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# Insuring Nature's Survival:

## The Role of Insurance in Meeting the Financial Need to Preserve Biodiversity

1818 H Street NW
Washington DC 20433
Telephone: 202-473-1000
Internet: www.worldbank.org






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# Acknowledgements

This report was prepared by Samantha Cook (Senior Financial Sector Specialist) and Susan Holliday (Senior Consultant).

The authors would like to thank Jayne Hoagbin for her contributions and for the comments and guidance received from the peer reviewers: Alastair Norris (Risk Finance Consultant), Elisson Wright (Senior Environmental Finance Specialist), Fiona Stewart (Lead Financial Sector Specialist), Michaela Dolk (Financial Sector Specialist), Olivier Mahul (Practice Manager), Samantha Power (Sustainable Finance Consultant, EFNLT) and Tetsutaro Shindo (Financial Sector Specialist). The report was edited by Anne Himmelfarb.

The authors would like to gratefully acknowledge the financial support provided by the Swiss State Secretariat for Economic Affairs (SECO) which made this work possible.

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# Glossary

**Biodiversity** is the variability among living organisms from all sources including, inter alia, terrestrial, marine, and other aquatic ecosystems and the ecological complexes of which they are part; this includes diversity within species, between species, and of ecosystems. (Convention on Biological Diversity)

**Biosphere** is the sum of all the ecosystems of the world. It is both the collection of organisms living on the Earth and the space that they occupy on part of the Earth's crust (the lithosphere), in the oceans (the hydrosphere), and in the atmosphere. The biosphere is all the planet's ecosystems. (IPBES)

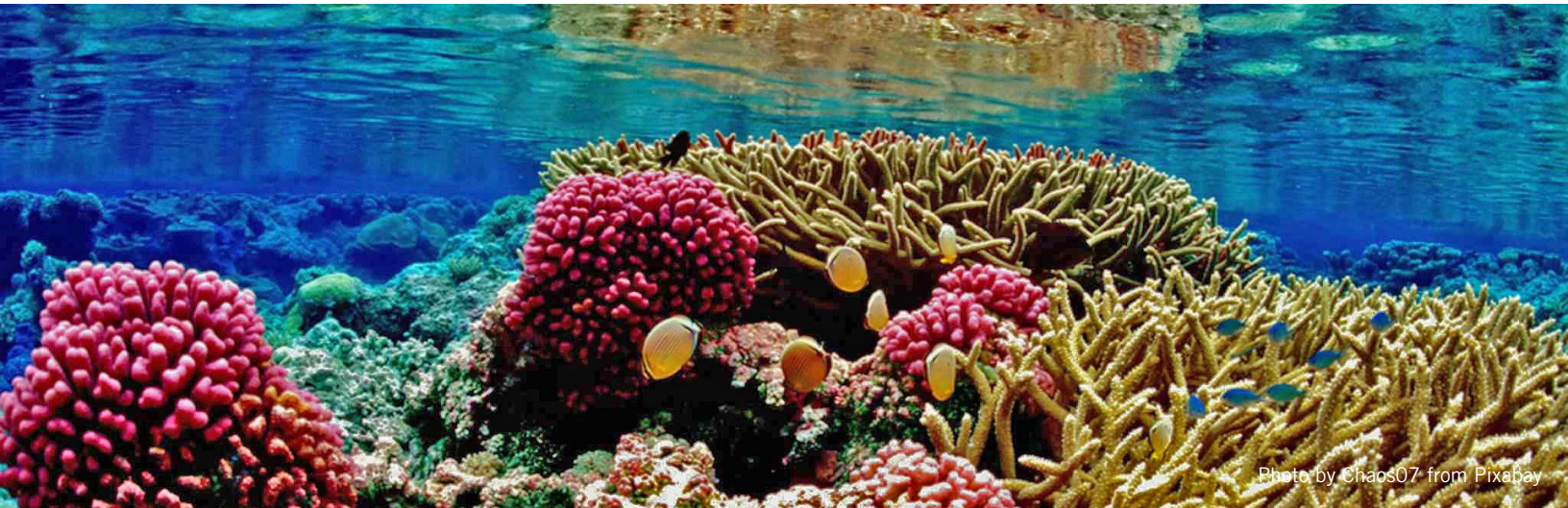
**Climate change** is change of climate which is attributed directly or indirectly to human activity that alters the composition of the global atmosphere and which is, in addition to natural climate variability, observed over comparable time periods. (UNFCCC)

**Double Materiality** is a two-dimensional perspective on materiality (see below) adopted by the NonFinancial Reporting Directive of the European Commission in the context of climate change. It involves: (i) The reference to the company's "development, performance [and] position" indicates financial materiality, in the broad sense of affecting the value of the company. Climate-related information should be reported if it is necessary for an understanding of the development, performance and position of the company. This perspective is typically of most interest to investors, and (ii) The reference to "impact of [the company's] activities" indicates environmental and social materiality. Climate-related information should be reported if it is necessary for an understanding of the external impacts of the company. This perspective is typically of most interest to citizens, consumers, employees, business partners, communities, and civil society organizations. However, an increasing number of investors also need to know about the climate impacts of investee companies in order to better understand and measure the climate impacts of their investment portfolios. (European Commission)

**Ecosystem** is a dynamic complex of plant, animal, and micro-organism communities and their non-living environment interacting as a functional unit. (IPBES)

**Materiality** refers to the significance of a matter in relation to a set of financial or performance information. If a matter is material to the set of information, then it is likely to be of significance to a user of that information. (OECD) Materiality is rarely determinable by a bare quantitative equation; rather, it requires an assessment of whether a reasonable investor would consider the information relevant to its decision of whether or not to invest in a company. That assessment may require consideration of both quantitative and qualitative factors. (Commonwealth Climate and Law Initiative)

