

# UNPACKING NATURE'S VALUE - taking biodiversity impact measurement from science to action

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GIST Impact is a leading impact data and analytics provider that has been measuring and quantifying corporate impacts for more than 16 years, with a team of 100+ scientists, engineers, data scientists, and environmental economists. GIST Impact works with pioneering companies across all sectors and investors representing over \$8 trillion in assets under management, and partners with the world's largest ESG data providers, business networks, and fintech platforms.

Protecting and restoring biodiversity is an essential component of the ecological transformation we need to support a thriving society. The healthy functioning of natural systems provides the foundation upon which human society, and within it, business, can progress. This article discusses innovative approaches being deployed by GIST Impact with companies and other partners to measure and value biodiversity and ecosystem services. By incorporating this data into their decision-making and monitoring, companies can better align their practices and processes with positive outcomes for nature and generate value for people and planet.

## INTRODUCTION

Biodiversity is the living fabric of this planet – its ecosystems, species, and genes<sup>1</sup>. In recent years, we've seen growing awareness of biodiversity's central importance for viable economies, human health and wellbeing, and maintaining the balance of our planetary systems. This is evidenced by recent commitments to the 2030 nature restoration targets of the Convention on Biological Diversity (CBD), established at the 15<sup>th</sup> COP of the Global Biodiversity Framework<sup>2</sup>.

Companies rely on nature to access valuable resources and are exposed to significant risks from biodiversity decline. More than 50% of global GDP – or \$44 trillion USD – is estimated to be moderately or highly dependent on nature and the services it provides<sup>3</sup>. These ecosystem services include carbon storage and water regulation by forest ecosystems; pollination by insects; food, fuel, and fibre supplies from various species. In the absence of these provisioning and regulating services, recent studies have shown that none of the world's top industries would be profitable<sup>4</sup>.

Most understandings of the change required of economies and societies to bring humanity back within planetary boundaries include the integration of non-financial risks and measures of value into economic and private sector thinking. In this future, companies, and investors need to have a clear and objective set of metrics to help them make informed decisions about nature and biodiversity, as with carbon emissions and other negative externalities. Companies are often predominantly concerned with their carbon emissions, but there are many other significant impacts (and opportunities) that must be measured to ensure a holistic ecological transformation.

<sup>1</sup> TEEB (2010) The Economics of Ecosystems and Biodiversity: Mainstreaming the Economics of Nature: A synthesis of the approach, conclusions and recommendations of TEEB. Available at: <https://teebweb.org/publications/teeb-for/synthesis/>

<sup>2</sup> UNEP. (2022) "COP15 ends with landmark biodiversity agreement." Available at: <https://www.unep.org/news-and-stories/story/cop15-ends-landmark-biodiversity-agreement>

<sup>3</sup> WEF. (2020) "Nature Risk Rising report." Available at: [https://www3.weforum.org/docs/WEF\\_New\\_Nature\\_Economy\\_Report\\_2020.pdf](https://www3.weforum.org/docs/WEF_New_Nature_Economy_Report_2020.pdf)

<sup>4</sup> TruCost & TEEB. 2013. Natural Capital at Risk: The top 100 externalities of business. Available at: <http://naturalcapitalcoalition.org/wp-content/uploads/2016/07/Trucost-Nat-Cap-at-Risk-Final-Report-web.pdf>

Once these metrics are integrated into decision-making, the resulting investments and changes in business models can stem the rising tide of financial, physical, and systemic risks biodiversity loss presents. Even further, as these innovative ways of measuring and valuing nature mature, businesses will increasingly see reward from the positive contributions they make to the protection and regeneration of ecosystems.

