

Rooted in Resilience

Innovations in nature insurance for business

Contents

Executive summary	1
Introduction	2
The nature risk landscape for businesses	3
The evolution of nature risk transfer solutions for businesses	9
New applications of nature insurance solutions for businesses	12
Scaling up risk transfer solutions for businesses	17

Executive summary

Building business resilience to nature loss is more important than ever. Nature loss is already material to many businesses, impacting their balance sheets, operating models, value chains, and stakeholder relationships. While environmental degradation is not new, the scale of biodiversity loss and ecosystem changes is an unprecedented challenge. This gives rise to expectations from stakeholders — investors, policymakers, and regulators — for corporates to help restore nature.

It is vital for companies to understand how their assets and operations impact nature and how dependent they are on nature. Strong enterprise risk management strategies are needed to protect businesses from nature loss, and to protect the corporate balance sheet from business activities that harm nature. The first step is a materiality assessment of nature loss risks, considering direct and indirect risks. This requires businesses to identify the nature risks across the different tiers of their supply chains to minimize and better prepare for these types of disruptions through business continuity plans and other risk reduction measures. Once the assessment is completed companies need to consider setting measurable and achievable science-based targets.

Nature loss places new demands on corporate risk managers. New regulations, emerging disclosure requirements, and growing stakeholder and investor scrutiny require sophisticated tools and solutions. While industry focus on nature loss is rising, corporates need to navigate policy and regulatory unpredictability, particularly when operating across different regions and jurisdictions. In addition, the increasing scale and complexity of these risks puts pressure on existing risk management systems and

requires data, models, and tools that most businesses are not yet familiar with. There are significant data limitations that need to be acknowledged by all those who are assessing nature loss.

Risk transfer plays an important role in reducing businesses' impact on nature and building corporate resilience. Well-designed and implemented insurance solutions can reduce risks and impacts of nature loss, and underpin the ESG, sustainability, and climate credibility of corporates and insurers, while avoiding financial penalties, including from greenwashing. Long-established insurance solutions — such as environmental impairment liability (EIL), directors' and officers' (D&O), and business interruption (BI) insurance — already help corporates address nature-related vulnerabilities by covering loss events typically excluded by traditional policies. In addition, parametric insurance solutions have been developed to augment EIL and BI products by complementing their limits and exclusions.

New insurance solutions are emerging. Technological innovations such as remote sensing and advanced modeling are enabling underwriters to expand cover to new types of risks. Recent innovations are designed to help businesses manage nature loss risks, build resilience to climate physical risks, and mitigate the impacts of climate transition risks by de-risking decarbonization efforts. These innovative solutions acknowledge the interdependencies between nature and climate change, particularly the essential carbon mitigation services provided by nature. Successfully achieving climate goals is closely tied to the preservation and restoration of the environment.

The role of risk transfer in environmental risk management is expected to grow. As businesses face greater financial risks, regulatory pressures and tightened disclosure regimes, nature insurance solutions become more relevant. An increasing number of insurers are committing to nature-positive practices and see nature-risk underwriting as an important part of their corporate sustainability and climate strategies. Accordingly, a number of insurers are starting to collect data and consider the deployment of new tools to help forecast nature-loss risks.

Corporates and insurers need to align ambitions, requirements, and capabilities to bring nature insurance solutions to scale. Barriers, such as lack of data and regulatory issues, prevent the mainstream adoption of these solutions. New models of collaboration and investments in analytics and risk management systems are needed to foster more innovation and bring new insurance solutions to scale. Collaboration between the public and private sectors can enhance societal resilience and awareness of nature-related risks, increasing appetite for risk transfer solutions.

Key actions that need to be taken now include:

- Re/insurers and corporates should participate in initiatives that help define standards and collaborate with governments and regulators to ensure that assessment and reporting guidelines are workable and robust;
- Corporate risk managers should work with industry bodies, insurers, and government agencies to develop and implement innovative solutions that reduce and avoid negative impacts on nature, and to mitigate and overcome nature loss;
- Re/insurer and brokers should engage early to preempt exclusions of new risks and to explore solutions across financial, operational, strategic, and compliance risks; and
- Businesses should seek partnership with credible organisations or scientific experts to limit greenwashing risk and to help ensure that new risk transfer solutions are robust.

Introduction

Environmental degradation is significantly affecting businesses by disrupting supply chains, decreasing available natural resources and ecosystem services, and threatening corporate climate risk management strategies. The interactions between a company and the natural environment require businesses to understand how their assets and operations affect nature — and, in turn, how dependent their businesses are on it.

Irreversible changes are increasingly evident, threatening the delivery of the services on which businesses and societies depend: Clean air, fresh water, soil, and pollination. Food production, for example, remains a leading driver of biodiversity loss. Population growth means that in some regions food availability and affordability challenges conflict with efforts to protect and restore biodiversity and curb climate change. Similarly, new technological interdependencies put stress on ecosystems (for example, deforestation due to the extraction of essential rare earth minerals needed for the transition to a green economy), thus increasing the need for effective nature-risk management strategies including risk transfer.

Rooted in Resilience: Innovations in nature insurance for business explores the role of insurance solutions in supporting corporate environmental risk management

in the face of growing impacts from nature loss. It discusses how environmental protection and restoration can build resilience against physical climate risks and de-risk corporate ambitions to decarbonize. It also sets out how innovations in the insurance industry can support corporates in their environmental risk management endeavours. The report concludes with reflections on the barriers to mainstreaming and deploying risk transfer solutions and offers corporates, re/insurers, and governments a set of actions to foster innovation, scale solutions, and grow markets.

In *Rooted in Resilience*, the expression “nature loss” is used as a synonym of “environmental degradation”, and refers to the loss or deterioration of nature due to pollution, overexploitation of natural resources, and biodiversity and ecosystem changes such as invasive species.¹ Managing these risks requires companies to assess their own environmental footprint, reduce their impact on nature, and analyze the risks that nature loss poses for their operations, assets, customers, and value chains. For a full list of terms see the Glossary in *Embracing Nature: How businesses can engage with new environmental imperatives*.



The nature risk landscape for businesses

Nature-related risks are already material for many companies, forcing organizations to develop new strategies to adapt their business models and protect their balance sheets. These challenges, along with stakeholder pressures and a tightening regulatory landscape, are compelling businesses to incorporate nature-related risks and their interdependencies into risk governance and quantitative risk management frameworks.

