arrive at the total estimated ecosystem quality cost resulting from its water use.

To calculate the **human health cost from water use**, Olam similarly used the watershed ID to first determine the disability adjusted life years (DALY), or lost years of healthy life, for each cubic meter of water use. The company multiplied this value by its total water use and then valued it using data on global average GDP per capita to arrive at the estimated total human health cost resulting from its water use.

For the **economic cost of water replacement**, Olam had to capture the hidden water use where watershed information was unknown. The company derived an average replacement cost of water use by applying a valuation factor of USD $1.90 per cubic meter against the total water use of its farmer groups and processing facilities. The valuation factor is an average value of desalination costs as determined by various research papers.

The sum of these three impact costs determined the total estimated impact value of Olam's water use at both its farmer group and processing facility levels on the IIS.

Key challenges faced

The main challenges center on a lack of water valuation methodologies and research. Certain assumptions and limitations are also often the basis of existing research and academic literature; this can deter the ability to scale the study and can limit the analysis.

In particular, the lack of relevant water valuation research poses a challenge in determining a fair water valuation factor to ascertain the impact of water use.

For example, the desalination cost value used is based on an average from research done in geographies that do not necessarily correspond to where Olam's operations are located. Another challenge is lack of information for many watersheds.

Results and outcomes

Despite the limitations, by better understanding the economic cost of water use, the IIS is helping Olam to sharpen its approach to water stewardship and risk management by enabling its businesses to devise appropriate plans to reduce their water-related natural capital impacts. Olam is continuing to refine its IIS tool to:

- Gain insights and implications for the company and internal stakeholders;
- Identify potential water-related risks and opportunities to its business operations by geography over short-, medium- and long-term time horizons;
- Apply effective strategies to reduce externalities.

This includes applying a more comprehensive valuation method that takes into account regionalized valuation factors that vary depending on the level of water stress seen at each location. Due to the difficulties of obtaining watershed ID-specific data in some areas, this method will help in retrieving underlying data regardless of the traceability or availability of watershed ID-specific data, as well as factor in country-level pricing that accounts for other important impacts, such as environmental, health, domestic supply and agricultural demand.

Olam is also exploring ways to include other types of water use currently not captured, such as green water (water entering soils from precipitation used to grow crops) and wastewater generated from its operations.

Next steps and lessons learned

As companies are increasingly facing requirements to disclose the externality costs of non-financial capital, Olam see its IIS tool as a necessary step in preparing for future reporting of non-financial capital, where monetizing, consolidation and reporting of externalities would appear alongside conventional financial figures. Accounting for these costs will help the company better understand future risks and swiftly manage them.

Current methodologies reveal the direction of travel for better water use management and Olam is currently exploring and updating its own methodologies in this direction. With no formal framework for measuring non-financial capital, the company believes that natural capital accounting requires some standardization to truly deliver long-term value. Olam will create partnerships to grow this mindset.

Contact

Ria Bakshi
Finance for Sustainability Lead,
Email: ria.bakshi@olamnet.com

Ruri Lee
Finance for Sustainability Deputy Manager
Email: ruri.lee@olamnet.com

II. DANONE'S WATER STEWARDSHIP AND REGENERATIVE AGRICULTURE PROGRAMS

About Danone

Danone is a world leading food company built on four business lines: Essential Dairy and Plant-based Products, Waters, Early Life Nutrition, and Advanced Medical Nutrition. Danone's company signature is "One Planet. One Health", reflecting its vision that the health of people and the health of the planet are interconnected.

Key driver for impact accounting

Water issues drive material business risks in operations and supply chains, including higher price volatility and reduced crop or livestock production. At Danone, 89% of the company's water footprint is in agriculture, which is why the health and sustainability of the agricultural supply chain is a major focus of its Water Stewardship and Regenerative Agriculture programs.

Enhancing resilience by adapting farming practices first requires understanding businesses' water dependencies and impacts on agricultural commodities globally. Danone therefore partnered with the WRI to conduct a water risk assessment in its full supply chain. The objective of the analysis was to identify priority commodities and geographic sourcing zones at water risk and optimally target mitigation and adaptation actions.

In addition, Danone co-developed a Regenerative agriculture scorecard with WWF, technicians and other environmental and agricultural experts to be able to analyze and monitor impacts of activities on farms. This too should inform response strategies for Danone's entire agricultural supply chain to reduce risks, drive collective action, and engage farmers, suppliers and consumers.

Approach to water impact accounting and valuation

In 2020, the Water Cycle team conducted a Water Risk Assessment in Danone's agricultural supply chain for all 68 main agricultural commodities from crop and livestock farming sourced by Danone globally. WRI provided Danone with a data collection template to obtain the necessary primary data from buyer teams to conduct the analysis for each raw material: sourcing locations, annual purchase volume, annual spending.

