MARKETING MATERIAL FOR PROFESSIONAL INVESTORS AND ADVISERS ONLY

ASSESSING OUR IMPACT ON NATURE NATURAL CAPITAL AND BIODIVERSITY

DECEMBER 2021

The visibility of nature-related and biodiversity risks is improving. Policy momentum is building and investors and regulators are increasingly attuned to corporate environmental performance beyond climate change. Progress on policy and reporting frameworks for climate change can serve as a blueprint for naturerelated risks, enabling a much swifter response from regulators and investors.

This paper will establish what we mean by natural capital and biodiversity, why it is essential to the ongoing functioning of our economies, and why it is relevant for corporates and investors. We will explore the sectors that are particularly exposed and how we might go about assessing this exposure, recognising that data and approaches across the industry are changing quickly.

The topic of natural capital and biodiversity is farreaching and encompasses a number of sub-themes, including deforestation, sustainable food and water, pollution, as well as the circular economy. We will explore these in a series of thematic research papers.

NATURE GENERATES VALUE: WITH NATURE LOSS WE LOSE THAT VALUE

Governments, investors and corporates are alive to the threat posed by inaction on climate change. National net zero emissions targets now cover well over 70% of global emissions and GDP, and corporates are starting to follow suit. Broader environmental threats get much less air time – but this is starting to shift, with increasing recognition of the vital role that nature plays in the functioning of our economies. In 2021, the World Economic Forum (WEF) identified biodiversity loss and ecosystem collapse as one of the top five risks in terms of likelihood and impact in the coming 10 years – behind infectious diseases, climate action failure, and weapons of mass destruction.



Catherine Macaulay Sustainable Investment Analyst



Niall Smith ESG Models and Data Analyst

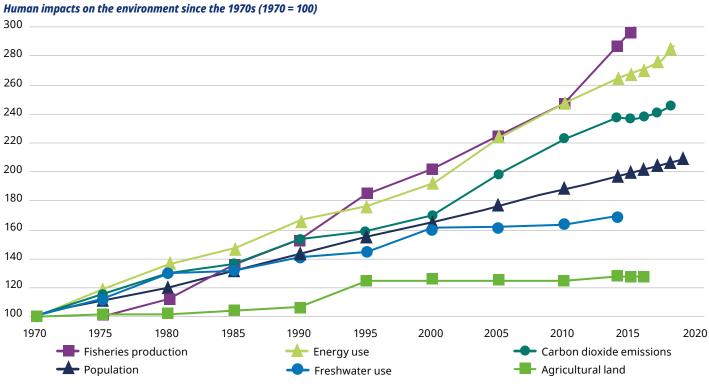
Natural capital refers to the stock of renewable and nonrenewable natural assets, including everything from soil, forests, air, water, geology, and all living organisms. We've written more about this <u>here</u>. Biodiversity is an important element of natural capital and, put simply, refers to the variety of living things in a given area. This variability is vital for the healthy functioning of ecosystems which in turn provide a multitude of goods and services that underpin our economies. These include everything from direct goods such as food, energy, and medicinal resources, to services provided by nature, such as water filtration, crop pollination, carbon sequestration, climate regulation, and flood protection, to name just a few. The WEF estimates some <u>\$44tn</u> of economic value generation (>50% of global GDP) is either moderately or highly dependent on nature.

The services that nature provides, termed 'ecosystem services', almost always go unpriced, resulting in their excess use. In some instances they are even negatively priced through environmentally harmful subsidies – in the agricultural sector, for example, total well over \$100bn per year. This has resulted in ecosystem decline and degradation as well as rising ecological scarcity. Natural forests are declining at unprecedented rates, wetlands are disappearing, 30% of corals have already been killed and a further 75% are at risk of bleaching, and vertebrate species populations have declined by close to 70% since 1970. To put this in perspective – this level of nature loss is tens to hundreds of times the average rate over the past 10 million years, and is on par with previous mass extinctions (of which there have been five in the last 450 million years – all as a result of natural rather than human causes).¹

1 https://www.pnas.org/content/117/24/13596



The 'Great Acceleration':



Source: Barbier, E.B. 2022. Economics for a Fragile Planet.