**Nature**, in the context of this report, refers to the natural world, with an emphasis on biodiversity. Within the context of science, it includes categories such as biodiversity, ecosystems, ecosystem functioning, evolution, the biosphere, humankind's shared evolutionary heritage, and biocultural diversity. Within the context of other knowledge systems, it includes categories such as Mother Earth and systems of life. Other components of nature, such as deep aquifers, mineral and fossil reserves, and wind, solar, geothermal and wave power, are not the focus of the report. Nature contributes to societies through the provision of contributions to people. (Adapted from IPBES)



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# Abbreviations

| | |
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| CCRIF SPC | Caribbean Catastrophe Risk Insurance Facility Segregated Portfolio Company |
| COAST | Caribbean Ocean and Aquaculture Sustainability FaciliTy |
| COP | Conference of Parties |
| ESG | Environmental, Social, and Governance |
| EU | European Union |
| GDP | Gross Domestic Product |
| ILS | Insurance Linked Securities |
| IPBES | Intergovernmental Science-Policy Platform for Biodiversity and Ecosystem Services |
| IPCC | Intergovernmental Panel on Climate Change |
| ISSB | International Sustainability Standards Board |
| MAR | Mesoamerican Reef |
| NCA | Natural Capital Accounting |
| SEC | Securities and Exchange Commission |
| TCFD | Taskforce on Climate-related Financial Disclosure |
| TNFD | Taskforce on Nature-related Financial Disclosure |
| WFP | World Food Programme |

# Executive Summary

**Biodiversity loss will be an increasingly important source of risk and opportunity for the insurance sector.** The significant degradation of ecosystems has the potential to materially impact global finance, economies, and societies alike. Understanding the physical and transition risks associated with biodiversity loss and working to mitigate the damage to biodiversity will be a key aspect of meeting the targets set by the Paris Agreement.

**Insurance companies will be impacted by biodiversity risks in several ways: as underwriters, as investors, and as corporate citizens.** Insurers will be impacted both by changes in climate and biodiversity and by transition risks affecting the risks they insure or the investments they make. As with climate-related risk, the concept of double materiality applies to biodiversity risk, as insurance companies can impact on biodiversity through both investment and underwriting activities.

**Insurance can promote investment in biodiversity in three ways: (i) asset protection, (ii) liability reduction, and (iii) facilitation of capital inflow from the financial markets.** Ideally, efforts to protect biodiversity will include a combination of instruments, not only insurance.

**Insurers, as investors, can contribute directly to the preservation of biodiversity by channeling capital towards biodiversity-positive investments, but the opportunities to do so are still limited.** For example, AXA announced that they will invest EUR1.5 billion to support sustainable forest management. This includes a EUR500 million for reforestation projects in emerging countries that will enable 25 megatons of CO2 to be captured each year. In addition, AXA will also strengthen its investment and insurance requirements in activities that contribute to deforestation, such as soy, palm oil, timber, and cattle production in regions where these industries strongly contribute to deforestation (AXA, 2021).

**The G20 Sustainable Finance Roadmap (G20 SFWG, 2021) highlighted the need to integrate nature and biodiversity in future work on sustainable finance.** The establishment of the Taskforce on Nature-related Financial Disclosures (TNFD) and the development of sustainability disclosure standards by the International Sustainability Standards Board (ISSB) are important developments in this area. For example, France introduced mandatory reporting on financial risks related to biodiversity loss, as well as dependencies on and impacts to biodiversity in 2022. From 2023, the EU disclosure framework requires disclosing the alignment with all six environmental objectives of the EU Taxonomy, including the protection and restoration of biodiversity and ecosystems.

**The financial materiality of underestimating or inaccurately pricing biodiversity-related risks could pose a threat to the solvency of the insurance industry and lead to an increase in exclusions of uninsurable risks.** Due to the challenges around data, the industry may need to work with some independent third parties to collect data and to help develop generally accepted taxonomies. In addition, if not addressed this could result in basis risk whereby payouts either over pay or under pay versus the actual risk incurred.

**Risk management can be enhanced by combining the results of both catastrophe and climate risk models, but more needs to be done to incorporate biodiversity risk.** If captured by modeling, the interlinkages between climate and biodiversity risk could arguably enhance risk management and mitigation strategies by taking a holistic view and providing clarity on adaptation investments, portfolio risk profiles, real estate values, and insurability.

**Combining ecological action with financial protection can make good economic and financial sense and help overcome the pricing issues associated with risks such as wildfire.** For example, an ecological forestry approach linked to parametric wildfire losses could reduce losses for the insurance and reinsurance sector. A study by The Nature Conservancy and Willis Towers Watson (2021) found a 41 percent decrease in residential insurance premiums was possible when ecological forestry techniques such as forest thinning and prescribed burning were applied to a relevant area. Without such ecological measures, the risk of wildfire continues to grow.

Photo by Tom Fisk from Pexels

**This discussion paper considers the role the insurance industry could play in protecting biodiversity and comes to five main conclusions:**

1. **More needs to be done by policy makers and regulators to incentivize market participation in insurance solutions.** While some products are emerging, it remains to be seen how much demand there is for the products. The insurance industry needs to be more closely involved in developing the taxonomies and reporting requirements for measuring biodiversity.

2. **The challenges in pricing biodiversity risk, which is notably separate from public accounts, should be addressed.** The Dasgupta (2021) report highlights the need to address this issue, and there are several frameworks that exist to account for the economic value of natural assets. However, as yet, these have not been linked to the core public accounts of nations.

3. **In order to adequately address biodiversity risk, public and private sectors need to collaborate, and regional risk pools may have a role to play in the development of cost-effective solutions.** Regional risk pools exist to serve the needs of their members, and if nature-based insurance is in demand, then risk pools are well placed to invest in research for product development.