Evolving risks require new solutions

Environmental degradation is not a new challenge, but the scale of biodiversity loss, degradation of ecosystems, soil depletion, pollution, and loss of arable land resulting from land use, natural resource exploitation, pollution, invasive species, and climate effects is unprecedented. At the heart of this trend is the recognition that our planet's natural systems are being ruptured, posing risk to society and economic processes. With this comes the expectation from stakeholders, including investors, policymakers, and regulators, for companies to prevent nature loss and to help restore nature.

In some sectors and geographies there have been advances in reducing the impact of business activities, often driven by pressure from consumers, regulators and investors and enabled by technological innovations. Examples are improvements in management of toxic waste, water treatment, and efficient fuel cell technologies.² Coupled with tightened regulation, this has seen improvements average air and water quality in major economies such as the US^{3,4} and the EU^{5,6} over the last two decades.

Despite these efforts, the overall health of global ecosystems is deteriorating as human actions continue to take a toll on the natural environment, triggering a chain of reactions because ecosystems are inherently dynamic, complex, and carefully calibrated — the product of millions of years of evolution.

As highlighted in Marsh McLennan's *Embracing Nature: How Businesses Can Engage with New Environmental Imperatives*, nature loss is driving a range of direct and indirect risks for companies, impacting their balance sheets, operating models, value chains, and stakeholder relationships. In turn, the shifting environmental risk landscape presents new demands for corporate risk managers: New regulations, emerging disclosure requirements, and growing stakeholder and investor scrutiny require sophisticated tools and solutions. As such nature loss spans business functions and strategies. It is an enterprise risk with implications for supply chain and operations, putting at risk wider climate ambitions and corporate environmental, social, and governance (ESG) goals.

From an enterprise risk management perspective this is about:

- Protecting the business model from nature loss
- Protecting the corporate balance sheet by minimizing business activities that harm nature
- Protecting directors and officers and avoiding reputation loss

For many businesses this is creating significant financial, operational, strategic, and compliance risks (see Exhibit 1).

Exhibit 1: Examples of nature loss risks for businesses

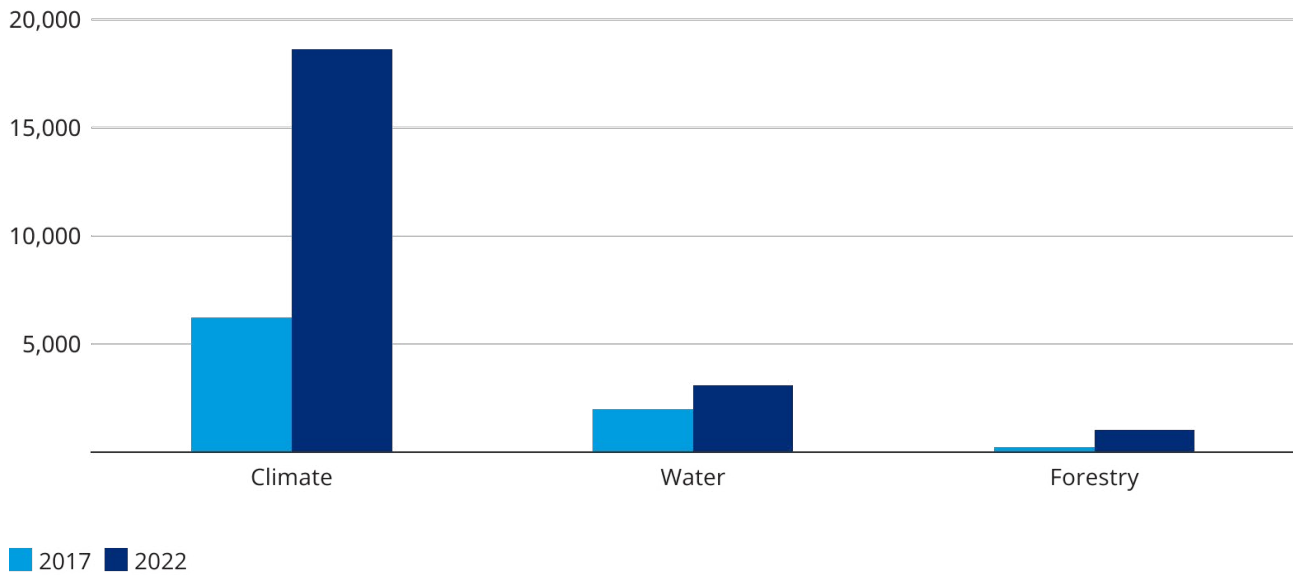
<p>COMPLIANCE RISKS Affecting business models and reputation</p>	<p>The average settlement cost for environmental cases in the US has increased eight-fold between 2002-2022, reaching \$3.7 million.</p> <p>As of 2023, the EU’s proposed “Green Claims Directive” could see firms facing penalties for greenwashing amounting to 4% of their annual revenue.</p> <p>(Agriculture) EU stakeholders in the palm oil value chain could lose \$14.3 billion for non-compliance with the EU’s deforestation regulation.</p> <p>(Chemicals) In 2019, a plastics company paid \$50 million to settle a lawsuit filed by residents in Texas for the illegal dumping of plastic pollutants into local waterways.</p>
<p>OPERATIONAL RISKS Affecting operations and productivity</p>	<p>(Construction) Rapid depletion of sand resources have increased prices of the material in the US by 250% between 1991 and 2021.</p> <p>(Agriculture) Air pollution can trigger a ground-level ozone effect that reduces agriculture yields. This leads to an economic loss of \$7 billion a year in Europe, and an estimated loss of \$28 billion worldwide.</p> <p>(Consumer goods) In 2017, a major consumer conglomerate suspended one of its palm oil contracts — worth over \$20 million — on grounds that the supplier’s deforestation and peatland clearance practices violated environmental contract terms.</p>
<p>STRATEGIC RISKS Affecting commercial and enterprise risk management strategies and long-term performance</p>	<p>(Electronics) Large contract chipmaker spent over \$26 million on additional water trucks amidst drought conditions in Taiwan. Uncertainty around water supply has motivated several chip companies to leave Taiwan permanently.</p> <p>(Digital services) In 2021, a group of Dutch farmers launched an appeal against an expansion of a data center’s operations, on the grounds that its significant water consumption would impact local agriculture.</p> <p>In 2019, 77% of UK grocery shoppers indicated they would boycott products based on brands’ environmental policies, including their sustainability credentials, environmental reputation and environmental commitments.</p>
<p>FINANCIAL RISKS Affecting business’ abilities to manage debt and fulfil financial obligations</p>	<p>(Financial institutions) A 2020 analysis by a Dutch bank found that 36% of investments by Dutch financial institutions were either highly or very highly dependent on one or more ecosystems at risk from pollution.</p> <p>(Tourism) A persistent algal bloom in an Ohio lake caused more than \$37 million in lost local tourism revenue over two years.</p> <p>(Energy) 61% of current and planned hydropower dams will be in river basins with high to extreme risk of water scarcity, floods, or both by 2050.</p> <p>(Property) A 2020 study across 113 lakes in the United States found that water quality has a statistically significant impact on housing prices, with water quality decreases triggering house price changes of up to 9.9% in houses nearby.</p>