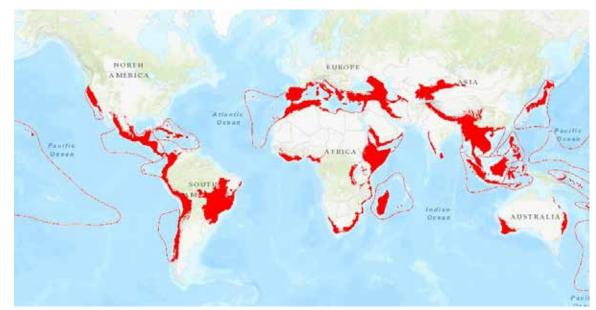
A QUICK OVERVIEW OF THE SCIENCE

There are five key ecosystems that are of systemic importance:

Oceans	Coastal	Freshwater	Forests	Peatlands
 Important carbon sink; provides ~80% of world's oxygen Critical in rain cycle Important source of food and livelihoods Coral reefs are natural wave barriers Key threats include overconsumption, pollution, tourism, and climate change 	 Includes mangroves, lagoons and tidal marshes Highly biodiverse environments and important carbon sinks (can sequester >2x the amount of carbon of tropical rainforests) Key threats include tourism and development 	 Includes ground ice and permafrost, swamps, marshes, rivers and lakes Freshwater ecosystems account for 1% of all freshwater but support 55% of all fish Very fragile, higher extinction rates than marine and terrestrial species Key threats include overuse, pollution and water diversions 	 Tropical rainforests, temperate forests and boreal forests Highly biodiverse (~80% of terrestrial animals and plants found in forests) and important carbon sinks Key threats include deforestation, wildfire, agriculture and urbanisation 	 Peatlands are wetland ecosystems. They are waterlogged, which slows the process of decomposition, resulting in accumulation of peat or turf Largest store of carbon on land and important in regulating water flows to minimise flooding and drought At risk of peatland drainage

These are distributed across "biodiversity hotspots" – defined as areas that hold very high numbers of species of plants and animals, and that are under threat of habitat destruction and disruption. There are currently 36 biodiversity hotspots across the globe, as shown in the map below. These are under threat from five direct drivers of nature and biodiversity loss:

- **1. Land and sea use change:** activities that change the natural environment and result in habitat destruction and fragmentation, including agriculture, deforestation, mining, infrastructure and urbanisation.
- **2.** Natural resource use and exploitation: Direct extraction of living organisms resulting in habitat destruction and fragmentation such as hunting, fishing, logging, and harvesting.
- **3. Climate change:** Climate change adversely affects genetic variability, migration patterns, ocean acidification, and species richness.
- **4. Pollution:** Includes industrial waste, fertilizer runoff, and plastic pollution.
- **5. Invasive species:** Can pose threats to indigenous species; caused by transport, climate change and tourism.



Biodiversity hotspots

Source: Conservation International, Data Basin.



THE LINK BETWEEN NATURAL CAPITAL AND CLIMATE CHANGE

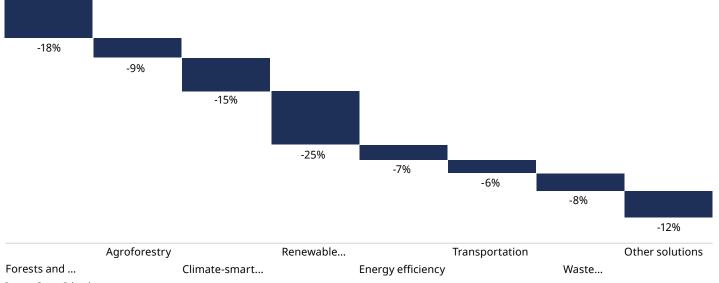
The natural environment and biodiversity play a vital role in limiting climate change. Forecasting suggests that forests and other natural ecosystem solutions will account for over a quarter of the mitigation needed to limit global temperatures to within 1.5 degrees C by 2050. Given the scale of action required to forestry and other natural carbon sinks, decarbonisation strategies and policies must consider broader impacts on natural capital and biodiversity.