4. **Insurers can play a role as both underwriters and investors to simultaneously to promote investment in biodiversity-positive activities and to help discourage biodiversity-negative activities.** The insurance industry can impact the market by the way it allocates capital, both on the investment and the underwriting side. They can discourage biodiversity-negative activities by excluding certain sectors as many insurers already have with coal for example, and by actively seeking opportunities to deploy to activities that are neutral or biodiversity-positive. Insurance can also be used as part of a range of solutions to mitigate risk and encourage investments that protect or enhance the natural environment.

5. **While nature-based insurance can incentivize investments in adaptation and facilitate access to rapid liquidity, it will not address all risk.** Insurance plays a limited but important role by incentivizing adaptation and providing financial protection for when an acute climate or biodiversity shock happens.

**The risks to biodiversity are only now gaining attention, and much hope is placed on the Post-2020 Global Biodiversity Framework to be agreed upon at the Biodiversity COP (Conference of Parties) in the third quarter of 2022.** Should any resulting global agreements specify key targets that can inform regulatory practices, the insurance sector will have a great opportunity to develop a market for nature-based insurance. In the absence of globally agreed targets, efforts to develop nature-based insurance will continue to be driven by a few key investors with vested interests or by corporates in the context of increased disclosure requirements.

**This paper explores how and to what extent insurance can play a role meeting the increasing financial needs to protect biodiversity.** It outlines how the insurance sector, as underwriters, may impact and protect against biodiversity risks, leveraging approaches to climate change and catastrophe risk to highlight key opportunities and challenges that exist for insurance-based solutions for biodiversity.

# Background

**Humans derive approximately $125 trillion of value from natural ecosystems each year (WEF, 2020) but as a public good there are many challenges to raise capital to protect our ecosystems.** Given that we as humans are highly dependent upon biodiversity, it's agriculture feeds us, it's beauty through tourism entertains us and it helps to fight disease, we cannot afford to risk degrading our biodiversity further. If we apply the principle that you insure what you cannot afford to lose then arguably there is a clear role for the insurance sector to help *Insure Nature's Survival.*

**Biodiversity loss could have significant economic and financial implications, because the decline of ecosystem services poses physical risks for the economic actors that depend upon them; these same actors also face transition risks from policies designed to halt biodiversity loss (NGFS and INSPIRE 2021).** Furthermore, biodiversity risk could be systemic, and any mitigation requires urgent 'transformative changes' in our socioeconomic and financial systems. This requires policymakers and regulators, including central bankers and financial supervisors, to develop comprehensive strategies to manage nature-related financial risks (NGFS, 2022).

**The "twin crises" of climate change and biodiversity loss are interlinked: climate change could result in significant biodiversity loss, and such biodiversity loss will impact the climate change dynamic.** Increasing temperatures are a broadly agreed climate change phenomenon, mostly driven by human activity, and they will cause alterations to ecosystems and biodiversity, including possible harm to many species, along with the alterations to local climate conditions. It is essential that we learn lessons from climate change to tackle the biodiversity crisis (Chandellier and Malacain 2021).

**Climate and biodiversity hazards will occur simultaneously and compound with non-climatic risks that cascade across sectors and regions, making both climate and biodiversity risks more complex and difficult to manage.** The Sixth Assessment Report, released by the Intergovernmental Panel on Climate Change (IPCC) in February 2022, emphasizes the interdependence of climate, ecosystems, biodiversity, and human societies, suggesting that there is a greater than 50 percent likelihood that global warming will reach or exceed 1.5°C in the near term, even for the very low greenhouse gas emissions scenario (IPCC 2022). The report highlights that the projected levels of climate change, combined with non-climatic drivers, will cause loss and degradation of much of the world's natural assets, including forests, coral reefs, and low-lying coastal wetlands.

**Biodiversity risks can be categorized into two types of risk, physical risk and transition risk.** Physical risks are the material consequences of changes to biodiversity and the quantity and the quality of goods and services provided by nature. For example, after a cyclone there may be some bleaching of coral reefs, which impacts the availability of reef fish to local fishermen, in turn impacting their livelihood and food stock. Similarly, for a business the cyclone may disrupt operations due to supply chain risks and material damages. Physical risks may be chronic (e.g. gradual decline of species, deforestation etc.) or acute (these are event driven e.g. wildfire). Transition risk from biodiversity will arise as people and businesses move toward more sustainable, low-carbon systems, as such transitions could lead to big shifts in asset values or higher costs of doing business for some sectors of the economy. Thus, the speed of transition toward a greener economy - and the effect of this transition on certain sectors and financial stability - matters.

**Building capacity and removing some barriers to accessing finance are fundamental to address both physical and transition risk.** More access to cost-effective public and private financial instruments, such as guarantees, equity, concessional debt, market debt, internal budget allocation, and insurance, is needed. Public finance is an important enabler of adaptation and a promoter of financial resilience. By addressing real and perceived regulatory, cost, and market barriers, governments and regulators can incentivize the financial sector to offer additional instruments that complement public resources with private capital. More effort in this area is needed.

**Biodiversity loss will be an increasingly important source of risk and opportunity for the insurance sector.** The significant degradation of ecosystems has the potential to materially impact global finance, economies, and societies alike. Understanding the physical and transition risks associated with biodiversity loss and working to mitigate the damage to biodiversity will be a key aspect of meeting the targets set by the Paris Agreement.

**Biodiversity loss and natural disaster risks are not the same, but there are areas of overlap.** For example, acute physical shocks, natural disasters such as tsunamis or wildfires, can impact biodiversity in a short time period in ways that may be either permanent or temporary. Similarly, declining biodiversity can increase the frequency and severity of natural disasters.