Sources: De Nederlandsche Bank, World Wildlife Fund, World Bank, United States Environmental Protection Agency, CNBC, Chain Reaction Research, Marketplace, United Nations, Forbes, Data Center Dynamics, Kantar, Texas tribune, The Drum, Moore et al. (2020)

The materiality of these risks depends on a company’s economic sector, the location of assets and operations, supply chain exposures, dependency on eco-system services including the provision of natural resources, as well as regulatory and policy regimes, and stakeholder pressures. However, not many corporates have yet fully assessed and disclosed their exposure, with nature disclosures significantly lagging behind those for climate (see Exhibit 2). For example, of the 18,700 companies that participated in CDP disclosures in 2022, only about 20% and 6% had water and forest disclosures respectively. Similarly, only 5% of companies analyzed by the

World Benchmarking Alliance have carried out a science-based assessment of how their operations impact nature, and only 1% understand how much their activities depend on ecosystem services.⁷ The lack of nature-risk assessment frameworks and missing disclosure or target setting guidelines have given rise to initiatives such as Taskforce on Nature-related Financial Disclosures (TNFD) and the Science Based Targets Network (SBTN). The increasing scale and complexity of these risks puts pressure on existing risk management systems and requires data, models and tools with which most businesses are not yet familiar.

Exhibit 2: Number of corporate CDP disclosures by type (2017 to 2022)



Source: CDP

A particular challenge for corporates is the assessment of nature-related risks along their supply chains. Typically organizations have poor knowledge of their supply chains beyond their tier one suppliers, which gives them limited visibility of ecosystem degradation occurring higher up the chain. Without control measures in place, this can translate into increasing downstream disruptions where nature loss materially impacts production and/or transportation of raw materials and components. Businesses therefore need to identify the nature risks across the different tiers of their supply chains to minimize and better prepare for these types of disruptions through business continuity plans and utilizing other risk reduction measures.

A shifting regulatory and policy landscape

The rapid deterioration of the environment has led to increased oversight and requirements for businesses in form of policies and regulations at national and international level (see Exhibit 3). For example governments are acting to curb waste

and pollution such as plastic⁸, while actions from regulators like the United States Environmental Protection Agency (EPA) and the European Environment Agency seek to halt and reverse nature degradation. In addition, substances used in industrial processes may have been previously deemed harmless, but better analysis and emerging evidence may prove negative impact on nature and therefore lead to new regulation and liability arrangements. Furthermore, several countries, including New Zealand, Mexico, Brazil, Colombia and Bangladesh, have issued court decisions, enacted laws, or amended their constitution to explicitly recognize the legal rights of nature. Overall, the United Nations' Environment Program (UNEP) found a 38-fold increase in environmental laws globally between 1972 and 2019⁹, with more than 150 countries having enshrined the right to a healthy environment in their constitution. While industry focus on nature loss is rising, there is still considerable policy and regulatory unpredictability related to nature, climate and broader sustainability and ESG issues. Corporates need to navigate this, particularly when operating across different regions and jurisdictions.

Exhibit 3: Examples of national laws, regulations and international agreements to protect and restore nature

International

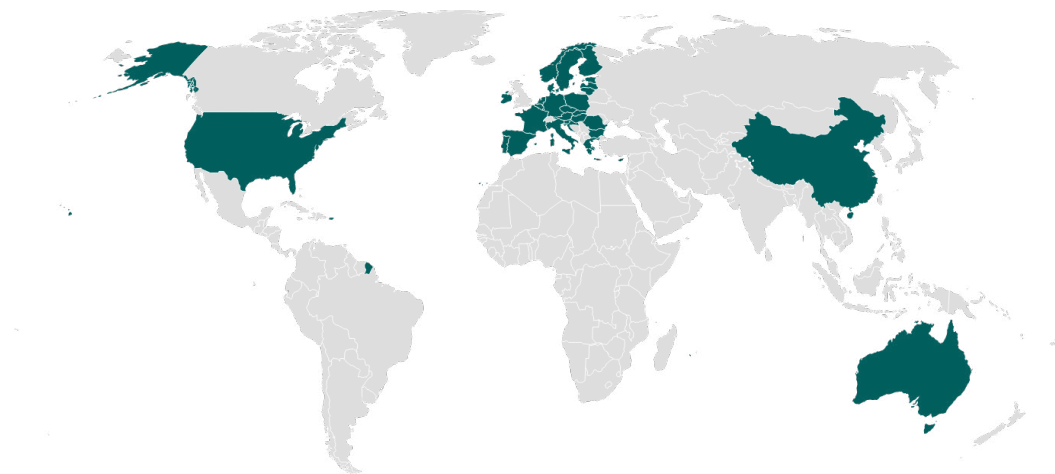
- 2023:** UN High Seas Treaty to protect biodiversity in international waters, and UN Plastic Treaty addressing the full life cycle of plastic and aiming to end plastic pollution
- 2022:** COP15' — UN Convention on Biological Diversity adopted the “Kunming-Montreal Global Biodiversity Framework” (GBF), including four global goals for 2050 and 23 targets for achievement by 2030
- 2021:** COP26 deforestation pact to end and reverse deforestation by 2030, signed by 100 countries