ECONOMIC IMPACTS

The potential economic impacts are large: the World Bank estimates that a partial ecosystem collapse² could cost 2.3% of global GDP (or \$2.7 trillion) per year by 2030. These impacts would be disproportionately borne by developing nations given reliance on pollinated crops, forest products and limited ability to switch to alternative modes of production.

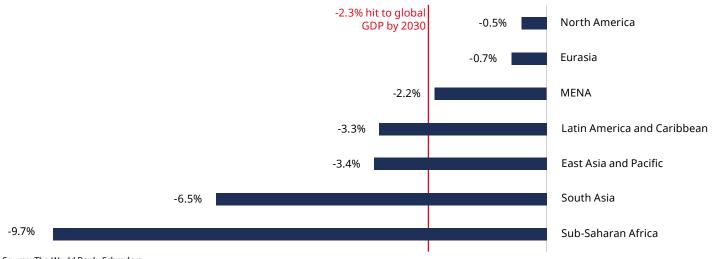
2 Partial ecosystem collapse is defined as a collapse in three key ecosystem services: wild pollination, marine fisheries, and timber provision.

Mitigation potential of climate solutions to limit global warming to 1.5 degrees C (2020-2050)



Source: Ceres, Schroders.





Source: The World Bank, Schroders.

There are a number of transmission channels through which this macroeconomic deterioration can occur. Biodiversity risks impact companies through business disruption, stranded assets, as well as changing demand and increased costs – all of which can hamper profitability. The aggregate impacts of these can result in reduced productivity, price shifts, capital destruction, and labour market frictions.

Macroeconomic transmission channels for nature related financial risk

Biodiversity risks	Impact on companies	Financial risks	
Physical risk: land and sea use change;	- Disruption of activities or supply chain	- Market risk: risks to investments	
overexploitation; climate change; pollution; invasive species	 Raw material price volatility 	 Credit risk: rising risk of default 	
Transition and reputational risk: changing policy landscape, and	 Adjustment or relocation of activities 	 Liquidity risk: liquidation risks; cost of debt refinancing 	
investor and consumer expectations	 Pricing externalities 	 Business risk: legal, regulatory and 	
	– Stranded assets	reputational costs	

Source: University of Cambridge Institute for Sustainability Leadership, Schroders.

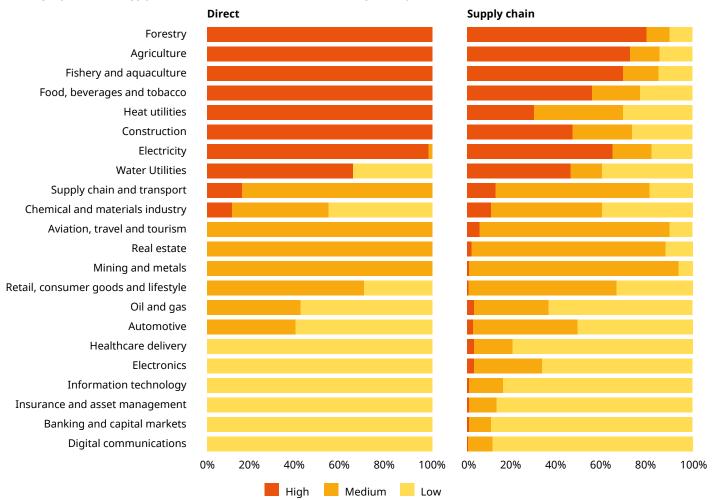
NATURE AND BIODIVERSITY RISKS AS THE NEXT FRONTIER OR CORPORATES

Risks surrounding nature and biodiversity loss are highly relevant to companies, which are embedded in the natural environment through their dependence and impact on natural resources. We see four key risks for corporates:

RISK	DESCRIPTION	EXAMPLES
OPERATIONAL AND SUPPLY CHAIN RISKS	Exposure to geographies in which nature loss is occurring through direct operations and supply chain. This can disrupt business continuity, for example through water shortages or reduced rainfall leading to lower crop yields. This is particularly relevant for companies operating in regions with higher exposure to nature-related risks, and for end markets that are reliant on goods and services provided by nature, including the food, agricultural, apparel and forestry industries.	Australian agricultural income declined by 46% in the 2002/2003 drought. Mismanaged species introductions as agricultural pests estimated to cost \$100 billion per year. Flooding linked to deforestation in South Asia in 1998 estimated to cost \$24 billion. Soil erosion in Europe estimated to cost €53 per hectare per year.
REGULATORY RISKS	The policy landscape is still nascent when it comes to regulating nature-related risks, in large part due to difficulties in measuring and reporting on these risks. Momentum is building, with major economies committing to ambitious nature goals and regulation starting to follow suit. Climate disclosure and reporting frameworks provide a blueprint for nature-related reporting.	EU proposal to reduce fertiliser use by >20% by 2030 poses material risk to sales for chemical companies. China's securities regulator moved to ban IPOs that have violated environmental protection rules in 2016.
RISKS TO CONSUMER AND INVESTOR SENTIMENT	Consumers and investors are increasingly attuned to environmental issues, presenting a risk for laggards, who may suffer reduced demand for their products and services or an increased cost of capital.	A <u>study</u> found that 82% of consumers would be willing to change product purchases in favour of sustainable palm oil. Investors have <u>threatened</u> to divest from companies associated with deforestation in the Amazon.
LIABILITY RISKS	Includes any fines or pay-outs that may arise as parties seek compensation for losses associated with nature loss, and also covers legal costs, insurance and financing costs.	Deepwater Horizon explosion in the Gulf of Mexico in 2010 cost BP >\$18bn in fines.

A number of sectors are particularly exposed to these risks, either because of greater dependence on natural resources to produce their services and products, or through greater impact on the natural environment through their operations and supply chains. The WEF's table below highlights sectors that have high levels of dependence on nature, either through their direct operations or through the value chain. The number of sectors that are reliant on nature highlights the breadth of exposure: nature-related risks are deeply interlinked with investment portfolios.

Percentage of direct and supply chain Gross Value Add (GVA) with nature dependency



Source: WEF, PwC.

A key part of the challenge is that there is no universally agreed upon framework or metric to measure impacts on nature, in addition to practical challenges of measurement. Some of the more commonly used methods include Mean Species Abundance (MSA) and Environmental Profit & Loss (EP&L):

- MSA is a measure of biodiversity intactness. MSA is given per km2 as a range between 0 to 1, with 1 indicating a fully intact environment. <u>Schneider Electric</u> reported its biodiversity impact in MSA/km2 in 2020.
- EP&L quantifies a company's impact on the environment in monetary terms and includes a number of biodiversityrelated indicators, including emissions, land use and water consumption. This approach was pioneered by <u>Kering</u> and has also been used by <u>Philips</u>.

However, these are still fairly infrequently used and it is challenging to draw comparisons. Some of these challenges will be alleviated in time as industry-wide frameworks and standards emerge, as discussed in the next section – but we are still at least a couple of years away from standardised metrics for measuring biodiversity impacts. In the meantime, we can still assess companies' level of ambition, the quality of their governance and oversight mechanisms, supply chain management and disclosure practices, as well as engagement with wider industry initiatives to tackle biodiversity loss.

POLICY MOMENTUM AND INVESTOR SENTIMENT IS BUILDING

An assessment of intergovernmental progress on biodiversity to date paints a fairly bleak picture. The UN Convention on Biological Diversity (CBD) set a series of targets in 2010, known as the <u>Aichi targets</u>, with a 2020 target date – and not a single one has been achieved.