**Solutions developed by the insurance industry to address climate and natural catastrophe risks can be utilised to address the growing need to protect biodiversity.** The insurance/reinsurance sector has seen increasing innovation in the development of financial products that can mitigate the physical impacts posed by climate change, and a few actors have looked to develop solutions for biodiversity either directly or indirectly. Climate-related risks to sovereigns and to the private sector and investors are increasing, and insurance could play a role in both managing and incentivizing management of this risk.

**One of the challenges of insuring biodiversity is determining who will pay the premiums, given that natural capital is a public good.** The benefits of many ecosystems are not attributable to a singular entity, and as such are deemed public goods. The resulting free rider problem could undermine the incentive of those with an insurable interest to pay the insurance premium. In turn, this could disincentivize insurers to provide biodiversity focused insurance at scale in the private market. Such a market failure presents the case for public intervention suggesting that there may be a need to finance premiums and levy additional taxes to do so.

**Mobilizing finance for biodiversity is one of the core themes of the COP (Conference of Parties) on biodiversity, which will convene in the third quarter of 2022 to debate the post-2020 global framework for biodiversity and seek to ensure that, by 2050, the shared vision of living in harmony with nature is fulfilled.** The role of the COP in biodiversity is to give the protection of biodiversity the same level of prominence as climate protection. It is important that the re/insurance sector is present in these discussions, not only because they are risk carriers but also because they are investors.

**Among the targets for reaching net zero biodiversity loss by 2050 articulated by the COP 15, there are two where the insurance and reinsurance sector could play a role, both by incentivizing financial protection of natural assets susceptible to physical risk and by providing capital for this protection.** The first target is to increase international financial flows from all sources by US$200 billion to developing countries. The second is to redirect, repurpose, reform, or eliminate incentives that are harmful for biodiversity.

**If the financial sector can start regularly identifying, assessing, mitigating and disclosing biodiversity and broader nature related risks there is the potential to avoid severe consequences.** This is a potential for a win-win-win for nature, climate, people and the economy (WEF, 2020). This paper explores how and to what extent insurance can play a role meeting the increasing financial needs to protect biodiversity. It outlines how the insurance sector, as underwriters, may impact and protect against biodiversity risks, leveraging approaches to climate change and catastrophe risk to highlight key opportunities and challenges that exist for insurance-based solutions for biodiversity.

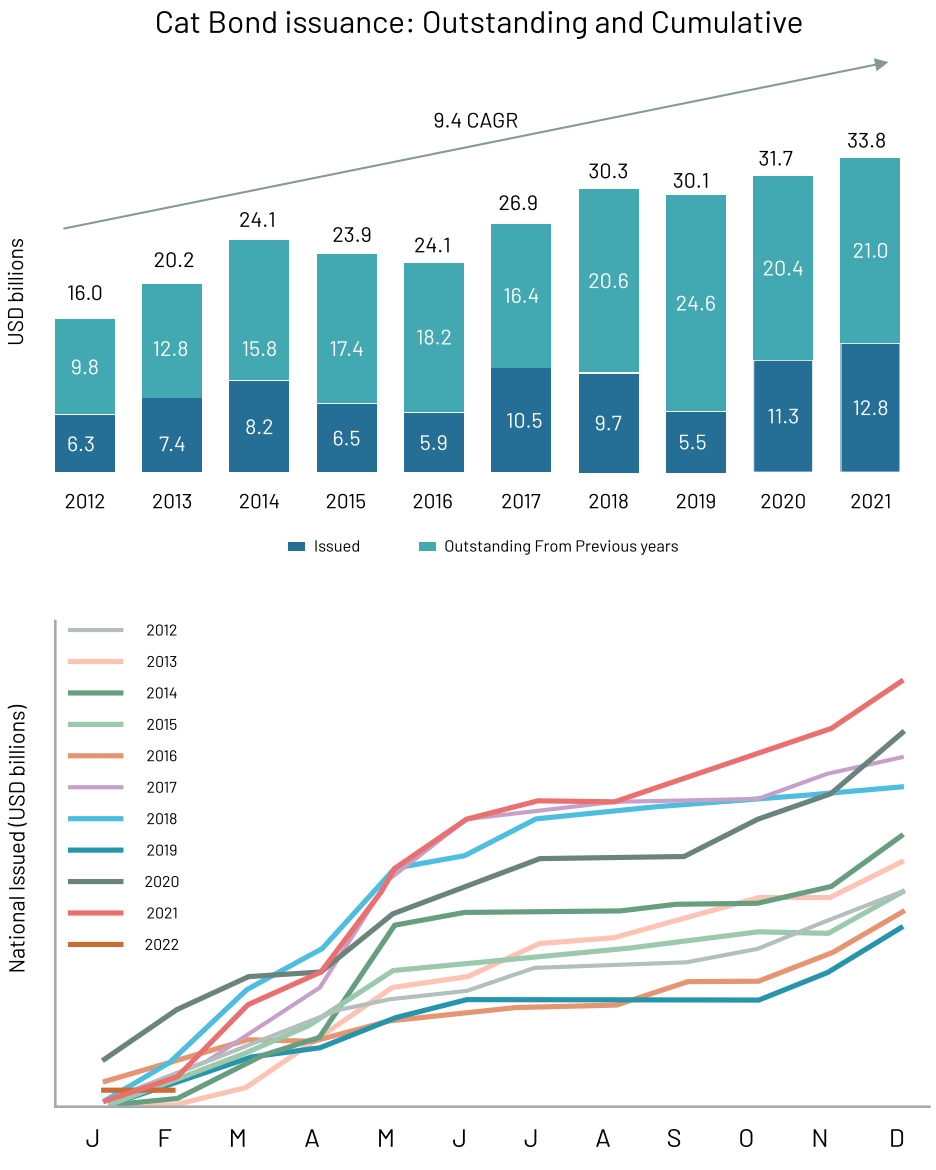
# Insurance Market Developments

**Insurance companies face the impact of biodiversity risks in several ways: as underwriters, as investors, and as corporate citizens.** As underwriters, insurers will be impacted by changes in climate and biodiversity and also by transition risks affecting the risks they insure or the investments they make. Insurance companies as investors face challenges similar to those of all asset managers, with the added complexity of asset-liability matching and the capital requirements of various investment types under risk-based solvency calculations. As corporate citizens, insurance and reinsurance companies face the same considerations as other companies in terms of managing factors such as energy consumption, CO2 emissions, and interactions with local communities. The discussion that follows will primarily focus on the role of insurers as underwriters.