United States

- 2022:** Executive Order 14072 to safeguard mature forests on federal lands
- 2021:** Commitment to protecting at least 30% of land and waters by 2030

European Union

- 2022:** Biodiversity Strategy for 2030 commits to a reduction land use impact on biodiversity by 50%, and achieve “no net land take” by 2050
Nature Restoration Law requiring member countries to repair 20% of habitats by 2030
Adoption of Corporate Sustainability Due Diligence Directive (CSDDD), extending liability to environmental abuses in overseas operations for EU firms
Draft European Sustainability Reporting Standards (ESRS) include disclosure requirements on biodiversity and ecosystem loss for companies



Australia

- 2023:** Launch of the Nature Positive Plan committing to protect 30% of land and seas by 2030, and establishment of an independent, federal-level Environmental Protection Agency to increase enforcement of federal environmental laws

China

- 2023:** A revision of the Marine Environmental Protection Law enhances controls of land discharge and conserve marine systems
Measures included in the Administration of Legal Disclosure of Enterprise Environmental Information require major polluters to submit ESG disclosures
- 2022:** The Rules on Compensation for Ecological and Environmental Damage requires polluters to bear costs for nature restoration

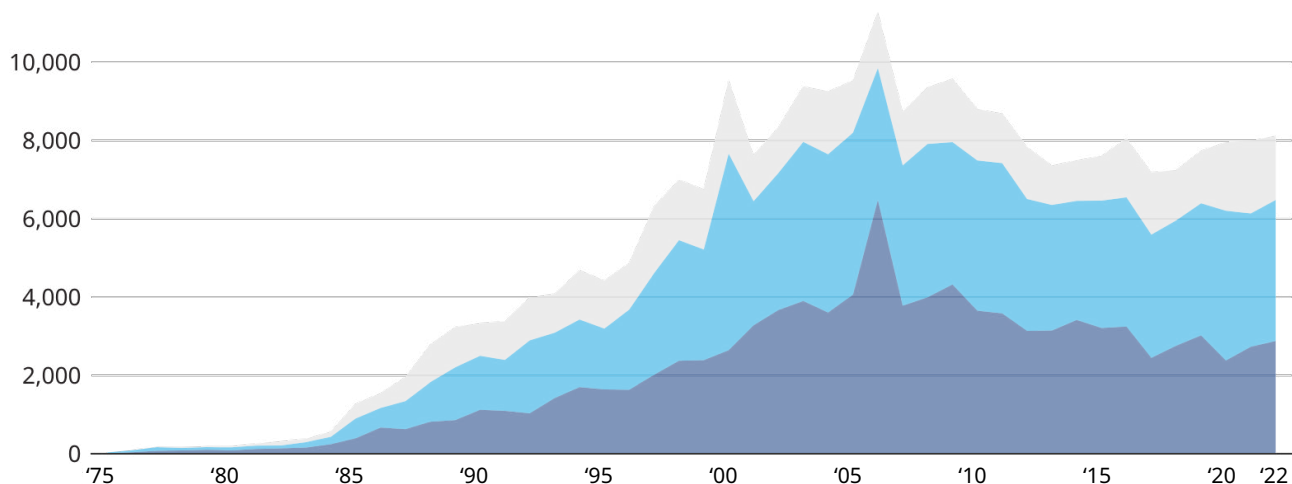
Sources: United Nations, European Commission, Australian Government, US Department of State, China Briefing, China Dialogue, Inside Climate News

Enforcement levels vary across the world, with the OECD’s Environmental Policy Stringency Index (EPS) noting that regulatory enforcement more than doubled across all OECD countries between 2000 and 2020.¹⁰ Tighter regulatory standards have led to a sharp rise in climate and environmental liability risks for corporates. In the United States alone, a total of 168,983 cases were settled following enforcement actions by the federal EPA from 2003-2022, a near doubling of the 85,971 cases from 1983-2002¹¹ (see Exhibit 4).

companies towards the rehabilitation of hazardous waste sites.¹² The Deepwater Horizon oil spill in the Gulf of Mexico in 2010 took nearly a decade to clean up and cost the company responsible more than \$60 billion in legal settlements, including expenses associated with remediation and restoration efforts, fines, and compensation. In addition to the financial and reputational consequences to the company, many businesses in the fishing, tourism, and hospitality industries in the Gulf region were hurt by fallout from the spill.¹³

Liability is based on the “polluter pays” principle. The EPA’s Superfund trust, for example, redirects special tax revenues from chemical and petroleum

Exhibit 4: Number of federal and state settlements for civil and criminal cases in the United States 1975-2022



Source: United States Environmental Protection Agency, Marsh McLennan analysis

Another area of growing regulatory scrutiny and corporate liability is greenwashing. The European Commission found that 42% of online market websites contain environmental claims that are false, deceptive, or exaggerated and could qualify as unfair commercial practice under EU legislation.¹⁴ Since 2022, the EU, Australia, and the US Federal Trade Commission have announced plans to take punitive measures against greenwashing.¹⁵ European businesses with misleading claims on their environmental sustainability could see fines of up to 4% of annual revenues.¹⁶ The European

Union’s Sustainable Finance Disclosure Regulation (SFDR) for example came into force in 2021 to enhance transparency for sustainable investment products, mitigate greenwashing, and improve clarity on sustainability claims by financial market participants.¹⁷ Furthermore, in 2023, the EU Corporate Sustainability Reporting Directive (CSRD) came into effect, strengthening the rules concerning companies’ disclosures of their social and environmental risks, as well as the impact of their activities on society and the environment.



The evolution of nature risk transfer solutions for businesses

To protect corporate balance sheets from activities that harm nature, businesses need robust enterprise risk management strategies, including pollution prevention and avoidance. Risk transfer solutions, such as environmental liability and business interruption cover, are emerging as vital components in this process.

Corporates have a duty to prevent nature loss. To achieve this, though, they need to evaluate sites, operations, and third-party relations, assess the likelihood of business activities causing harm to the environment, and act to reduce their environmental impact. Prevention of pollution and avoidance of harmful activities, across supply and value chains are essential for this.

Risk transfer solutions have emerged as an important component in this process, where there is a clear insurable interest — i.e., where insured goods or activities suffer nature-loss related damage or where the insured causes accidental nature damage. In recent decades, well-established insurance solutions — such as environmental impairment liability (EIL), directors' and officers' (D&O), and business interruption (BI) insurance — have been developed, addressing nature-related vulnerabilities by covering loss events typically excluded by traditional policies.