## ADOPTING A SCIENCE-BASED APPROACH TO MEASURING AND VALUING BIODIVERSITY

Quantifying how a company affects the natural world, and the ways in which a company relies on nature for its success, poses some significant challenges:

- **More complex than CO2e:** Biodiversity encompasses life at every stratum and operates at various spatial and temporal scales. From genetic variations within species to entire ecosystems, capturing this complexity demands robust methodologies.
- **Scarcity of on-the-ground data and expertise:** Comprehensive in-situ biodiversity data is often unavailable, particularly in remote regions and for lesser-known species. Accurate identification and classification of species also require taxonomic expertise, which is scarce in some regions.
- **Tight coupling of dependencies and risks:** Biodiversity impacts need to be evaluated both inside-out (i.e. impacts on the public due to the activities of a company and its value chain) and outside-in (i.e. threats to a company's performance due to its dependency on the services of nature and the decreasing ability of damaged ecosystems to provide these services).

*More than 50% of global GDP – or \$44 trillion USD – is estimated to be moderately or highly dependent on nature and its services*

Tackling these challenges requires investment in data collection using a wide range of approaches informed by an emerging set of frameworks. It also requires an understanding of both direct and indirect biodiversity impacts. With these underpinnings, sound science and robust economics are required to provide meaningful and actionable insights to decision-makers on how a company and its value chain are impacting biodiversity.

## KEY FRAMEWORKS ELEVATING BIODIVERSITY MEASUREMENT AND REPORTING

In recent years, key frameworks, grounded in science-based approaches, have emerged to drive transparency in reporting biodiversity-related risks and opportunities. The most notable is the Task Force on Nature-related

Financial Disclosures (TNFD)<sup>5</sup>. Along with others, this framework is creating increased pressure, but also increased structure for companies to engage with their biodiversity impacts.

In the EU, the Corporate Sustainability Reporting Directive (CSRD) requires large companies to disclose information on material biodiversity and ecosystem-related topics as detailed in its new sustainability reporting standards (ESRS)<sup>6</sup>. France also requires financial institutions to publish the main biodiversity-related risks arising from their investments as part of Article 29 of its Energy-Climate Law passed in 2021<sup>7</sup>.

The Partnership for Biodiversity Accounting Financials (PBAF) has also published its Standard for Financial Institutions, with guidance on how to measure impacts and dependencies on nature and biodiversity<sup>8</sup>.

There is heartening congruence in these frameworks, as PBAF is aligned to the “Evaluate” stage of the TNFD’s “LEAP” framework (Locate, Evaluate, Assess, Prepare), for example. Together, these increasingly aligned frameworks are providing the foundations of a robust and science-based system of measurement and reporting.

Understanding these frameworks is the first step for companies and investors who wish to contribute to safeguarding ecosystems, preserving endangered species, and promoting sustainable practices through their activities. And by adopting such frameworks, biodiversity measurement and reporting can become more transparent, comparable, and credible.

## MEASURING DIRECT AND INDIRECT BIODIVERSITY IMPACTS

Businesses and investors have significant impacts – both direct and indirect – on biodiversity and ecosystems through their operations, products, and investments.