**Having dealt with climate-related events for hundreds of years, the insurance industry has evolved to meet some of the challenges associated with climate risk, and this expertise is helpful for addressing biodiversity risk.** If we look at the history of the insurance industry, we can see how some of these developments may suggest ways to meet biodiversity challenges, and also how they point to new issues that may arise in relation to climate change and biodiversity.

**Insurance has often been used to mitigate climate risks like floods, hurricanes, windstorms, and hailstorms.** Because some of these risks were very large and "catastrophic," they became too big for individual insurance companies to bear, and the reinsurance industry was born. Operating at the wholesale end of the market, reinsurers benefit from diversification because they typically operate on an international basis and cover a variety of risks. However, as demand for insurance grew, insurers and reinsurers wanted to be able to access external capital and not retain all the risks on their own balance sheets. Catastrophe bonds ("cat bonds") were developed in response to this pressure and were first issued in 1997. Cat bonds gave insurers and reinsurers access to the broader and deeper capital markets and gave investors such as pension funds, hedge funds, and mutual funds an opportunity to earn a return on investments that were not correlated to stocks or bonds. Since 2012, the insurance-linked securities (ILS) market has reached a compound annual growth rate (CAGR) of 9.4 percent, while in 2021 catastrophe bond issuance hit a new record of US$12.8 billion in notional outstanding, surpassing the previous annual record set in 2020 by US$1.5 billion, or 13 percent (See Figure 1).

## Figure 1: Cat bond issuance: Outstanding and cumulative, 2012 – February 2022




*Source: Swiss Re Capital Markets as of February 10, 2022.*

Photo by Skyler Ewing from Pexels

**Typically, insurance works on an indemnity basis, where the insurer compensates the insured for the actual losses incurred.** The challenge with this approach, however, is that it may be difficult and time-consuming to assess the damages, particularly after a major disaster. Access to the area may be limited, and local expertise may not be available, meaning that the insured could wait for months or even years to recover from the loss. In response to this challenge, the insurance industry started developing parametric or index-based solutions (Singer 2019).

**Unlike traditional insurance, parametric insurance does not aim to indemnify the pure loss, but rather issues a set payment upon the occurrence of an objective event that meets pre-agreed parameters, such as an earthquake of a certain magnitude or a hurricane of a specific intensity.** These products can be based on either an actual index point (e.g., water level, hurricane category) or a modeled loss (the estimated market size of the loss). Their advantage over a traditional indemnity product is that they are much quicker to pay out, but the disadvantage is that they do not correlate with actual exposure, so there is risk of over- or underpayment ("basis risk"). These products may also be very binary in nature. Finally, in some cases the premiums may actually be higher than those for traditional indemnity insurance.

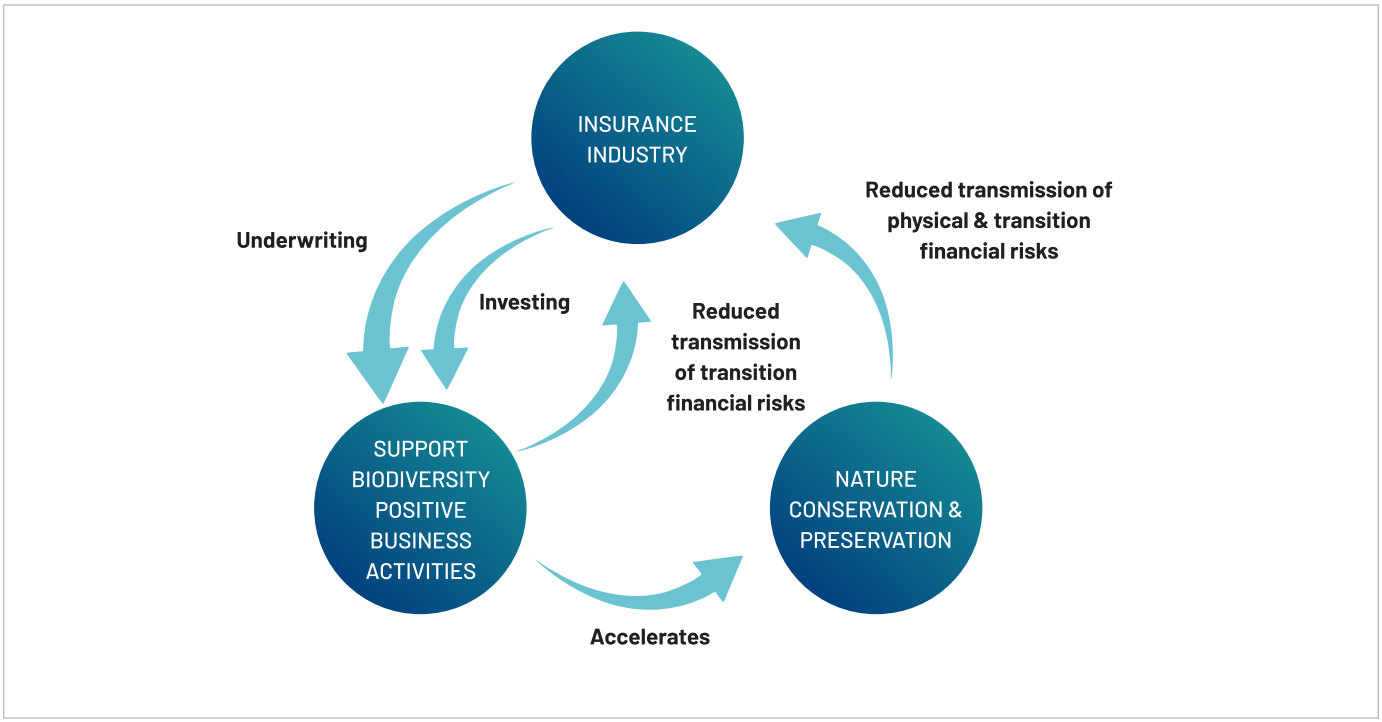
**Another alternative to traditional indemnity products, first developed in the 1990s, is the use of derivatives as hedges for weather-related losses.** As derivatives have a market price and can be traded on exchanges like the Chicago Board of Trade, they can be used by companies for risk management and by insurers as either a hedge or an input in structuring and pricing products. More recently, with the increase in available data, products have been developed based on inputs such as average room revenues for hotels, footfall (movement of people in an area), or internationally recognized acts of terrorism. These techniques may also be applied to biodiversity-related risks, but a degree of experimentation will be required, and in the short term some concessional financing may aid this effort.