- **Environmental Impairment Liability insurance (EIL)** has been a tool for enhancing risk management and transferring risks, having emerged in the 1970s in response to the establishment of the US EPA and the tighter enforcement of pollution cases, specifically related to liability transfer for pre-existing pollution conditions within merger and acquisition(M&A) transactions. Within the EU, Environmental Insurance was introduced at the same time, focusing on indemnifying third parties for forward looking exposures arising from technological accidents at industrial sites with high hazardous risk potential. New definitions of environmental degradation and tightening policy enforcement have encouraged re/insurers to adapt EIL to different contexts. Following the implementation of the EU's Environmental Liability Directive in

2007 — which required businesses to undertake precautionary and restorative measures for environmental harm — European re/insurers began offering expanded EIL coverage for preventative environmental measures.¹⁸ Re/insurers also expanded EIL offerings across emerging markets.¹⁹ Over the last two decades, the US is more and more addressing forward-going exposures and the EU picks up the historical liability issues within M&A transactions. The scope of EIL having historically been limited to pollution has been widened with the US Natural Resource Damage Liability and still more with the EU Biodiversity Directive, offering cover for Nature having been damaged and requiring restoration, including losses resulting from groundwater overexploitation resulting in unexpected biodiversity losses. EIL has developed as a hybrid insurance solution over recent years as most Third Party Liability insurances would exclude Public Law Liabilities and as such biodiversity damage. However, EIL does cover for example biodiversity damage resulting from a cyber-attack on companies operating hazardous substances. A recent analysis highlighted ways for expanding EIL to include a broader range of nature-related risks, extending coverage to ecosystem degradation and air and plastic pollution.²⁰ In the United States alone, for example, corporate liabilities from plastics litigation could exceed \$20 billion for 2022-2030.²¹

- **Directors' and Officers' (D&O) insurance** has increasingly become an important instrument offering protection against lawsuits. Pollution exclusions are commonly found in D&O policies, and underwriters are placing greater emphasis on a company's environmental performance during renewal submissions, examining how sustainability strategies are integrated into the insured's agenda.²²

- **Business Interruption (BI) insurance** has a track record of mitigating business losses caused by climate and environmental hazards. Growing interest in sustainability and broader ESG performance has sparked new conversation among re/insurers about how BI insurance could be reimagined to encourage practices aligned with nature preservation and restoration. Examples are business interruption due to loss of pollination and crop yield, or water scarcity for a business highly dependent on water, timber manufacturing companies impacted by wood loss due to alien species (such as non-native insects), or disruptions related to regeneration and restoration efforts, or the transition to a nature-positive economy.²³ One example is a pollution-specific contingent business interruption policy, for example in the hospitality or tourism industry.^{24, 25}

The scope of these insurance solutions has expanded to cover a growing range of nature-related risks, often interacting to cover possible protection gaps: For example EIL can also extend to physical environmental losses which are not covered by D&O, as far as judges attribute these directly to directors and officers. EIL it also more and more extending to First Party losses, covering for example business interruption because of biodiversity damage or pollution risk created by nature events

In addition, parametric insurance solutions have been developed to augment EIL and BI products by complementing their limits and exclusions. And technological innovations — remote sensing, advanced modeling, and picture-based recognition — have enabled the underwriting of groundwater and soil quality as metrics for crop insurance.²⁶ Similarly, digitalized tree health monitoring programs have enabled more precise tree salvage, and additional reforestation benefits.²⁷ Existing parametric indices for rainfall measurement used for water utility insurance have also been extended to safeguard against risks for waterborne diseases and fluctuations in reservoir stocks due to droughts.²⁸

Overall, these risk transfer solutions help to ensure swift corporate action is taken in case of accidental pollution or environmental harm, which can be used to incentivize good environmental risk management. However, despite the growing market for nature-related risk transfer solutions, a protection gap remains: Although EIL saw double-digit growth in the US in 2022, reaching premium volume of \$2 billion for the US market²⁹, it is unclear whether the premiums are sufficient to cover the growing costs of corporate environmental settlements.



New applications of nature insurance solutions for businesses

New insurance solutions are emerging in response to growing nature loss risks. Technological advancements are allowing re/insurers to extend coverage to a broader range of nature-related risks. These innovative solutions acknowledge the interdependencies between nature and climate change, particularly the essential carbon mitigation services provided by nature.

While adaptations of established insurance solutions can help limit losses linked to nature-related physical risks, they do not address the underlying business risk drivers, including the depletion of ecosystem services and degradation of ecosystem conditions that undermine the achievement of climate goals. As highlighted by the Global Risks Report 2023, nature loss and climate change exacerbate each other. Successfully achieving climate mitigation goals is therefore closely tied to the preservation and restoration of the environment. Similarly, the interplay between climate change and nature loss leads to a broad range of threats that are starting to be addressed through new risk management practices and risk transfer products addressing both nature and climate. Nature-based solutions, for example, are drawing attention as tools for building resilience to climate extremes and removing carbon from the atmosphere while restoring and preserving the environment.

Improved understanding of nature loss, new risk quantification methodologies, data analytics, and new models of collaboration have enabled re/insurers to introduce innovative risk transfer solutions which go beyond the traditional pollution focus. These are designed to protect from the risks of nature loss, restore nature to build resilience against physical climate risks, and de-risk decarbonization efforts depending on ecosystem services (see Exhibit 5). These three objectives are interdependent and align with broader business climate and sustainability objectives.

A particular feature is the recognition of the interdependencies between the environment and climate by focusing on the risk reduction services that nature can play, for example in protecting coastlines from storm damages and by providing essential carbon mitigation services. Nature loss puts both at risk, with impacts for supply chains, locations, and operations.

Exhibit 5: Classification of emerging insurance solutions



Building resilience against nature loss

Novel insurance solutions help organizations protect their assets and operations from a growing range of nature impacts, while supporting their business efforts to reduce impacts on nature.



Restoring nature to build resilience against physical climate risks

Insurance solutions can incentivize nature restoration while reducing the impacts of climate extremes such as floods, droughts and wildfires, and helping organizations prepare for chronic climate trends like sea level rise.