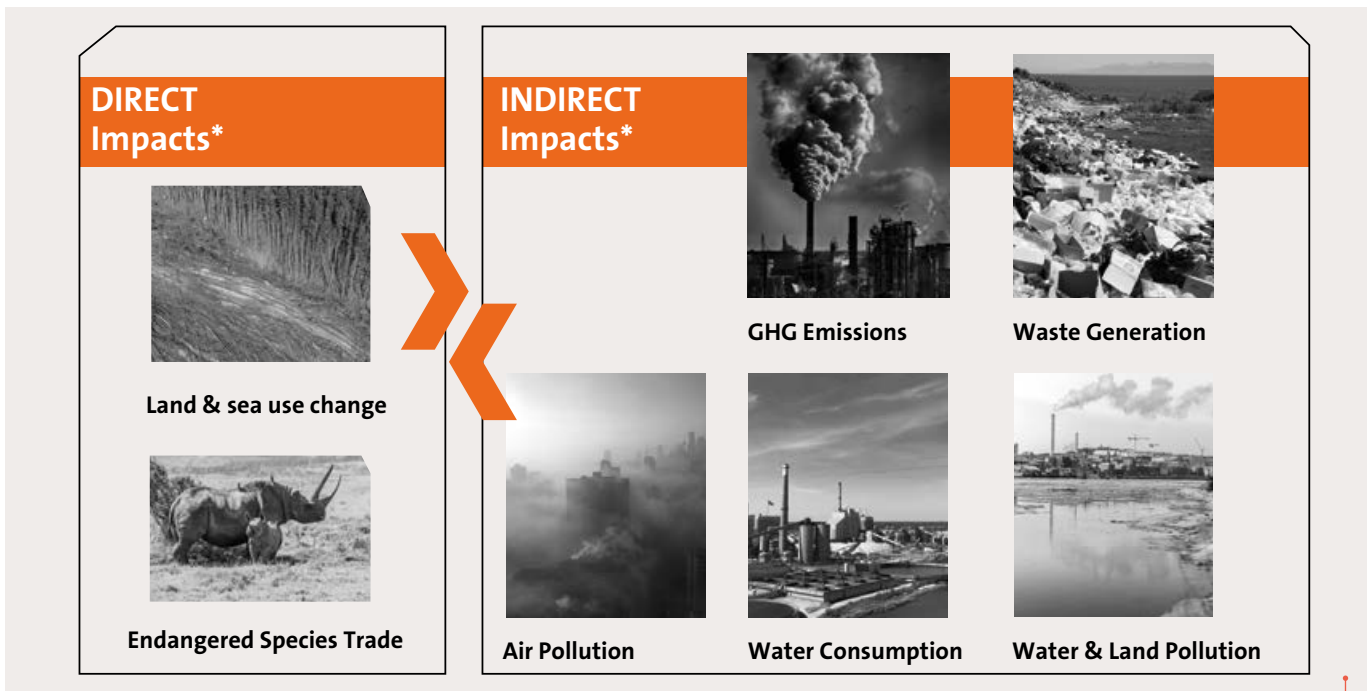
**Direct impacts** are what most people consider when they think of biodiversity loss e.g. clearing forested land for business purposes. These impacts can be significant for companies in primary sectors such as agriculture, forestry, water, hydropower, and mining.

5 TNFD. (2023) “TNFD Nature-Related Risk & Opportunity Management and Disclosure Framework, v0.4 Beta Release.” Available at: <https://framework.tnfd.global/>

6 European Commission (2023) “Corporate Sustainability Reporting” Available at: [https://finance.ec.europa.eu/capital-markets-union-and-financial-markets/company-reporting-and-auditing/company-reporting/corporate-sustainability-reporting\\_en#legislation](https://finance.ec.europa.eu/capital-markets-union-and-financial-markets/company-reporting-and-auditing/company-reporting/corporate-sustainability-reporting_en#legislation)

7 Ministry of Economics, Finance and Industrial and Digital Sovereignty (2021) “Publication of the implementing decree of Article 29 of the Energy-Climate Law on non-financial reporting by market players.” Available at: <https://www.tresor.economie.gouv.fr/Articles/2021/06/08/publication-of-the-implementing-decree-of-article-29-of-the-energy-climate-law-on-non-financial-reporting-by-market-players>

8 PBAF (2022) A Biodiversity Accounting Standard for the Financial Industry. Available at: <https://pbafglobal.com/standard>



Impact on biodiversity can occur via direct and indirect drivers. Source: GIST Impact (2023).

**Indirect impacts** can be greater, taking many forms – a company in Europe releasing carbon emissions from its factory, for example, which leads to Amazon rainforest dieback and impacts Amazonian biodiversity.

We cannot effectively address biodiversity loss without understanding, measuring, and valuing **both types** of impacts.

While the impacts of direct drivers of biodiversity loss are significant and should be investigated, the majority of the biggest companies by market capitalisation are in sectors that typically have mainly indirect impacts on biodiversity.

These indirect drivers include greenhouse gas emissions (GHGs), water extraction, water & land pollution (Nitrogen and Phosphorus), air emissions (such as oxides of Nitrogen and Sulphur) and impacts from end treatment/disposal of waste. While the indirect impact drivers might not have an immediate impact on biodiversity, the eventual scale of these impacts can be significant.