## The role of insurance in biodiversity

**The activities that insurers underwrite or invest in can create negative impacts on biodiversity.** The insurance industry neither directly causes damage to biodiversity by damaging plants, animals, or ecosystems nor does it consume a large amount of natural resources in its day-to-day business operations. However, the insurance industry, can have an impact on biodiversity externalities, by underwriting risk for or investing in financial instruments where the issuers are engaged in activities that are harmful to the ecosystem. There is no global study on the extent any such externalities at present.

**The smooth functioning of the insurance industry is underpinned by the conservation, restoration, and sustainable use of nature.** By insuring or financing biodiversity-positive or biodiversity-neutral business activities, the insurance industry contributes to the conservation and preservation of ecosystems. In particular, insurers as investors have extra incentive versus other financial institutions to invest in biodiversity-positive activities as this has a positive feedback loop on their liabilities. That is, this creates a feedback loop that reduces physical and transition risks to businesses - risks that would otherwise be transmitted as financial risks to the insurance industry (see Figure 2). It is therefore critical for the insurance industry to take stock of whether and how it is contributing to biodiversity loss.

## Figure 2: Feedback loops from financing nature-positive business activities




*Source: Adapted from UNDP Sustainable Insurance Forum 2021.*

**Insurance products can promote investment in biodiversity in three ways: (i) asset protection, (ii) liability reduction, and (iii) facilitation of capital inflow from the financial markets.**

- **Asset protection.** Property insurance can be used to protect natural assets such as forests or mangroves, or to mitigate the risks of projects designed to protect against climate change or to promote biodiversity.
- **Liability reduction.** Liability covers may be available to protect corporations that accidentally damage or destroy biodiversity, including protection against reputational or legal risks from integrated reporting. Biodiversity considerations may also increasingly be used in decisions about risk selection and pricing, just as environmental, social, and governance (ESG) factors are now increasingly used in assessing D&O (directors and officers) risks.
- **Facilitation of capital inflow.** Offering cat bonds and similar solutions, especially those using parametric techniques, can bring capital market investors into the biodiversity space.

**Ideally, any insurance-based solution should involve a combination of the above.** For example, Swiss Re was involved in a dyke restoration project that included adaptation and mitigation measures to strengthen the dyke and better protect the surrounding ecosystem. This was then complemented with an indemnity-based insurance cover to cover the construction itself. See Box 1 for more details.

