

May 2022

INSIGHT



Thematics Water

BIODIVERSITY AND WATER ...TWO SIDES OF THE SAME COIN

Why does biodiversity matter and what role does water play?

What exactly is biodiversity?

Although less well understood and appreciated than climate change risk, biodiversity and its associated risk is an integral part of the “E” part of an ESG investment framework, measured either directly as a topic, or indirectly through different items such as water management, effluents, waste management or resource use. While it is an admittedly broad and daunting concept, biodiversity is defined by the United Nations as ‘the variability among living organisms from all sources including...terrestrial, marine, and other aquatic ecosystems (and) includes diversity within species, between species and of ecosystems.’

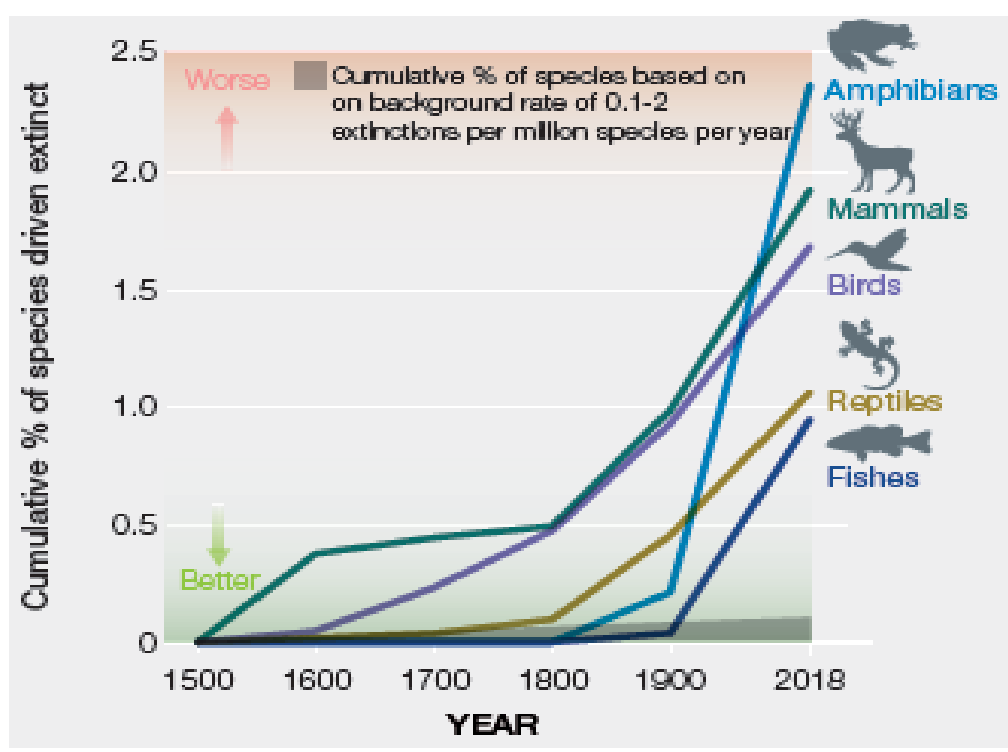
There has been a growing awareness on the importance of biodiversity and this trend is clearly accelerating in 2022. The landmark moment of 2022 will be the equivalent of the ‘Paris Agreement’ for nature – namely, the **UN Biodiversity Conference (COP 15)**. Having been being delayed several times due to the pandemic, the second part of COP 15 will take place physically in the third quarter of 2022 in Kunming, China. While none of the 20 goals that were initially set in 2010 for 2020 were fully met, COP 15 will see the negotiation of a post-2020 Global Biodiversity Framework for a nature-positive world by 2030. For example, the “30x30” target aims to protect 30% of land and sea areas by 2030

On the regulatory front, in March 2022 the EU Commission’s technical expert group published a detailed set of technical recommendations for the biodiversity objective of the EU Taxonomy. These recommendations will then be applied in 2023. By way of broader context - in France, Article 29 of the Climate law includes biodiversity considerations for the first time.

.... and why is this important?