*In a world increasingly stressed by natural capital scarcities and risks, a company can only be said to be “future-ready” if it has a good understanding of, and viable management plans for, its most material natural capital impacts and dependencies*

### VISUALISING BUSINESS RISKS WITH PROXIMITY ANALYSIS

By using **proximity analysis**, companies with land use footprints can visualise direct risks better. The Integrated Biodiversity Assessment Tool (IBAT) is a powerful tool helping facilitate this process. The tool aggregates detailed global datasets on protected areas, species distribution, and key biodiversity areas, providing a comprehensive view of the potential impacts of corporate activities.

With this spatial data, IBAT allows businesses to understand biodiversity significance around where they have or might plan to have operations. For example, a mining company may use the IBAT tool to assess the biodiversity sensitivity of a proposed expansion site. By overlaying their proposed project areas with IBAT data, they can identify the presence of critical habitats and protected species nearby, enabling them to modify their project design to minimise negative impacts on biodiversity.

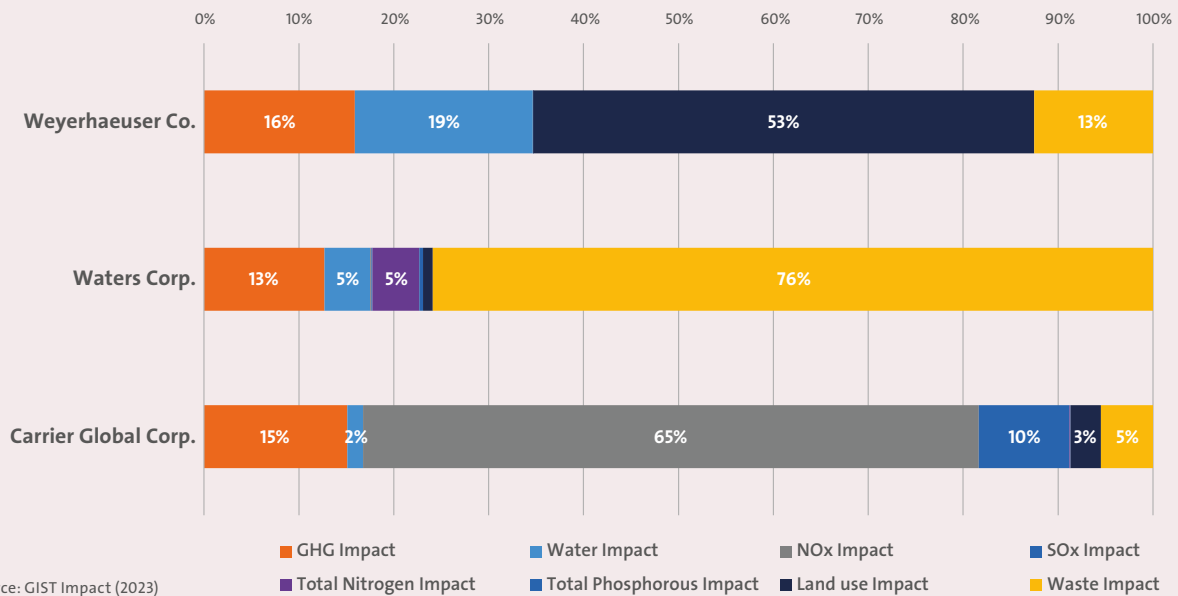
### BEST PRACTICES AND INNOVATIONS IN MEASURING BIODIVERSITY IMPACTS

Businesses are deploying a range of approaches to capture and harness data on their biodiversity impacts and dependencies, enabling them to make informed decisions and prioritise nature-positive investments.

### MEASURING BIODIVERSITY FOOTPRINTS WITH PDF AND MSA

For companies and investors looking to assess species-level biodiversity impacts, the TNFD framework offers a comprehensive set of recommended metrics. These include assessments of species richness through indicators of *destructive pressure* such as Potentially Disappeared Fraction of species (PDF), and indicators of *state of intactness* such as Mean Species Abundance (MSA).