We see a step change in momentum at the intergovernmental level. The latest UN Biodiversity Summit (COP15) - the first half of which took place in October 2021 and will be concluded in May 2022 - aims to establish the post-2020 global biodiversity framework. The draft plan includes pledges to halt biodiversity loss by 2030; ensure that 30% of land and sea areas are conserved and that 20% of degraded areas are under restoration. The plan also includes commitments to eliminate plastic pollution and reduce pesticide use, as well as redirect and eliminate \$500bn worth of subsidies that contribute to nature and biodiversity loss. The hope is that COP15 will serve as a Paris-equivalent agreement on nature. G7 nations had already committed to a 2030 Nature Compact at the most recent conference in the UK in June 2021, and 196 nations adopted the Kunming Declaration in October, signally broad based political support and paving the way for the adoption of the post-2020 framework in May 2022.

Yet despite this increased momentum, challenges in translating these high level commitments into action still remain. A key takeaway from the intergovernmental process on tackling climate change, which dates back to the 1992 Earth Summit in Rio de Janeiro, is that it can be protracted at best and ineffective at worst. This is in large part due to the voluntary nature of these international commitments and lack of enforcement mechanisms, as former US President Donald Trump's withdrawal from the Paris Agreement exposed. The challenge is even greater for broader natural capital risks than it was for climate change given difficulties in measuring and assessing performance. It therefore seems unlikely that international cooperation will be the primary driver of change.

However, these intergovernmental commitments are indicative of growing political support at the national level, and many of these commitments are starting to filter through into national policies and strategies. In Europe, the Commission's biodiversity strategy for 2030 plays a central part in the European Green Deal and will establish binding nature restoration targets later this year. The Sustainable Finance Disclosure Regulation (SFDR) also incorporates a company's impact on biodiversity sensitive areas under the principal adverse impacts framework. Recent legislation in France (Article 29 of the Energy and Climate Law) will also require disclosure of biodiversity impacts from financial institutions. In the UK, the Environment Bill seeks to set legally binding targets on species abundance by 2030 and introduce a sustainable farming scheme that will provide financial incentives to farmers for conservation and preservation activities.

Many of the reporting frameworks that have been established to tackle climate change are now being developed for nature. While these may be some years out, we see growing pressure on corporates and investors to effectively assess, manage and disclose on their nature-related risks.

The Task Force for Nature-related Financial Disclosures (TNFD), for example, is set to launch its framework in 2023. This will be modelled on the Task Force for Climate-related Financial Disclosures (TCFD), which sets out best practice in climate reporting and is fast becoming mandatory across numerous geographies. The Science Based Targets Network is also developing Science Based Targets for Nature (SBTN), which will provide guidance to corporates on assessing nature-related risks and setting effective targets. Nature Action 100+ (NA100) will leverage these frameworks to collaboratively engage with companies that are of the greatest importance to tackling biodiversity and nature-related risks, much in line with its action on climate (CA100). Beyond this, organisations such as the Climate Disclosure Project and Forest 500 are helping to establish best practice.

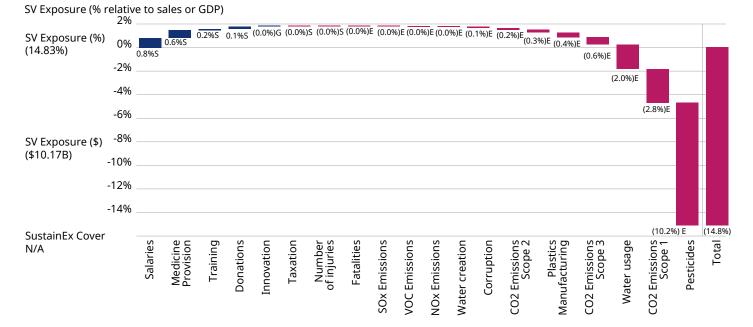
While there is still a long way to go in creating effective policy mechanisms to address nature-related risks, the direction of travel seems clear. Progress made in climate action and disclosure can serve as a blueprint for policymakers and investors alike.