Since 1970, according to the OECD, the world has lost 60% of its global vertebrate population, while in parallel more than 40% of insect species are declining rapidly. The planet is possibly facing its sixth mass extinction, arguably one of the most significant threats to society. If this isn’t a stark enough warning, the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES) has stated that ‘nature is declining globally at rates unprecedented in human history, and the rate of species extinctions is accelerating, with grave impacts on people around the world now likely.’

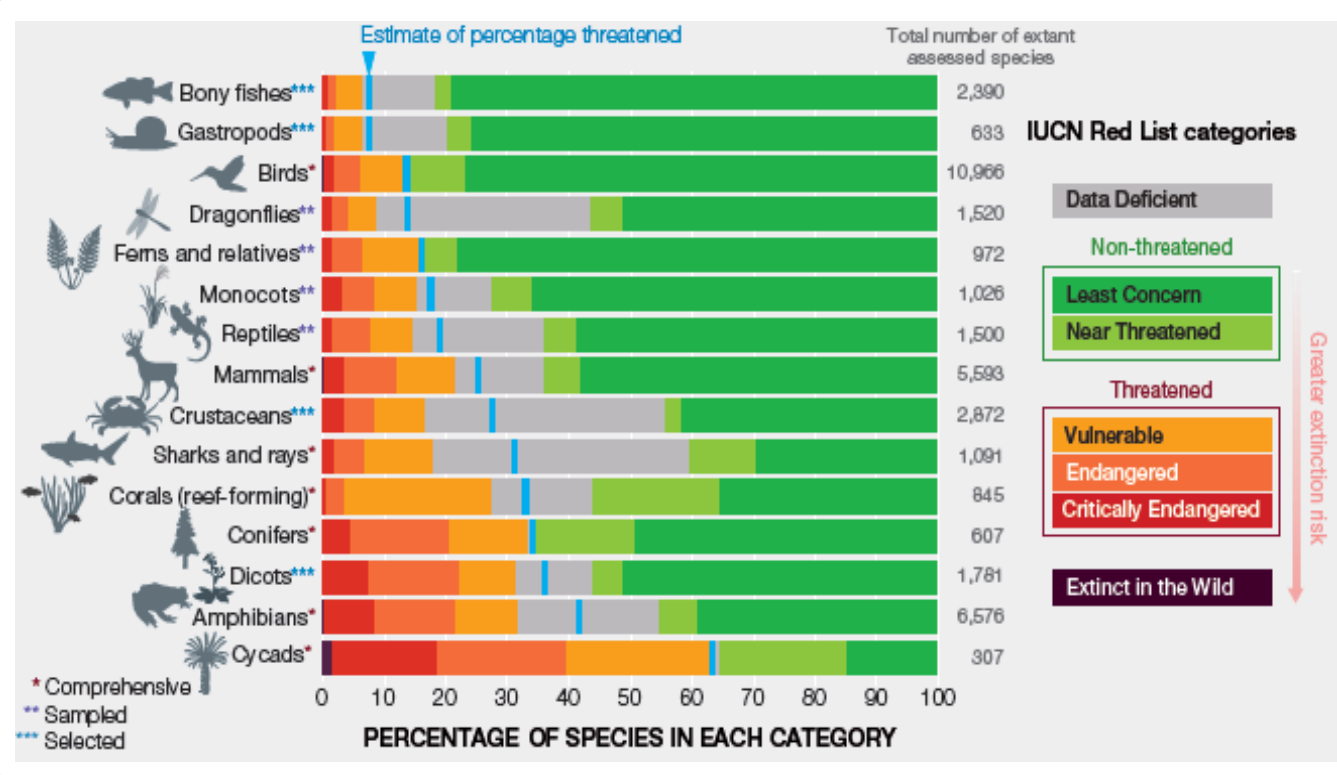
Extinctions since 1500



Furthermore, the IUCN (International Union for Conservation of Nature) assesses that more than 40,000 species are threatened with extinction, with cyclads (63%) and amphibians (41%) being most at risk.