### Comparative biodiversity impacts: contribution of drivers to PDF (2021).



PDF provides a helpful indicator of how specific business activities can increase the risk of driving species to extinction both directly (e.g. via land use change) and indirectly (e.g. via GHG emissions causing habitat loss). Using driver-specific PDF impact assessment data helps companies and investors analyse and manage their biodiversity impacts.

When comparing biodiversity impacts of three North America-based companies from different sectors (see above), the most prominent drivers emerge — for Weyerhaeuser, a timber company, 53% of impact came from land use (a direct driver) in 2021. In contrast, Waste and Air Pollutants (NOx and SOx) were respectively the primary drivers of biodiversity impact for Waters Corp (an analytical instruments and software manufacturer) and Carrier Global (an industrial machinery manufacturer).

**Mean Species Abundance (MSA)** is another helpful indicator to understand how primary sector businesses (e.g. mining, forestry) affect the abundance of species in an area. Using geographic information system (GIS) maps overlaid with business asset locations, MSA helps visualise and identify biodiversity hotspots or areas of concern, showing the state of biodiversity at different points in time.

In the example on the following page, the mining areas in China, India, and the USA were assessed using the MSA indicator. The difference between the mean MSA for country and mining areas shows the decline in MSA due to mining activity-led habitat loss and fragmentation. Showing this picture can help businesses

to identify the scale of the challenge they need to address to minimise their negative impacts.

### EVALUATING IMPACTS AND DEPENDENCIES ON NATURAL CAPITAL

Natural capital is defined as “the limited stocks of physical and biological resources found on earth and the limited capacity of ecosystems to provide ecosystem services”<sup>9</sup>.

*Biodiversity encompasses life at every stratum and operates at various spatial and temporal scales... capturing this complexity demands robust and scientific methodologies*

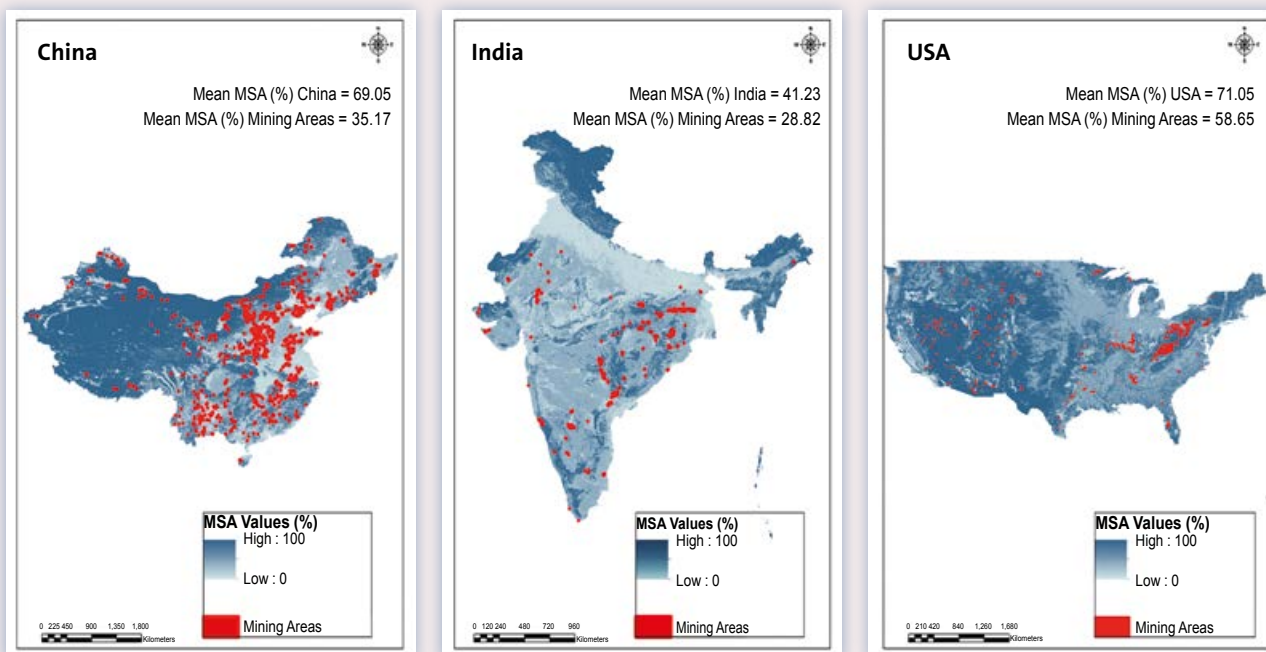
These ecosystem services provide substantial economic value and other benefits to society, and are pivotal for businesses and communities alike. By quantifying the value of ecosystem services companies can gain insights into their dependence on natural capital and the potential risks associated with its further degradation. Simultaneously, models of how materially a company and its value chain impact these ecosystems