ASSESSING OUR EXPOSURE AND IMPACT

NATURAL CAPITAL AND BIODIVERSITY IN OUR TOOLS AND ENGAGEMENTS

Issues surrounding natural capital and biodiversity have factored into our research and engagements for many years. Within our suite of proprietary tools, we assess company and sovereign performance on key natural capital criteria, seeking to place an economic value on the environmental externalities that are driving nature loss. For companies, our tools incorporate measures such as a company's ecological footprint, its Forest 500 score and whether or not it has a biodiversity policy. We also measure fertiliser use, heavy metal pollution, waste production and water consumption. At the sovereign level, we assess biodiversity loss using Yale's Environmental Performance Index. We also assess net carbon emitted or sequestered as a result of i) changes occurring on forest land and ii) net forest conversion from forest land to other land uses. In addition, we look at ocean pollution as well as carbon and other emissions.

An example of the social and environmental externalities created by a multinational chemicals company, captured in our proprietary SustainEx tool



ASSESSING OUR IMPACT ON NATURE 7

We have also engaged with more than 200 companies on the topic of biodiversity since 2018, including over 100 companies that we spoke to to understand the risks associated with plastic pollution across the full value chain.

We recognise that there are myriad challenges associated with measuring a company's impact on natural capital and biodiversity, in large part because of challenges in measurement and data availability. While SustainEx can help us to understand these broader environmental impacts, there are certain measures that are not captured by the SustainEx framework, and thus require more focused work, which in turn can help us to expand and strengthen the analysis we apply over time.

BUILDING A MORE HOLISTIC UNDERSTANDING OF EXPOSURE AND IMPACT

Data is starting to emerge that will enable us to build a more holistic picture of our impact on nature. Building on the framework developed by the Exploring Natural Capital Opportunities, Risks and Exposure (ENCORE) – which assesses the dependencies and impacts on nature of different production processes – we can identify those industries that have the largest impact and dependence on natural capital through their direct operations. ENCORE assigns individual production processes an associated impact materiality with drivers of environmental change (impact) and an associated dependency materiality on ecosystem services (dependency). From this we calculated a mean impact and dependency score per production process, which we then mapped to companies based on GICS sub-industries.

For more information, ENCORE's impact drivers are explained <u>here</u> and ecosystem service dependencies are explained <u>here</u>.

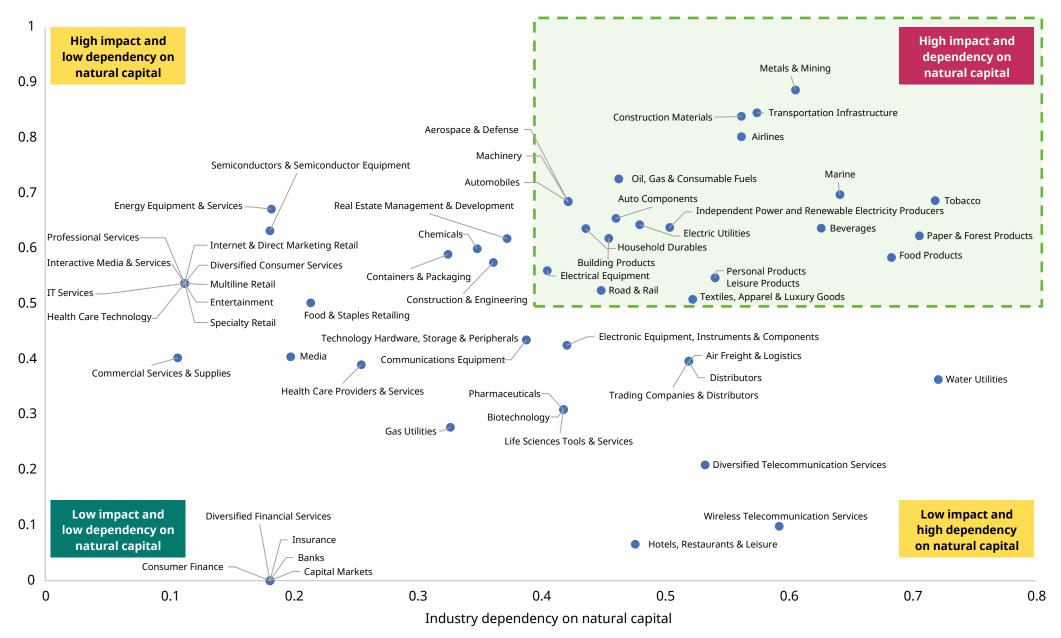
Taken together, these data points provide us with an estimate of a sub-industry's impact and dependence on natural capital. This is displayed graphically in the chart below, calculated using an exposure-weighted average of the constituent companies. This approach only assesses the impacts from a company's direct operations, excluding upstream and downstream impacts, hence why the financial sector's impact on nature is given as zero. While this is undoubtedly a drawback to the framework, it is still a useful starting point in better understanding the impact and dependence of these industries on the natural environment.