WRI used the Intergovernmental Panel on Climate Change (IPCC) risk function, released in 2014, as the overall analytical framework for the risk assessment, where risk is a function of hazard, exposure and vulnerability. It then ranked the 68 ingredients from high to low, enabling prioritization using an aggregation algorithm based on their risk levels. To obtain future scenarios, WRI projected Aqueduct's Business-As-Usual and Pessimistic scenarios out to 2030 and 2040.

In that way, WRI assessed all ingredients across four variables:

- Business relevance for Danone from **sourcing volume per supplier**;
- Business relevance for Danone from **spending per ingredient**;
- **Impacts** (water intensity from water footprint assessment in m^3 water/ton);
- Water-related hazards (**average water stress** from sourcing location, averaged by volume, spending, water consumption, and 2020, 2030, 2040 water stress projections).

The data identified the 20 ingredients with the highest scores as the most business relevant and hence priority ingredients for action. WRI created an additional list with all ingredients with a high average water stress across all suppliers.

Key challenges faced

The main challenges center on a lack of water valuation methodologies and research. Certain assumptions and limitations are also often the basis of existing research and academic literature; this can deter the ability to scale the study and can limit the analysis.

In particular, the lack of relevant water valuation research poses a challenge in determining a fair water valuation factor to ascertain the impact of water use. For example, the desalination cost value used is based on an average from research done in geographies that do not necessarily correspond to where Olam's operations are located. Another challenge is lack of information for many watersheds.

Results and application

For the list of 20 priority ingredients for water risk mitigation and adaptation actions, Danone has developed ingredient- and context-specific recommendation plans that it has integrated into ongoing and future regenerative agriculture and water stewardship project pipelines.

One example for action and impact monitoring is on strawberries, one of its priority ingredients: 95.7% of estimated total annual purchased strawberry volumes are from suppliers facing high water stress. Danone projects that this will reach extremely high levels by 2030, with severe consequences for production. In Mexico and Morocco, two of the most important production areas for strawberries, Danone and its key suppliers are therefore promoting regenerative agriculture practices with upstream farmers and starting to baseline their performance with the scorecard. They are setting water reduction targets to mitigate high water-related risks. Danone is providing innovative training, technical implementation and monitoring support, access to market, and financial incentives for regenerative agriculture at the farm level.

Nonetheless, it needs to put additional mitigation actions in place. Danone is therefore aiming to scale the projects at the greater landscape level to integrate additional local farmers in activities to collectively reduce water quantity and quality risks. The aim is to sustainably transform the agricultural value chain and secure water resources for all local water users.

Key lessons learned

Going forward, companies should consider using one centralized system to manage their supply chain data when possible, and demand greater visibility into their suppliers' procurement chains. They must increasingly support stakeholders in their supply chain – through training, methods and tools – to build baselining and monitoring practices. The more granular and accurate the supply chain data are, the better and more detailed the water risk and impact assessments will be, and their related response strategies can be. This will be an important step in making global supply chains more transparent, fair and resilient.

Internal and external communication on the approach and results of risk and impact assessments is key to raising awareness of the issue and ensuring stakeholders can align on the water preservation strategy.

Next steps

Danone will continue to implement response actions for the 20 prioritized ingredients as well as impact monitoring using the scorecard.

More specifically, in line with the regenerative agriculture framework and the results of the water risk assessment, Danone's Water Policy commits to clear action for 2030. Focusing on ingredients for which production occurs in highly or extremely highly water-stressed areas, the aim is to achieve the following four targets through the implementation of regenerative agriculture practices:

- Reduce total water use by 25% through better irrigation management;
- Increase buffer zones by at least 15% to decrease run-off;
- Optimize fertilizer use at the farm level for 75% of milk, fruit, almond and soy volumes through appropriate planning and good practices;
- By 2025, implement specific pilots using an integrated landscape approach for five key ingredients, including almonds and strawberries.

Implementing projects at the broader landscape scale, rather than isolated farm-level approaches, will enable Danone to reach higher impacts at a greater scale with key partners. To optimally track these, Danone expects the regenerative agriculture scorecard to evolve in later stages according to future climate and agronomic realities.

Contact

Jehanne Fabre
Head of Global Water Stewardship at Danone
Email: Jehanne.fabre@danone.com

Annexes

I. HIGH-LEVEL MATRICES FOR WATER QUANTITY AND QUALITY

This annex presents two high-level matrices for water quantity and quality to support companies in understanding their water footprints. They can help companies answer questions like: Where do major water footprints lie across my value chain that can lead to major impacts in terms of water quantity and quality. Companies should use the footprint matrices along with the impact diagram (see section 4.3 Value impacts) to understand key impacts from the production of key crops and food commodities. Companies should interpret the footprint matrices and its outputs in the interest of taking action against their major impacts.