Source: IPBES, Global Assessment Report on Biodiversity and Ecosystem Services. Nov 2019

Current global extinction risk in different species groups



Source: IPBES, Global Assessment Report on Biodiversity and Ecosystem Services. Nov 2019

The IPBES also identifies 5 direct human-driven causes of biodiversity loss (ranked by impact):

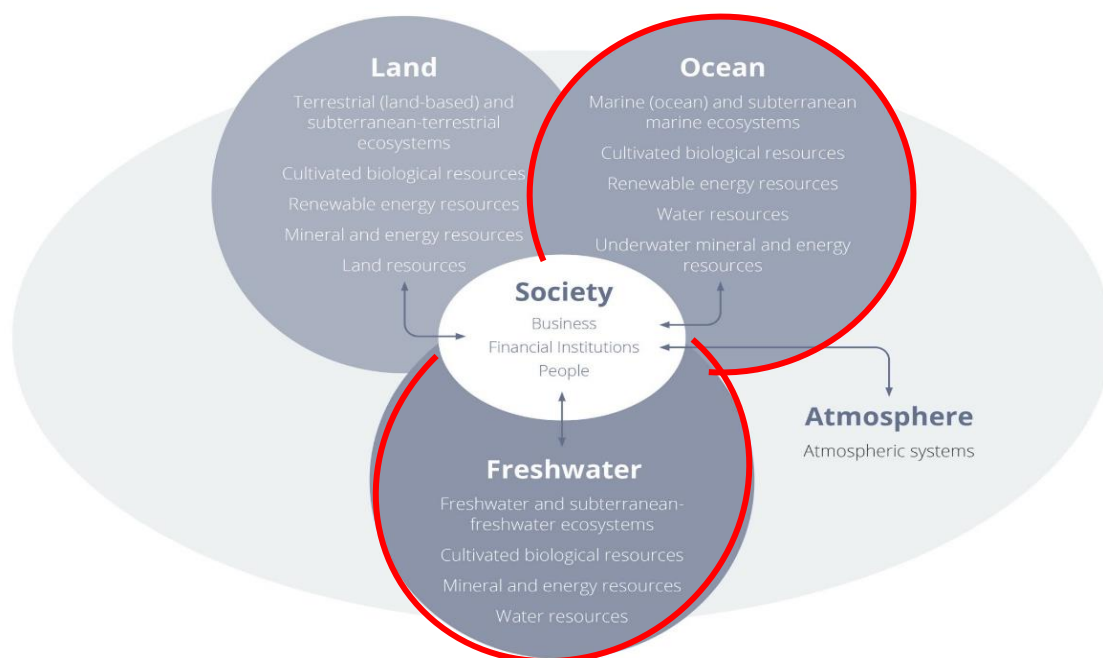
- **Changes in land and sea use**, driven primarily by agriculture, forestry, urbanization, and coastal development
- **Direct exploitation of organisms**, in particular overexploitation, of animals, plants, and other organisms, mainly via harvesting, logging, hunting, and fishing

- **Climate change**, which causes increase in average temperatures and an intensification of extreme weather events
- **Pollution** (air, water, and soil). Marine plastic pollution has increased tenfold since 1980
- **Invasive alien species**. The globalisation of trade and increased tourism have accelerated the introduction of invasive species into ecosystems (via ballast water in the shipping industry, for example)

Why does biodiversity matter and what role does water play?

As defined by the Natural Capital Coalition ‘natural capital is the stock of both renewable and non-renewable resources (e.g. plants, animals, air, water, land, minerals) that combine to yield a flow of benefits to people.’ Natural capital assets can be divided into 4 main groups or “realms”: **land, ocean, freshwater and atmosphere.**

Through ocean and freshwater resource management, water is a major component of natural capital assets



Source: The TNFD
Nature-related Risk &
Opportunity
Management and
Disclosure Framework
v0.1, March 2022

These natural resources provide services, known as ecosystem services, which benefit industry and are essential to our wellbeing.

Ecosystem services are grouped into three broad categories:

- **Provisioning services** represent the material outputs that are extracted or harvested from ecosystems (e.g. water supply)
- **Regulating and maintaining services** result from the ability of ecosystems to regulate biological processes and to influence climate, hydrological and biochemical cycles, and thereby maintain environmental conditions beneficial to individuals and society (e.g. water purification)

- **Cultural services** are the non-material benefits from nature (e.g., spiritual, aesthetic, recreational, and other)

Globally, these services were worth an estimated USD 125-140 trillion in 2011, or, more simply put, more than one and a half times global GDP in the same year (Costanza et al., 2014). However, the deterioration of biodiversity affects the stock of natural capital and the associated ecosystem services, which has severe consequences on business and society. This cost was estimated at USD4-20 trillion per year owing to land-use change alone (Costanza et al., 2014).