The top right quadrant highlights sectors that have both a high dependence and impact on nature through their operations. It is useful to consider these broader impacts and exposures to nature when analysing and engaging companies in these sectors.

ENCORE IMPACT DRIVERS	ECOSYSTEM SERVICE DEPENDENCIES	
Disturbances	Animal-based energy	Maintain nursery habitats
Freshwater ecosystem use	Bio-remediation	Mass stabilisation and erosion control
GHG emissions	Buffering + attenuation of mass flows	Mediation of sensory impacts
Marine ecosystem use	Climate regulation	Pest control
Non-GHG air pollutants	Dilution by atmosphere + ecosystems	Pollination
Other resource use	Disease control	Soil quality
Soil pollutants	Fibres and other materials	Surface water
Solid waste	Filtration	Ventilation
Terrestrial ecosystem use	Flood and storm protection	Water flow maintenance
Water pollutants	Genetic materials	Water quality
Water use	Ground water	



Industry impact on natural capital



Important Information

The views and opinions contained herein are those of the authors as at the date of publication and are subject to change and may become outdated due to market or regulatory developments. Such views and opinions may not necessarily represent those expressed or reflected in other Schroders communications.

This document is intended to be for information purposes only. The material is not intended as an offer or solicitation for the purchase or sale of any financial instrument or security or to adopt any investment strategy. The information provided is not intended to constitute investment advice, an investment recommendation or investment research and does not take into account specific circumstances of any recipient. The material is not intended to provide, and should not be relied on for, accounting, legal or tax advice.

Information herein is believed to be reliable but Schroders does not represent or warrant its completeness or accuracy.

No responsibility or liability is accepted by Schroders, its officers, employees or agents for errors of fact or opinion or for any loss arising from use of all or any part of the information in this document. No reliance should be placedon the views and information in the document when taking individual investment and/or strategic decisions. Schroders has no obligation to notify any recipient should any information contained herein change or subsequently become inaccurate. Unless otherwise authorised by Schroders, any reproduction of all or part of the information in this document is prohibited.

Any data contained in this document has been obtained from sources we consider to be reliable. Schroders has not independently verified or validated such data and it should be independently verified before further publication or use. Schroders does not represent or warrant the accuracy or completeness of any such data.

All investing involves risk including the possible loss of principal.

Third party data are owned or licensed by the data provider and may not be reproduced or extracted and used for any other purpose without the data provider's consent. Third party data are provided without any warranties of any kind. The data provider and issuer of the document shall have no liability in connection with the third party data. www.schroders.com contains additional disclaimers which apply to the third party data.

Past performance is not a guide to future performance and may not be repeated. The value of investments and the income from them may go down as well as up and investors may not get back the amounts originally invested. Exchange rate changes may cause the value of any overseas investments to rise or fall. This document may contain 'forward-looking' information, such as forecasts or projections. Please note that any such information is not a guarantee of any future performance and there is no assurance that any forecast or projection will be realised.

European Union/European Economic Area: Issued by Schroder Investment Management Limited,1 London Wall Place, London, EC2Y 5AU. Registered Number 1893220 England. Authorised and regulated by the Financial Conduct Authority.