In establishing impacts from high water-footprints, companies should assess the interdependencies and additionality of impacts caused due to their operations.

The analysis is based on high-level aggregation of the data available in secondary literature[37,38,39,40,41,42,43,44,45,46] and practice insight.

- The matrices allow for a relative estimation of footprints along the value chains of a product but not across different products.
- It does not reflect variation of footprints within individual product categories.
- Quality footprints provided in Matrix 2 include footprints due to nitrogen-discharge from the value chain activities.
- Special case: Impacts from packaging and waste depend on the type of packaging and producer location; pulp and paper packaging, for example, has high water quantity impacts while plastic packaging affects water quality adversely.

Figure 5: Water use footprint matrix for relative estimation of water use for key food and agriculture products

Category	Product Group	Input Manufacturing	Crop Farming	Livestock Farming	Manufacturing & Processing	Packaging	Distribution & Retail	Consumption	Waste	total average product group water footprint *(m3/ton)*
Livestock	*Beef (meat)*		*L*	*L*	*M*	*(S)*	*(S)*	*(S)*	*(S)*	15415
Livestock	*Sheep (meat)*		*L*	*M*	*M*	*(S)*	*(S)*	*(S)*	*(S)*	10412
Livestock	*Pork (meat)*		*L*	*M*	*M*	*(S)*	*(S)*	*(S)*	*(S)*	5988
Livestock	*Poultry (meat)*		*L*	*M*	*S*	*(S)*	*(S)*	*(S)*	*(S)*	4325
Livestock	*Cow Milk*		*M*	*M*	*M*	*(S)*	*(S)*	*(S)*	*(S)*	1020
Livestock	*Eggs*		*L*	*M*	*(N)*	*(M)*	*(S)*	*(S)*	*(S)*	3265
Crops	*Rice*		*L*	*N*	*M*	*(M)*	*S*	*S*	*S*	1673
Crops	*Sugarcane*		*L*	*N*	*S*	*S*	*S*	*S*	*S*	1666
Crops	*Wheat*		*M*	*N*	*S*	*S*	*S*	*S*	*S*	1827
Crops	*Maize*		*S*	*N*	*S*	*S*	*S*	*S*	*S*	1222
Fruits	*Fruits*		*M*	*N*	*S*	*S*	*S*	*S*	*S*	1800
Nuts & Oils	*Edible oils*		*M*	*N*	*M*	*S*	*S*	*S*	*S*	6792
Nuts & Oils	*Nuts*		*(M)*	*N*	*(S)*	*(S)*	*(S)*	*(S)*	*(S)*	14218
Beverages	*Tea*		*M*	*N*	*S*	*S*	*S*	*S*	*S*	8856
Beverages	*Coffee*		*M*	*N*	*M*	*S*	*S*	*M*	*S*	15897
Beverages	*Beer*		*M*	*N*	*L*	*M*	*S*	*S*	*M*	1420
Beverages	*Bottled water*		*N*	*N*	*S*	*L*	*S*	*S*	*M*	5

Legend

Large footprint	*L*
Medium footprint	*M*
Small footprint	*S*
No footprint	*N*
No data	
Assumptions based on practice insight	*(X)*

Figure 6: Water quality footprint matrix for relative estimation of water quality impacts from production of key food and agriculture products

Category	Product Group	Input Manufacturing	Crop Farming	Livestock Farming	Manufacturing & Processing	Packaging	Distribution & Retail	Consumption	Waste	total average product group water footprint (m3/ton)
Livestock	Beef (meat)		L	L	M	(S)	(S)	(S)	(S)	15415
Livestock	Sheep (meat)		L	L	M	(S)	(S)	(S)	(S)	10412
Livestock	Pork (meat)		M	L	M	(S)	(S)	(S)	(S)	5988
Livestock	Poultry (meat)		L	L	M	(S)	(S)	(S)	(S)	4325
Livestock	Cow milk		M	L	M	(S)	(S)	(S)	(S)	1020
Livestock	Eggs		(M)	(L)	(N)	((S))	(S)	(S)	(S)	3265
Crops	Rice		M	N	S	S	M	S	S	1673
Crops	Sugar Cane		M	N	M	S	M	S	S	1666
Crops	Wheat		S	N	S	S	S	S	S	1827
Crops	Maize		(S)	N	(S)	(S)	(S)	(S)	(S)	1222
Fruits	Fruits		(S)	N	(S)	(S)	(S)	(S)	(S)	1800
Nuts & Oils	Edible Oils		M	N	M	M	S	S	S	6792
Nuts & Oils	Nuts		S	N	S	S	S	S	S	14218
Beverages	Tea		S	N	S	S	S	S	S	8856
Beverages	Coffee		L	N	L	S	S	S	S	15897
Beverages	Beer		M	N	M	L	S	S	S	1420
Beverages	Bottled Water		N	N	S	L	S	S	M	5