through destruction of natural capital can size their damages: a social cost or externality which can be internalised by institutional changes, laws, and reputational or physical disasters.

In a world increasingly stressed by natural capital scarcities and risks, a company can only be said to be ‘future-ready’ if it has a good understanding of, and viable management plans for, its most material natural capital impacts and dependencies.

<sup>9</sup> TEEB (2010) The Economics of Ecosystems and Biodiversity. Mainstreaming the Economics of Nature.

## Mining areas using MSA indicators



Based on GLOBIO 4 Methodology (Alkemade et al., 2009), Source: GIST Impact (2023).

It should also be considered that some of the most material environmental drivers (such as air pollutants) have *human capital* impacts (such as the health costs of air pollution). The below coal-fired electric utility is a case in point:

The social costs of this utility are derived primarily from estimates of damages to human health. This company operates in population-dense areas in South-East Asia, and the health costs of the air pollution it releases are sizeable (\$2.76 billion) compared to the company’s annual turnover of \$6.6 billion. By quantifying the size of these impacts

in monetary terms, companies and investors can integrate these considerations into their decision-making processes and adjust its practices as needed.

A future ecological transformation that includes these more holistic measures of value could therefore fundamentally reshape how we think about the ways in which companies create or destroy value. Today, using these measures can help companies ensure they create not just financial value, but also human and natural value.

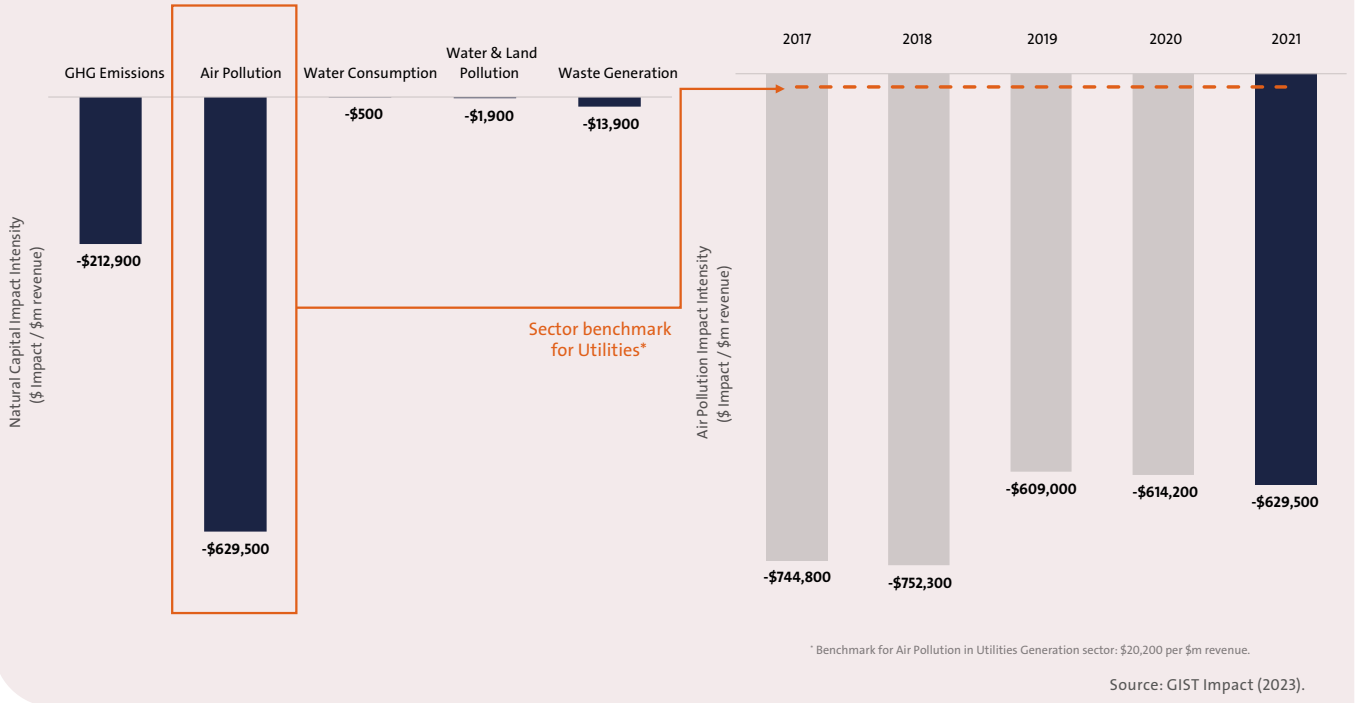
## Yarra Valley Water (Australia)’s Biodiversity Journey