Protecting nature to de-risk decarbonization efforts

A new class of risk transfer products aim to de-risk investments in nature-based solutions and carbon offsets.

Source: Marsh McLennan

Building resilience against nature loss

Managing the costs of soil preservation and restoration

60-70%

of Europe's soil has been classified as unhealthy

Only 13%

of recent urban developments across the EU have occurred on recycled land

390,000

sites of past or recent industrial contamination across the EU require remediation.

Sources: European Commission, European Environment Agency, EU Joint Research Centre

The EU has classified soil as a “strategic and threatened economic and environmental asset” and set ambitious targets to improve soil quality and reduce soil degradation. The new EU Soil Strategy requires member states to achieve “no net land take” by 2050. Land artificialization or “land take” is the transformation of land away from natural, agricultural or forestry areas due to urbanization and the development of infrastructure and industrial build-up. The loss of undeveloped land results in soil sealing, i.e., covering land with man-made surfaces, which has become the leading cause of global biodiversity loss. Artificial surfaces also reduce other ecosystems services such as the regulation of the water balance and protection against floods and the carbon-absorption of land.³⁰ In France, Marsh is working with EIL insurers on the preservation of natural areas, by reusing already artificialized soil within development projects. Environmental risk policies designed to deal with pollution clean-up can be used to restore

soil and water conditions to counter the effect of land artificialization, as well as transfer the risk of residual pollution remaining after clean-up. The aim is to facilitate and secure the reuse of built ground and thus avoid concreting of natural soil.³¹

Enhancing resilience of aquaculture businesses

Large investments have been made in the aquaculture industry in response to overexploitation of wild fish stocks. While aquaculture is a viable alternative to wild-caught seafood, the industry remains exposed to liabilities related to the release of invasive species, trawling methods that damage marine life, and water pollution from the leeching of nutrients and anti-parasitics. Although traditional insurance solutions like EIL have enabled loss recovery for pollution damage, new products are emerging that insure aquaculture firms against a broader set of nature-related risks. For example, in 2021, an insurance technology business announced plans to test and market a parametric solution to insure seafood manufacturers in the UK and India against water-related issues like algae blooms. The solution releases payouts to companies according to water quality and meteorological data and aims to incentivize producers to adopt better practices surrounding water quality and conservation.³²

\$800 million

in economic losses in Chile after a two-year period of chronic algal blooms

0.06%

of global aquaculture output insured in 2018

Sources: Naylor et al. (2021), Global Index Insurance Facility

Restoring nature to build resilience against physical climate risks

Risk transfer solutions can also incentivize investments in nature restoration. Products to de-risk the deployment of nature-based solutions represent a prime example, providing broad co-benefits for industries and the environment. The re/insurance industry has unveiled new solutions to de-risk these investments and increase their appeal.

Mitigating climate risks through nature-based solutions

50%

more cost-effective to use nature-based solutions than grey infrastructure

Up to 75%

of storm surge water levels can be mitigated by mangrove forests

Sources: World Economic Forum (2023), Earl O Juanico (2022)

In 2019, Conservation International established the Restoration Insurance Service Company (RISCO) pilot for mangrove restoration and coastal protection in the Philippines. RISCO's restoration of mangroves is partly financed by re/insurer investments and the sale of blue carbon credits to external organizations seeking to balance emissions targets.³³

Elsewhere, Ducks Unlimited has launched reforestation projects along the Mississippi and Milwaukee Rivers to reduce flood exposures, mitigate droughts, and promote urban recreation. The projects are funded by public investments and charitable donations, but over time the goal is to fund the programs through the sale of carbon sequestration credits, the utilization of innovative insurance

mechanisms, and other private arrangements. Working with Marsh McLennan, both projects are exploring parametric property/casualty covers, protecting both the reforested areas and carbon assets against hazard losses.

Managing forests for wildfire resilience

Forest preservation is key to protecting biodiversity, trapping carbon emissions, and mitigating the effects of climate change. Additionally, certain forest products depend on forest abundance and quality, which is threatened by ever-more frequent fire events.³⁴ Increased wildfires and burnt areas mean insurance premiums are rising, with the potential risk of coverage being withdrawn unless better wildfire management strategies are deployed at scale.³⁵ Conventional methods of curbing wildfires via chemical retardants lead to water pollution, exposing corporates and communities to spillover nature-related risks.³⁶ In 2021, Guy Carpenter launched a wildfire catastrophe model to test the efficacy of eco-friendly mitigation strategies such as fire buffer zones and found that these could reduce wildfire losses and insurance costs. Additionally, the buffer strategies would serve as urban growth boundaries that promote forest habitat restoration, reducing wildfires and preserving biodiversity.³⁷

\$50 billion

is lost every year to wildfires across the world

300%

increase in commercial wildfire insurance premiums in California between 2018 and 2021

Sources: Business Standard, Jergler (2021)

Protecting natural capital to de-risk decarbonization efforts

As of 2022, more than one third of the world's largest publicly traded companies had net-zero pledges, up from just 20% in 2020.³⁸ Companies are looking towards nature-based solutions as they ramp up their participation in voluntary carbon markets to deliver on decarbonization commitments.

Protecting against emerging carbon offset risks

A 2023 survey of 500 sustainability executives across the US, Canada, and the UK found that nearly half of the companies represented have used carbon offsets, although 41% of chief sustainability officers have expressed concerns about the trustworthiness of such offsets.³⁹ Carbon offsetting can pose significant risks: A sizeable portion of carbon credits are not backed by real sequestration projects, placing corporates at exposure.⁴⁰ Additionally, extreme events such as forest fires can lead to the release of carbon in sequestered areas. As a consequence, insurers are developing new models to protect businesses from carbon sequestration risk.

Lloyd's developed a Carbon Purchase Protection Cover that protects buyers of forward-purchased carbon removal credits against losses. This solution provides due diligence and fraud checks, along with independent audits, to reduce liability risks.⁴¹

One of China's largest insurers launched a parametric marine carbon sink insurance program in 2023. The pilot program will cover 8,800 square meters of ocean off the coast of Dalian and provides US\$50,000 in coverage if ecological changes damage marine life or weaken the ocean's carbon sink effect. In addition to incentivizing the protection and restoration of marine ecosystems, the program enables carbon sink indicators to be listed and traded.⁴²

500%

projected growth of the voluntary carbon market by 2030, reaching over \$10 billion

90%

of rainforest offset credits from a leading provider were "phantom credits" without genuine carbon reductions

37%

of carbon reduction needed to achieve the 2030 targets of the Paris Agreement can be met by nature-based solutions

Sources: Reuters, The Guardian, IPBES



Scaling up risk transfer solutions for businesses

As nature loss moves up the corporate agenda risk transfer can play an important role in reducing businesses' impact on nature and building corporate resilience. New models of collaboration and investments in analytics and risk management systems are needed to foster more innovation and bring new insurance solutions to scale.