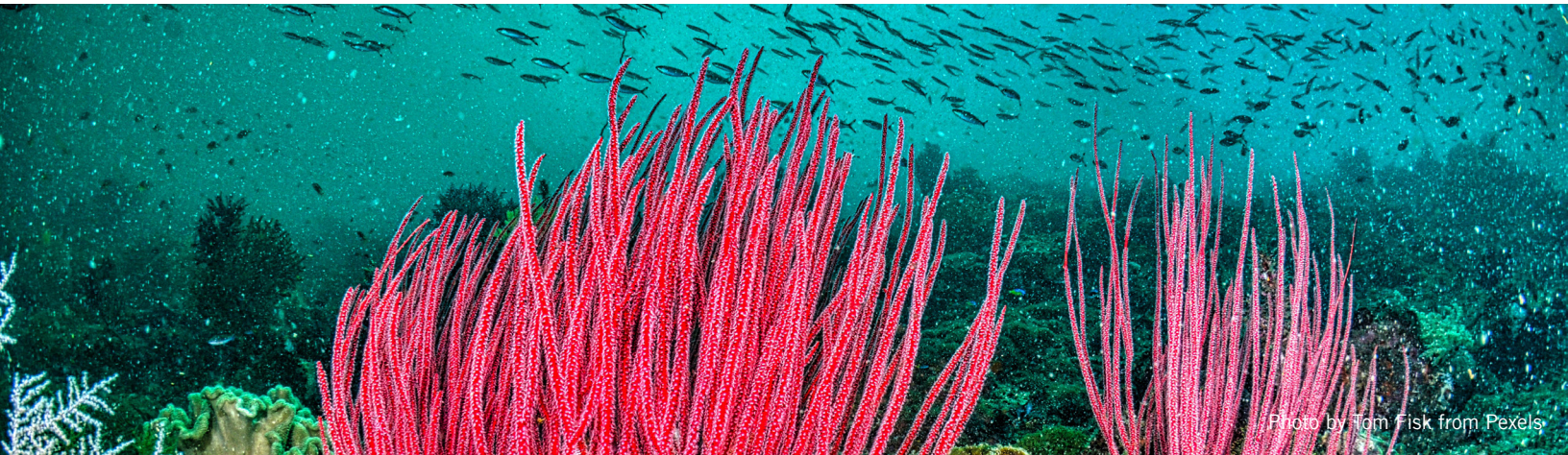


Photo by Tom Fisk from Pexels

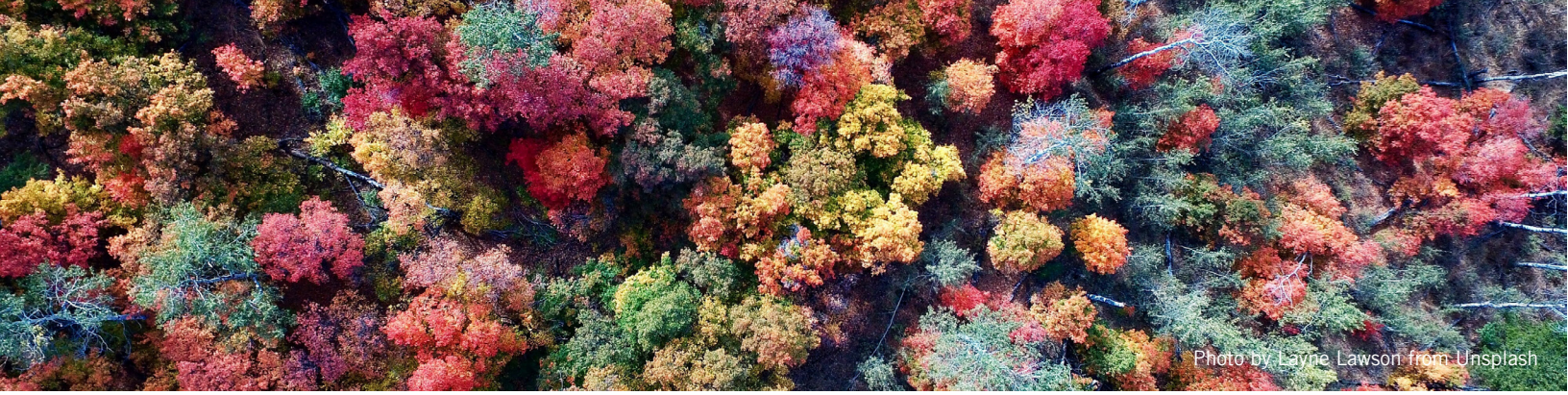


Photo by Layne Lawson from Unsplash

### Box 1: The Prins Hendrikzanddijk project

**The island of Texel in the Netherlands is a major tourist attraction situated on the west side of the Wadden Sea, a World Heritage site.** To prevent a major failure of the Prince Hendrick sand dyke, which protects the island, the proposed solution was to use and enhance the local habitat. Specifically, the dyke was reinforced with 5 million cubic meters of sand and 2 million marram grass plants to create a landscape gradient. This not only protected the island but also extended the area and had a positive impact on biodiversity.

**The project was notable as it involved preventative measures (was implemented before a loss occurred); in addition, it had a positive impact on nature and on the local community, which was explicitly included in the planning and construction process.** Meanwhile the insurers, led by Swiss Re Corporate Solutions, provided technical expertise on nature-based solutions and a construction all risks policy to support the project.

*Source: IADC et al, 2021.*

## How biodiversity changes may impact the insurance industry

**Research into how biodiversity changes may impact the insurance industry have led to partnerships that might previously have been considered unusual, but this research across different sectors is necessary to address the many facets of biodiversity risk.** One such partnership is that between the French Museum of Natural History and the French reinsurance company SCOR, which identified three broad categories of biodiversity-related risks for re/insurance carriers (Chandellier and Malacain 2021):

1. **Uninsurability risks.** Biodiversity-related risks are often systemic risks, difficult to measure and with high potential correlations and knock-on effects. These can vastly increase both financial losses and uncertainty, which may render standard insurance practices ineffective. Lack of data may lead insurance companies to conclude that they are unable to cover certain types of losses or geographic areas. Although such decisions allow the insurance industry to avoid losses in the short term, they are not part of a sustainable approach. The insurance industry needs to grow, and countries, businesses, and individuals need insurance to mitigate risks and support economic growth. For these reasons, the insurance industry needs to be involved in policy making, data collection, and analytics, and it should be encouraged to develop innovative solutions for covering risks rather than just relying on exclusions.

2. **Affordability.** A related risk is that some currently insured risks may become so expensive to insure that they are de facto uninsurable. For some emerging economies that rely on their ecosystems as a source of livelihoods or broader economic gain (for example, through tourism) and that previously relied on donor support to make insurance affordable, it may be challenging to start paying an insurance premium with national resources. However, moving in this direction, even partially, can provide the right incentives for proactive planning and risk-informed investments in adaptation.