All economic activities depend upon and impact ecosystem services in multiple ways, either directly through operations or indirectly through supply chains. For example:

- **Companies depend on biodiversity to produce goods and services.** For example, for an electric utility company, the hydropower production depends on ecosystem services such as ground and surface water provision, water flow maintenance, climate regulation, flood and storm protection, mass stabilization and erosion control
- **Companies also have impacts on ecosystem services that may be positive or negative.** For example, the distribution sub-sector can have impacts on biodiversity through the atmospheric pollutants it emits

The materiality of dependency and impacts on biodiversity differs based on sectors. Based on a study conducted by the United Nations Environment Program and Global Canopy, the highest priority sub-industries based on their potential **dependencies** and **impacts** on biodiversity are the following:

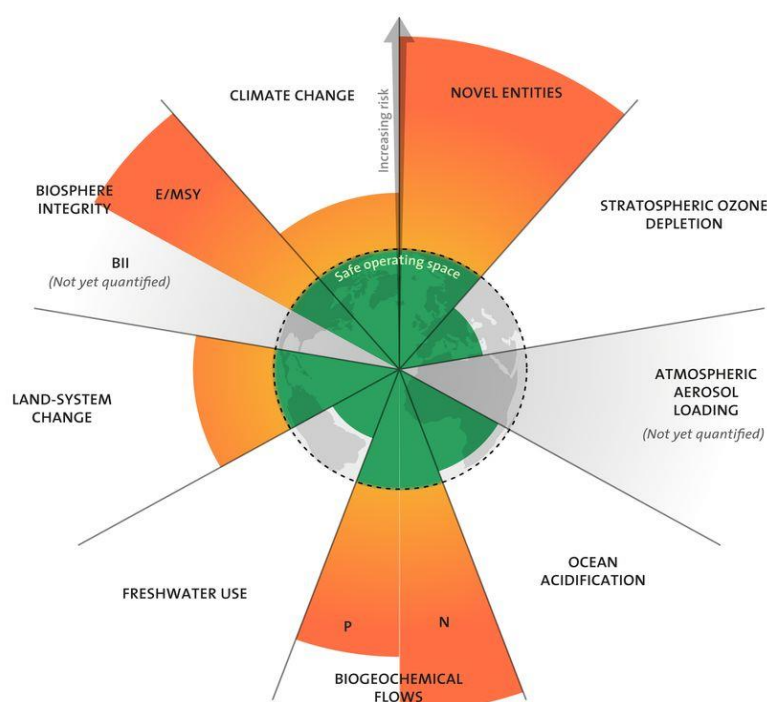
Dependency	Impact
Agricultural Products	Marine Ports & Services
Apparel, Accessories & Luxury Goods	Agricultural Products
Brewers	Airport Services
Distillers & Vintners	Oil & Gas Exploration & Production
Electric Utilities	Mining
Forest Products	Oil & Gas Storage & Transportation
Independent Power Producers & Energy Traders	Oil & Gas Drilling
Renewable Electricity	Distribution
Textiles	
Water Utilities	

Source: UN Environment Programme, UNEP Finance Initiative and Global Canopy June 2020. Beyond 'Business as Usual': Biodiversity targets and finance. Managing biodiversity risks across business sectors. UNEP-WCMC, Cambridge, UK

Biodiversity and climate

Despite the justified recent increased focus on climate change, the loss of biodiversity is more pronounced than climate change. If we look at the widely recognized “planetary boundaries” framework defined by the Stockholm Resilience Center, the loss of biosphere integrity (biodiversity loss and extinctions) has already crossed the safe operating space, meaning that it threatens the Earth system. In 2022, a group of scientists concluded that humanity has also exceeded a 5th planetary boundary related to environmental pollutants and other “novel entities” including plastics.

5 planetary boundaries have been crossed



The combined crisis of climate change and nature loss are tightly interconnected, and they must be addressed in tandem, with climate change a direct threat to biodiversity. At the same time nature plays an important role in carbon storage: half of anthropogenic CO₂ emissions are absorbed by natural sinks such as oceans, vegetation, and soils. However, ecosystem degradation through land-use changes is a major contributor to cumulative CO₂ emissions, and therefore is an additional driver of climate change.