Mainstreaming nature insurance solutions for businesses

The importance of nature insurance solutions for corporates is expected to grow, as businesses face greater regulatory pressures and tightened disclosure policies and growing financial exposure including to greenwashing. For example, regulators of signatories of the UN's Global Biodiversity Framework will likely increase their scrutiny of financial institutions' nature-related disclosures, nature-positive financial flows, and biodiversity targets.⁴³ One example is China, where major polluters are subject to more frequent audits and harsher penalties.⁴⁴ Additionally, the UK and the EU are seeking to extend environmental rules to supply chains and transactions outside of their jurisdictions.^{45, 46} As part of this process Governments may also consider mandating nature risk transfer solutions for example in high-risk sectors such as mining and utilities.

Greater focus on disclosure, for example as part of TNFD, is expected to lead to an increase in corporate understanding of nature loss, which in turn is likely to trigger growing demand for better risk management and risk transfer solutions. Businesses that incorporate nature considerations in their strategy and enterprise risk management practices can address new obligations and capture emerging opportunities, including new markets and investment prospects, access to capital and insurance, and building brand reputation.

At the same time a growing number of insurers are committing to nature-positive practices and see nature risk underwriting as an important part in their corporate sustainability strategy and in their wider climate efforts. With this comes the need to demonstrate a reduced impact on nature. The European Insurance and Occupational Pensions Authority is analyzing the impact of nature-related risks on re/insurers and exploring opportunities for the insurance industry to make a significant contribution to nature preservation and restoration investment and underwriting practices.⁴⁷ Supporting corporates in addressing nature loss can play a role in this. Well designed and implemented insurance solutions can help reduce risks and impacts of nature

loss, and underpin the ESG, sustainability and climate credibility of corporates and insurers, while avoiding financial penalties, including from greenwashing. This has led a number of insurers to start collecting data and consider the deployment of new tools to help forecast nature loss risks.⁴⁸

Taken together these drivers should be conducive to further innovation in the nature insurance space and help galvanize corporates, insurers and regulators to act now. However, as corporates and insurers are under pressure to reduce their impact on nature, advances are needed across data, technology, corporate practices, and governance to overcome existing barriers. This will require further funding, technological innovations and policy guidance.

Barriers to innovation

While recent innovations demonstrate how risk transfer can support the changing needs of corporates in managing nature-related risks, their implementation and extension remains limited. Attempts to foster new solutions and bring those to scale are beset by three core challenges.

First, lack of clear understanding of the materiality of nature-related risks has hampered corporate demand for these risk transfer solutions. Nature is complex and full of delicate balances, negative feedback loops and interdependencies. Most corporates are still at an early stage in assessing their exposure to these new risks, as standards for quantification, disclosure, and management of nature-related risks are only starting to emerge. This means that there is still a widespread lack of common understanding on how to apply and aggregate existing datasets for different operations. A recent Oliver Wyman study indicated that regional European financial institutions are ahead of the curve for conducting environmental risk management assessments. Half of Europe's regional banks have completed assessments, compared with an average 13% for banks in all other regions. Further, 28% of financial institutions in Europe are in the early stages of setting nature-based targets, compared to 10% in Africa and 0% in all other regions.⁴⁹

Second, the limited availability of data and analytical tools poses a significant supply-side challenge in transferring nature-related risks. In particular, many existing risk analytics solutions are not readily adaptable to estimate nature-related risks, limiting the availability and scope of insurance solutions. For example, catastrophe models, used to estimate potential losses due to natural disasters, are not equipped to accurately simulate the complexities of nature-related risks. As the field is still nascent, re/insurers entering it must overcome high first-mover costs, including piloting innovative techniques and technologies. At the same time solutions need to have high-integrity and be able to fulfill solvency standards and regulatory requirements. To achieve this better risk analytics and understanding of nature-risks by insurers, reinsurers, regulators and corporates are essential for innovation. However, as of today, only 19% of re/insurers use a nature/biodiversity-specific framework, while 40% are evaluating nature-related risks in their underwriting practices, and 49% consider nature-related risks in their investment portfolios, according to a United Nations Environment Programme survey.⁵⁰ Importantly, there are many local aspects of nature-related risks that need to be considered when collecting and validating data, but well-defined stakeholder and community engagement is often missing from these processes.

Third, insurability is dependent on the existence of an insurable interest. This tends to be clear if there is damage to an asset usually in the context of a specific loss event, such as an oil spill. One of the difficulties associated with for example biodiversity loss is identifying the stakeholder who has such an interest and establishing the insurable damage. Exposure to biodiversity varies significantly across sectors and companies, as does the impact that business processes have on biodiversity loss. This means that roles and responsibilities for managing the new types of risks are often still fuzzy. This is a consequence of a lack of established management practices, and because the costs of using ecosystem services such as clean water or healthy soil are not explicitly quantified and left unpaid. Ecosystem services are frequently classified as public goods, with multiple stakeholders

relying on them. For insurers it can be challenging to identify what solutions to design for which stakeholder without a clear assessment of nature loss materiality across sectors and geographies.

Aligning ambitions, needs and capabilities to bring nature insurance solutions to scale

Several actions can help address existing barriers, foster new risk transfer solutions and bring them to scale.