Legend

Large footprint	L
Medium footprint	M
Small footprint	S
No footprint	N
No data	
Assumptions based on practice insight	(X)

II. IMPACTS OF FOOD AND AGRICULTURE COMPANY ACTIVITIES ON FRESHWATER

This annex lists all impacts that food and agriculture company activities can have on freshwater. Note that companies do not cause all impacts in all cases and the magnitude of impacts varies spatially and temporally. As companies perform an analysis of their operational impacts on freshwater, they should take a balanced approach in being exhaustive vs being practical in accounting for their major impacts.

1. **Environmental impacts**
    - Global warming due to greenhouse gas emissions from effluent discharge
    - Impact on ecosystem services
2. **Impact on human health and health of other flora and fauna**
    - Impact on human health due to unsafe drinking water
    - Unsafe food due to irrigation from polluted water
    - Impact on child development, such as stunting
3. **Impact on economic and industrial uses**
    - Danger to local and regional food security due to insufficient or unfit irrigation water
    - Impact on fisheries due to polluted water
    - Poverty alleviation due to impacted incomes of farmers/ranchers
    - Reduced production by other industries due to water pollution
    - Impact on GDP due to impacted industrial and agricultural production
4. **Geopolitical impacts**
    - Conflict with water users (intra or transboundary)
    - Geopolitical instability
    - Disaster risk due to impact on hydro-geology
5. **Other societal impacts**
    - Impact on recreational activities
    - Impact on cultural activities
    - Impact on religious activities
    - Aesthetic impacts, such as impact on home gardens

Glossary

Definitions	
dependency	The reliance of a business or its use of a natural capital
externality	A consequence of an action that affects someone other than the actor undertaking the action, and for which the actor is neither compensated not penalized. Externalities can be either positive or negative.
impact driver	A measurable quantity of natural resource used as an input in production (example freshwater used in manufacture of a food product) or a measurable non-product output of business activity (such as effluent discharged from the industrial activity). Impact drivers are generally expressed in quantitative units and companies may already include it in non-financial reporting or generate it through life-cycle assessments. The FoodSIVI literature on Valuing the impact of food refers to an impact driver as footprint.
impact	The positive or negative effect of a business activity on one or more dimensions of well-being. A single impact driver may be associated with multiple impacts.
impact pathway	Describes how, as a result of a specific business activity, a particular impact driver results in changes in natural capital and how these changes impact different stakeholders.
impact valuation	The monetary assessment of the impact or the valuation of the change in economic value attributable to the business activity.
life-cycle assessment (LCA)	Also known as life-cycle analysis, this is a technique used to assess the environmental impacts of a product or service through all stages of its life-cycle, from material extraction to end of life (disposal, recycling or reuse). The International Organization for Standardization (ISO) has standardized the LCA approach under ISO 14040. Several life-cycle impact assessment (LCIA) databases provide a useful library of published estimates of different products and processes.
shadow price	The estimated financial value of a natural capital for which no market price exists. The shadow price of an impact driver is the change in economic value from capital changes due to one additional unit of the impact driver.
water footprint	The amount of water used by a process, product, company or sector. It includes both direct and indirect water use and wastewater polluted.
water withdrawal (or use)	Describes the total amount of water withdrawn from its source for use. Measures of water use help to evaluate the level of demand from the user.
water consumption	The portion of water use not returned to the original water source after withdrawal. Consumption happens when water evaporates into the atmosphere or is incorporated into a product and is no longer available for reuse.

Endnotes

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This report has been developed in the name of WBCSD. Like other WBCSD publications, it is the result of a collaborative effort by WBCSD staff, experts and executives from member companies. A wide range of members reviewed drafts, thereby ensuring that the document broadly represents the perspective of the WBCSD membership. Input and feedback from stakeholders listed above was incorporated in a balanced way. This does not mean, however, that every member company or stakeholder agrees with every word.

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We do this by engaging executives and sustainability leaders from business and elsewhere to share practical insights on the obstacles and opportunities we currently face in tackling the integrated climate, nature and inequality sustainability challenge; by co-developing "how-to" CEO-guides from these insights; by providing science-based target guidance including standards and protocols; and by developing tools and platforms to help leading businesses in sustainability drive integrated actions to tackle climate, nature and inequality challenges across sectors and geographical regions.

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