Source: designed by Azote for Stockholm Resilience Centre, based on analysis in Persson et al 2022 and Steffen et al 2015. Jan 2022

Biodiversity and finance - TNFD

Through their investments, business impacts and dependencies on biodiversity translate into risks to financial institutions. The **Taskforce on Nature-related Financial Disclosures** (TNFD) – an equivalent of the TCFD for biodiversity – was established to develop and deliver a risk management and disclosure framework to report and act on nature-related risks.

The TNFD defines nature-related risks as “the potential threats posed to an organization linked to its, and other organisations’ dependencies on nature and nature impacts”. These can be derived from three types of risks:

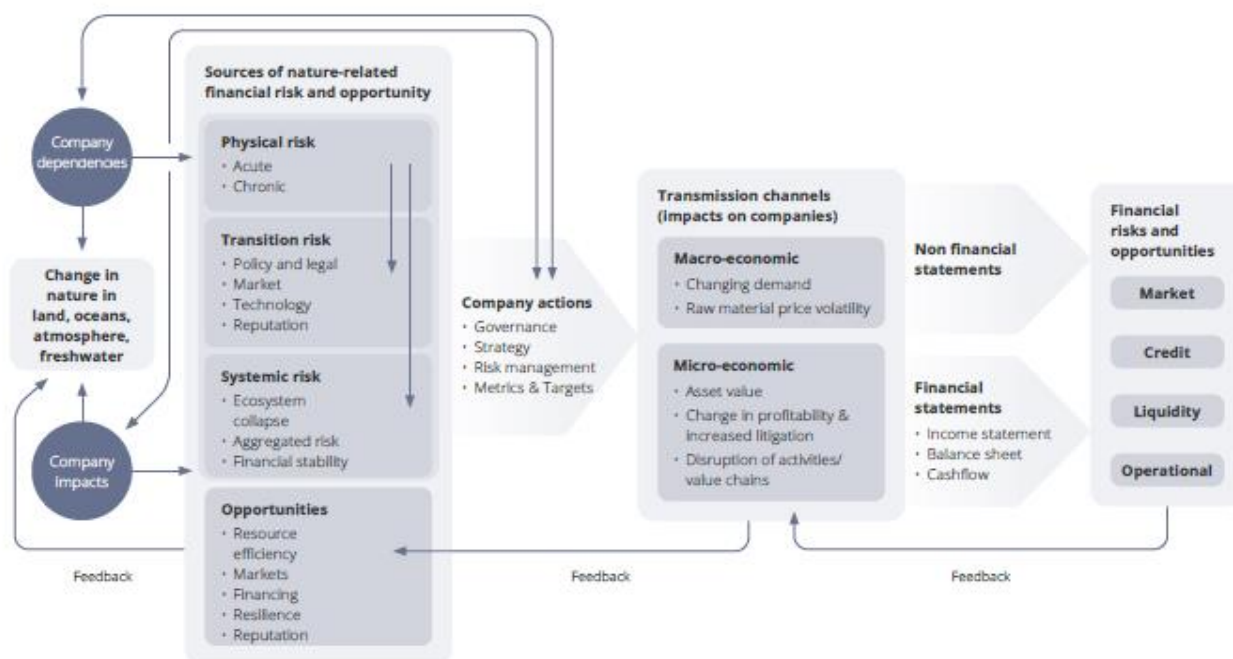
- **Physical risks** - a direct result of an organization’s dependencies on nature (e.g. natural disasters, loss of crop yield)

- **Transition risks** - from a misalignment between an organisation's or an investor's strategy and management and the changing landscape in which it operates (e.g. policy and legal, market, technology, reputation risks)
- **Systemic risks** - from the breakdown of the entire system, rather than the failure of individual parts (e.g. loss of a keystone species which has a critical role in an ecosystem)

The TNFD defines nature-related opportunities as 'activities that create positive outcomes for corporates and/or financial institutions and nature by avoiding or reducing impact on nature or contributing to its restoration.'