As Melbourne’s largest water utility, Yarra Valley Water (YVW) recognised its responsibility towards sustainability and wanted to demonstrate its commitment and progress to restorative practices. In 2016, the company sought GIST Impact’s help to develop its first Integrated Profit & Loss Report and benchmark its environmental and social impacts.

During this process, the team unearthed a key insight – the company’s biodiversity impact from land clearing was greater (in terms of materiality) than its greenhouse gas impact. This finding prompted the YVW team to revise their corporate strategy. As a next step, YVW carried out a PDF biodiversity assessment of the approximate 1500 hectares of land it owned, spread across 190 sites. They identified 12 sites with high-value remnant biodiversity requiring enhanced protection and identified the top 10 restoration opportunities.

With data that quantified the value of these opportunities - and associated risks from inaction - the company was able to gain backing from its board to embed biodiversity into its corporate strategy, establish a business case for a biodiversity-focused programme, and start to implement via a series of strategic investments. The company also pledged to refund around \$1.5 million annually to customers if they failed to meet their biodiversity targets. This is a commitment to taking biodiversity protection seriously, and to embracing science-based approaches to measuring and valuing nature.

## Natural capital impacts of an Asian electric utility: across drivers, and over time



## UTILISING BIODIVERSITY DATA FOR CONTINUOUS IMPROVEMENT

Once biodiversity impacts and dependencies are measured, companies can use this data to drive improvement and conservation efforts, and support the ecological transformation. The potential benefits of measuring and valuing nature are substantial:

- Regularly tracking biodiversity metrics allows businesses to **monitor changes**, identify emerging risks, and assess the effectiveness of conservation initiatives.
- Transparently **communicating biodiversity performance** to stakeholders builds trust and accountability. Adopting global reporting **standards**, such as the TNFD, enhances credibility, comparability and, increasingly, access to favourable finance.
- Integrating biodiversity considerations into **corporate strategies** aligns business objectives with nature conservation goals, unlocking opportunities for innovation and sustainable growth.

## CONCLUSION

The power of data-driven approaches to measuring biodiversity impacts cannot be underestimated. Companies have a very significant opportunity to leverage innovative and advanced tools and assessment frameworks to understand, protect and enhance the value of biodiversity and ecosystem services; for their own businesses, and for the planet at large.

Armed with this knowledge, businesses can continuously monitor, report, and improve their biodiversity performance, and incorporate biodiversity considerations into corporate strategies. Real-world examples like Yarra Valley Water show the transformative potential of these practices, inspiring a path toward a sustainable future where corporate growth and biodiversity conservation can coexist. By embracing a truly innovative and scientifically robust approach to valuing nature, companies can become champions for ecological transformation, and play a key role as protectors and restorers of nature.