1. Corporate and re/insurers to conduct materiality assessment of nature loss risks.

Put a clear and well-structured risk assessment at the heart of corporate nature strategy: For corporates and insurers nature loss remains a new topic with limited insights into current and future exposures and dependencies. As a first step, a materiality assessment needs to be conducted. For many sectors this will soon become mandatory, so early movers can have an advantage. Additionally, early disclosure and mitigation of nature-related risks can have a positive reputational impact and attract capital from investors interested in improving the sustainability performance of their portfolio. The main purpose of assessments should be to inform internal risk management and strategy. As such, corporates need to maintain ownership and conduct and develop these internally, so they can harness the true value of these assessments and integrate them internally. ESG tools may prove to be a good starting point for corporates' environmental risk management strategies. The Marsh ESG risk rating tool, for example, lets companies identify sustainability risk drivers and exposures, including those linked to environmental degradation. As nature-related risks can cascade across value chains, it is important for businesses to not only evaluate their own exposures, but also those across clients and vendors. For corporates, this may involve requesting nature-related risk disclosures at the vendor bidding

stage. Similarly, insurers need to build internal assessments of nature loss exposure across different business lines, sectors and geographies. This needs to go beyond traditional areas of environmental liability and capture the new interdependencies, particularly with climate change related risks.

Address data and analytical gaps through enhanced collaboration. Greater leverage of new data and analytics can support the business case and create momentum for innovations. However, there are significant data limitations that need to be acknowledged by all those who are assessing nature loss — particularly so as nature is a very complex and there remains a lot of work to do around quantifying risks. Corporates and re/insurers need to find a fine balance between robust, practical and transparent methods and tools. There are some clear lessons from climate risk transfer, where early engagement between insurers and corporates, and investment in tools and skills is eventually paving the way for more innovative risk transfer solutions.

2. Corporates and re/insurers to incorporate nature considerations in their governance and risk management practices.

Integrate nature loss into enterprise risk management strategies. Once assessed, nature-related risks need to be embedded in enterprise risk management strategies — including setting measurable and achievable science-based targets. This will help companies quantify, disclose, and minimize nature-related risk exposures. To achieve this, businesses must build technical capacity for risk accounting through continued investments in staff capabilities and training. By incorporating nature considerations into their operating models and strategies, businesses can uncover gaps in their risk management practices and help inform the development of new insurance solutions that address nature-related risks.

Incorporate nature loss into insurance processes. As new risk transfer solutions evolve, they tend to follow a typical pattern of risk identification, exclusions from standard policies and eventual development of new tailored solutions. Early engagement between corporates and re/insurers can preempt this. For corporates, it may help to formulate specific questions to brokers and insurers along the five risk categories (see Exhibit 1) to consider for which financial, operational, strategic, and compliance risks cover would be already available. For insurers committed to increasing nature-related risk coverage, a key focus will be on insurability and viability of solutions. For example, to make insurance viable for the nature-positive transition and new nature loss risks, the development of longer-term solutions, such as multi-annual policies, may gain traction with the market. Alternatively, re/insurers could offer premium reductions or improved terms for clients who demonstrate reduced environmental risks or who make investments in nature-based solutions that have the goal of conserving and restoring nature.⁵¹

Address greenwashing risks. Given the complexity of nature risks, there is heightened danger that well-intentioned activities may trigger unintended consequences, for example when a carbon sequestration project plants non-native species or disregards biodiversity standards. Another danger is that in the wake of a push for nature positive business processes the positive impact of an action on nature is overstated. These challenges apply to corporates and re/insurers. Partnerships with credible organizations or scientific experts can reduce this risk and help ensure that new risk transfer solutions are robust and credible.

3. Public and private sector synergies are critical to overcome challenges and mobilize action

Develop new partnerships. Building resilience to nature loss while reducing their negative impact on nature requires businesses to engage in new models of partnership. Corporate risk managers need to work with industry bodies, insurers, and government agencies to develop and implement innovative solutions that reduce and avoid negative impacts on nature, and to mitigate and overcome nature loss. Similarly stakeholders also need to adopt a double materiality lens, assessing how they impact the environment and how they are affected by nature loss. Government platforms possess a reach and influence that individual corporations and re/insurers lack. For example, the Ocean Risk and Resilience Action Alliance connects financial institutions and re/insurers with the governments of ten countries to drive investments into marine nature-based solutions.⁵² Another example is the EU-funded NATURANCE project which examines the technical, financial and operational feasibility and performance of nature insurance solutions, closely aligned with the EU framework for sustainable finance and the Just Transition Mechanism.

Engage with regulators and governments on risk assessment standards and tools. As industry frameworks for assessing nature loss are still lagging re/insurers and corporates need to be involved in defining standards and collaborating with governments and regulators to ensure that assessment and reporting guidelines are workable and robust. Access to accurate data is necessary not only for the underwriting and pricing of risks, but also for tracking progress in terms of disclosures and nature-related targets. Utilizing data for decision-processes is important and with this comes the need to understand limitations of tools and models. Participation in forums such as TNFD can help refine industry guidelines. Strategic collaborations can also aid the alignment of methodologies, as exemplified

by the Bank of England's recent partnership with the UK's Department for Environment, Food & Rural Affairs to size UK financial exposures from nature loss and degradation.⁵³ Data availability also varies across biomes, and non-standardized measurements may impede comparability. Overcoming these data challenges will require coordinated efforts between businesses, governments, and academia to develop new tools and datasets, such as the ENCORE tool which was developed by the Natural Capital Finance Alliance in conjunction with the United Nations.⁵⁴ More innovation is needed to match sophisticated decision making needs with robust data and analysis tools.

Engage with governments and regulators to address regulatory concerns and create financial incentives. Removing bottlenecks will stimulate greater appetite for nature-related risk transfer solutions. Collective momentum can be built by coordinating and streamlining regulations across overseas borders, as has been the case for TCFD uptake. Promoting innovation may require governments to offer research & development grants, invest in workforce upskilling, or fund pathways to de-risk private sector participation in nature-based solutions. For instance, the Blue Impact Bonds for Nature is an innovative bond — backed by a bank and the Australian government — to finance coastal wetland restoration projects.⁵⁵ Mexico's Quintana Roo program is another example, with a public-private funding arrangement for using tourism taxes to fund a parametric insurance policy to protect the Mesoamerican Reef and adjacent coastal economies.⁵⁶ Governments can also contribute to new risk pools to increase the affordability of risk transfer solutions. Bond sales towards new funding streams can alleviate start-up costs and help re/insurers and businesses allocate capital towards innovation. Governments can further influence private sector behaviors when awarding public contracts or licenses.⁵⁷ The UK's Environment Act stipulates that development schemes permission will only be granted to contractors who can deliver a 10% biodiversity net gain.⁵⁸

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