The complex interplay of nature-related dependencies and impacts on company and investor performance is summarized below:

Current global extinction risk in different groups of species



Source: The TNFD
Nature-related Risk
& Opportunity
Management and
Disclosure
Framework v0.1,
March 2022

To assist corporates and investors on nature-related risks and opportunities, the TNFD has developed a qualitative assessment framework called LEAP:

- Locate your interface with nature
- Evaluate your dependencies and impacts
- Assess your risks and opportunities
- Prepare to respond to nature-related risks and opportunities, and to report to investors

Unlike a carbon footprint, measuring the biodiversity footprint of a company or a portfolio is a more challenging task. There is no unique foot printing metric such as the tonnes of CO2 equivalent, and data is more localised.

Still, several methods have been recently developed by different data providers like Iceberg Datalab (Corporate Biodiversity Footprint) or Carbon4 Finance and CDC Biodiversité (Biodiversity Impact Analytics powered by GBS). They use indicators describing species richness and relative abundance as a proxy for overall biodiversity. These models do not directly count the relative abundance of a species in a location but measure it indirectly through a pressure-impact model. They follow a three-step process:

- They first gather environmental data on the products' flows of companies (e.g. cubic meters of water consumed, NOx emissions, CO2 emissions)
- They convert these product flows into environmental pressures. For example, phosphorous emissions can lead to eutrophication of freshwater
- They translate these pressures through pressure-impact functions into the same biodiversity impact unit as MSA

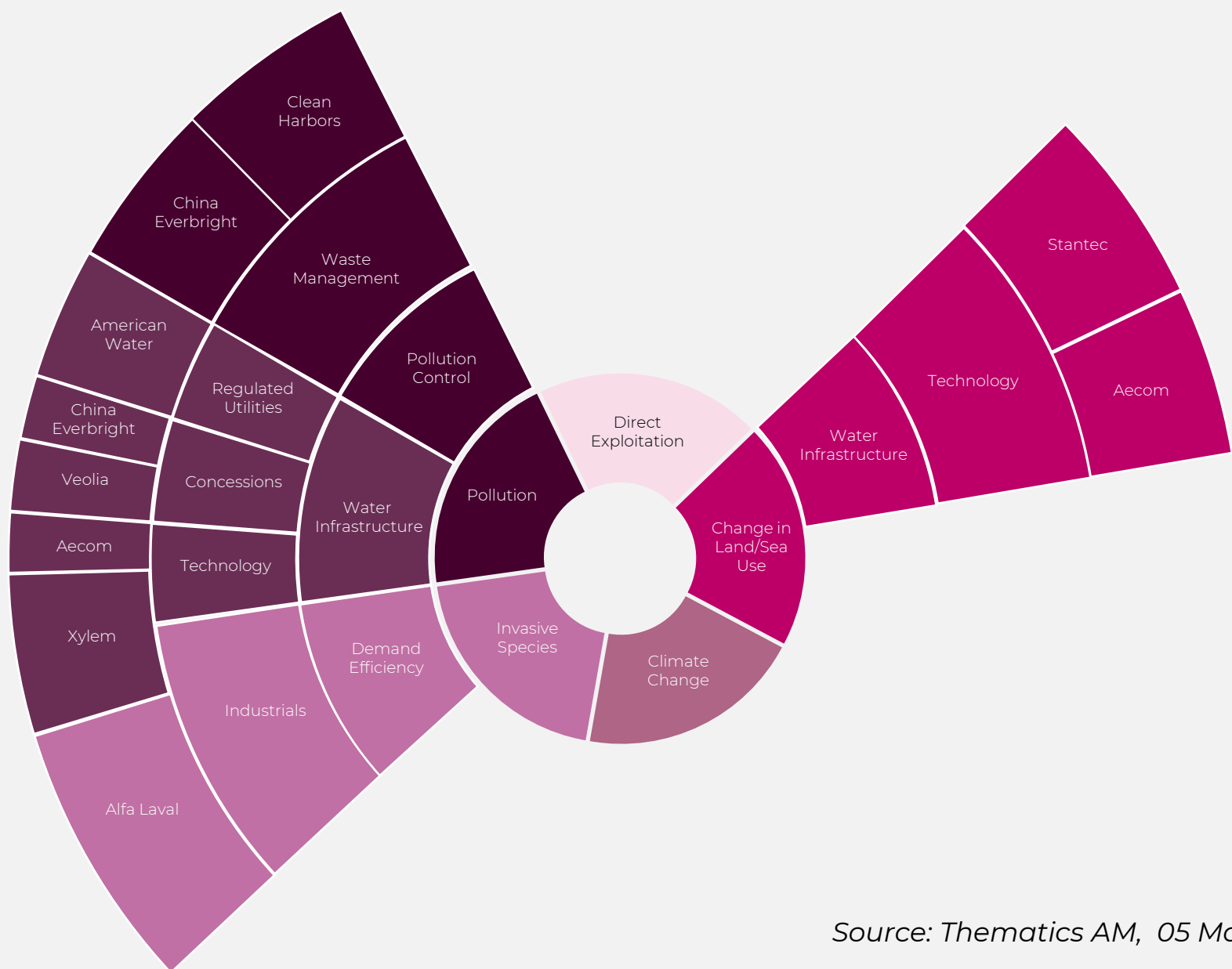
Several challenges and limitations of these models include:

- Indirect measure of biodiversity
- Data availability
- Not all types of pressures are currently covered (invasive alien species for example)
- Positive biodiversity impact is not yet covered

How investing in water preserves biodiversity

We have already seen that water is a key building block in sustaining biodiversity and want to emphasize the positive impact that well-sourced ideas can have in the water investment ecosystem. We similarly believe that water funds can play a role as a critical plank in the broader mandate of biodiversity investments. Within our investable universe, we see three principal areas into which we can invest to maintain and develop biodiversity - namely **pollution, invasive species** and **change in land/sea use**. Offering a portfolio with a wide range of possible investments in these areas that follow a strict ESG and SFDR Article 9 framework, we aim to generate superior returns for our clients, coupled with a positive impact associated with their investments.

Below, we share a chart of how certain stocks within our investable universe fit within the five main drivers of biodiversity loss highlighted earlier in this paper, to frame the diverse opportunity set that we can access through a biodiversity lens.



Source: Thematics AM, 05 May 2022

Pollution

In 1950 the world produced 2 million tonnes of plastic per year. Since then, annual production has increased nearly 200-fold, reaching 381 million tonnes in 2015. While the exact amount of plastic that has entered the world's oceans is obviously unknown, estimates from Science magazine (vol 347, no.6223) point to 275 million metric tons of plastic waste generated in 192 coastal countries in 2010, with 4.8 to 12.7 million MT entering the ocean. The cumulative quantity of plastic waste available to enter the ocean from land is predicted to increase by an order of magnitude by 2025. There have been many documented incidences of the impact of plastic on ecosystems and wildlife. Peer-reviewed publications of plastic impacts date back to the 1980s and typically cover issues such as entanglement, ingestion (including the impact of microplastics on wildlife and humans). Due to the fact that, at current rates, plastics are expected to outweigh all the fish in the sea by 2050, we believe plastics represent the most immediate challenge to ocean health and biodiversity globally, along with the incursion of hazardous chemicals and raw sewage into ground and surface water which then ultimately find their way to the ocean. Furthermore, we recognize that more must be done to stop the spread of non-native flora and fauna which can have a similarly detrimental local effect on biodiversity.

That said, within our investable universe, there are companies that provide services and technologies which are actively preventing this plastic and hazardous chemical pollution, as well as treating collecting and treating recovered materials (typically these companies operate in the waste management space), while more conventional water treatment technologies have been shown to have a positive effect on certain non-native species outbreaks..

Specific to this activity, we would point to Veolia, a company that is among the global market leaders in offering water and waste management services to municipalities, cities and industry. While Veolia has assets to sort, recycle and reprocess waste plastics collected on land, it is also running the European research project MEDITPLAST (Microplastics in Toulon Territory and Bay) launched in 2019 to assess the performance of wastewater treatment plants in reducing microplastics, as well as their environmental impacts on the Mediterranean coastal ecosystem.



US-based hazardous waste management business Clean Harbors facilitates thousands of Household Hazardous Waste (HHW) and pesticide collection programs throughout North America—collecting paints, solvents, batteries, fluorescent lamps, pesticides, cleaners and other hazardous materials. Through its highly regulated network of specialist disposal facilities, companies such as Clean Harbors provide a vital service in terms of protecting water resources and the ocean from pollution.