For readers in United Kingdom: Issued by Schroder Investment Management Limited, 1 London Wall Place, London, EC2Y 5AU. Registered No. 1893220 England. Authorised and regulated by the Financial Conduct Authority.

Note to Readers in Australia: Issued by Schroder Investment Management Australia Limited, Level 20, Angel Place, 123 Pitt Street, Sydney NSW 2000 Australia. ABN 22 000 443 274, AFSL 226473. **Note to Readers in Canada:** Schroder Investment Management North America Inc., 7 Bryant Park, New York, NY 10018–3706. NRD Number 12130. Registered as a Portfolio Manager with the Ontario Securities Commission, Alberta Securities Commission, the British Columbia Securities Commission, the Manitoba Securities Commission, the Nova Scotia Securities Commission, the Saskatchewan Securities Commission and the (Quebec) Autorite des Marches Financiers.

Note to Readers in Hong Kong: Schroder Investment Management (Hong Kong) Limited, Level 33, Two Pacific Place 88 Queensway, Hong Kong. Central Entity Number (CE No.) ACJ591. Regulated by the Securities and Futures Commission.

Note to Readers in Indonesia: PT Schroder Investment Management Indonesia, Indonesia Stock Exchange Building Tower 1, 30th Floor, Jalan Jend. Sudirman Kav 52–53 Jakarta 12190 Indonesia. Registered / Company Number by Bapepam Chairman's Decree No: KEP-04/PM/ MI/1997 dated April 25, 1997 on the investment management activities and Regulated by Otoritas Jasa Keuangan ('OJK'), formerly the Capital Market and Financial Institution Supervisory Agency ('Bapepam dan LK').

Note to Readers in Japan: Schroder Investment Management (Japan) Limited, 21st Floor, Marunouchi Trust Tower Main, 1–8–3 Marunouchi, Chiyoda–Ku, Tokyo 100- 0005, Japan. Registered as a Financial Instruments Business Operator regulated by the Financial Services Agency of Japan. Kanto Local Finance Bureau (FIBO) No. 90.

Note to Readers in People's Republic of China: Schroder Investment Management (Shanghai) Co., Ltd., RM1101 11/F Shanghai IFC Phase (HSBC Building) 8 Century Avenue, Pudong, Shanghai, China, AMAC registration NO. P1066560. Regulated by Asset Management Association of China.

Note to Readers in Singapore: Schroder Investment Management (Singapore) Ltd, 138 Market Street #23–01, CapitaGreen, Singapore 048946. Company Registration No. 199201080H. Regulated by the Monetary Authority of Singapore.

Note to Readers in South Korea: Schroders Korea Limited, 26th Floor, 136, Sejong-daero, (Taepyeongno 1-ga, Seoul Finance Center), Jung-gu, Seoul 100–768, South Korea. Registered and regulated by Financial Supervisory Service of Korea.

Note to Readers in Switzerland: Schroder Investment Management (Switzerland) AG, Central 2, CH-8001 Zürich, Switzerland. Authorised and regulated by the Swiss Financial Market Supervisory Authority (FINMA).

Note to Readers in Taiwan: Schroder Investment Management (Taiwan) Limited, 9F, 108, Sec.5, Hsin-Yi Road, Hsin-YI District, Taipei 11047 Taiwan, R.O.C. Registered as a Securities Investment Trust Enterprise regulated by the Securities and Futures Bureau, Financial Supervisory Commission, R.O.C.

Note to Readers in the United Arab Emirates: Schroder Investment Management Limited, 1st Floor, Gate Village Six, Dubai International Financial Centre, PO Box 506612 Dubai, United Arab Emirates. Registered Number 1893220 England. Authorised and regulated by the Financial Conduct Authority.

Note to Readers in the United States: For financial professionals and consultant only. Schroder Investment Management North America Inc., 7 Bryant Park, New York NY 10018-3706. CRD Number 105820. Registered as an investment adviser with the US Securities and Exchange Commission.

603269