In the US, we would point to a business such as Xylem as having a diverse range of water treatment technologies, from ozone treatment through to remote water quality monitoring systems; Xylem has focused increasingly on making basic water and wastewater networks evolve into smart, integrated networks with a variety of technological applications to enhance their hardware offerings.



On the other side of the world, we would highlight the example of China Everbright Environment a Chinese water and waste treatment company. While water is often a very local problem, biodiversity issues are global. China Everbright builds, owns and operates water and wastewater treatment systems as well as waste processing plants for Chinese cities, where pollution and extreme weather problems are often most severe.

The investable universe also focuses on the pollution of and sustainability of groundwater and the development of so-called bio infrastructure. Groundwater and more specifically aquifers are a major source of water for us all, but, when depleted, they do not refill – placing unique emphasis on the intelligent and sustainable stewardship of such resources. In the US, 29% of fresh water is sourced from aquifers. These water sources can be highly impacted by floods, and water retention, while contamination can also be a serious problem, often and notably, by saltwater ingress from the ocean. In addition to being a great source of water for us, groundwater sources also offer places of refuge for a wide and diverse range of flora and fauna.



US Utility American Water is at the forefront of groundwater and aquifer sustainability in the US. While large civil engineering projects are those that are most closely associated with large corporates, and often for a very good reason, American Water has undertaken a prairie grass planting project in Indiana and Missouri in order to measure the positive impact they have on wildlife and to re-implement a degree of natural flood and drought protection. As important as water storage and flood control is, wastewater treatment is also vital. With the earth's population ever-expanding, wastewater and its disposal are becoming a growing concern for biodiversity – and as the largest quoted, regulated US utility, American Water represents one of the most direct ways to gain access to the steward of a range of water and wastewater treatment technologies.

Invasive Species

Oceans are not only affected by external human pollution such as plastics and chemicals. The invasion of non-native species allowed by humans is also an issue. One example would be that of zebra mussels which were brought by boats' ballast water systems to the great lakes in the late 1980s. This invasive non-native species has radically endangered local wildlife through its impact on the local food chain. The mussels can even incapacitate power plants which, in some cases, have been required to spend millions of dollars each year to remove them from clogged water intakes. Swedish group Alfa Laval (among others) has a UV disinfection-based ballast water solution for the marine industry which allows flow-through UV systems to kill zebra mussels and prevent them from attaching to downstream surfaces



Change in land and sea use

When looking at changes in land and sea use, environmental consultants such as Stantec and Aecom (Canadian and US respectively) are examples of companies that contribute positively to biodiversity through the creation of better and more sustainable infrastructure. A key, recurring business stream is the production of biodiversity impact assessments, to provide clients with an iron-clad guarantee that the activity they will undertake is compliant from a biodiversity standpoint. This activity identifies, measuring, quantifies, values, and internalizes the potential negative impacts of large-scale projects which the consultants typically then oversee from feasibility to commissioning..



Conclusion

With a range of government and non-government entities sounding the alarm on the need for a greater focus on biodiversity, it is clear that considered investments in the water value chain can provide a solution to one of the greatest challenges faced by the human race. As is so often the case, we can see from the evidence presented in this paper that the cost of action is far outweighed by the cost of inaction and believe that water's intrinsic importance in creating a sustainable biodiverse world is as critical to global health as drinking the resource itself.

We believe it is too narrow a goal to simply pursue a low-carbon future – and view, as we have stated, the combined crises of climate change and nature loss as being intrinsically interlinked. To this end, we would urge any and all sustainability-focused investors to broaden the scope of their investments into those that cover both topics - with climate change a direct threat to biodiversity, and with biodiversity a hugely important sink for carbon. Can we afford one without the other?

The Team



Simon Gottelier is a Partner of Thematics Asset Management and a Senior Portfolio Manager of the Water strategy. Simon has managed a diverse range of Thematic strategies and vehicles for a range of clients for 18 years and was previously the manager of the two largest global Water funds before co-founding Thematics with his business partners.

Arnaud Bisschop is a Partner of Thematics Asset Management and the co-Manager of the Water strategy. Before co-founding Thematics, Arnaud spent more than 10 years in Geneva managing the world's largest Water fund, as well as a range of mandates for sovereign and institutional clients.



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