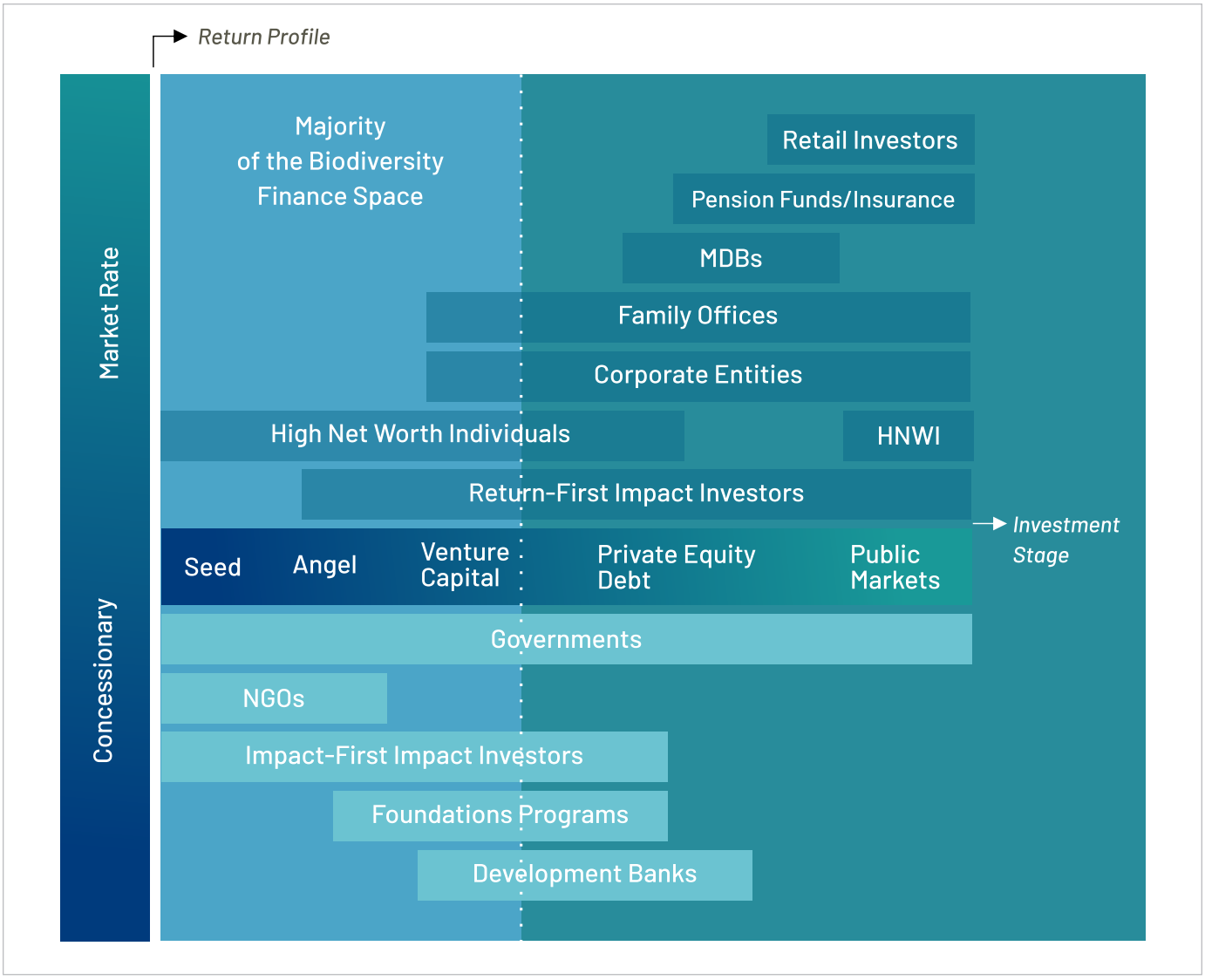
3. **Underwriting risks.** The profitability of the underwriting business depends on the ability of the re/insurer to correctly price and pool the risks so that the inflow of premiums is higher than the outflow of claims payouts and operating expenses. The next section discusses some of the challenges and opportunities that arise in underwriting biodiversity risk.

# Market Drivers

**There has been increasing interest from investors in sustainability-linked returns, and we believe that increasing regulatory and disclosure requirements will drive this further.** A report by the Responsible Investor Research and Credit Suisse (2021) that surveyed asset managers and investors found that 84 percent of respondents were concerned about biodiversity and that 67 percent are addressing it in their portfolio to some extent; but 72 percent have not yet assessed their investments' impact on biodiversity.

**Investors' interest in biodiversity is not all the same.** Some investors are philanthropic (grants), while some seek market returns in the context of ESG investing. One key factor in how quickly insurance and other solutions can be developed to address biodiversity risks is how different sources of capital can combine to meet investors' return requirements and other criteria. See Figure 3 for more information.

**Figure 3: The biodiversity investors' universe**




*Source: World Bank 2021.*

*Note: HNWI = high net worth individuals; MDB = multilateral development bank; NGO = nongovernmental organization.*

## Insurers as investors

**Insurers, as investors, have demonstrated willingness to address systemic risk to climate change and evidence is emerging to demonstrate that they are willing and able to do the same for biodiversity.** An example of insurers using their capital to support biodiversity is preservation is AXAs announcement that they will invest EUR1.5 billion to support sustainable forest management. AXA will strengthen its investment and insurance requirements in activities that contribute to deforestation, such as soy, palm oil, timber, and cattle production in regions where these industries strongly contribute to deforestation (AXA, 2021). Furthermore, AXAs commitment to prevent the deterioration of forest ecosystems includes a EUR500 million for reforestation projects in emerging countries that will enable 25 megatons of CO2 to be captured each year.

**The insurance sector can contribute directly to the preservation of biodiversity by channeling its capital to biodiversity-positive investments, but these are limited in supply and scale.** The insurance sector has over US$40 trillion in assets, which net of their reserving requirements could be used to invest in biodiversity-positive investments. For example, Dai-ichi Life invested US$32 million in a green bond whose proceeds are limited to biodiversity conservation, in a green bond issued by Anglian Water Services Financing PLC ("Anglian Water"). In addition, the Dai-chi Life Insurance Company and Meiji Yasuda Life Insurance Company purchased a dual tranched blue bond to finance ocean-related projects in Asia and the Pacific issued by the Asian Development Bank.

## Reporting and Disclosure Requirements

**In October 2021, the UK announced plans to introduce legislation mandating climate-related disclosure for large companies and financial institutions.** These would be in line with the recommendation of the Task Force on Climate-related Financial Disclosure (TCFD) and are expected to come before Parliament in April 2022. The disclosure requirement is expected to apply to listed companies and private companies (including insurers and banks) with over £500 million (c. US$655 million) in revenues and more than 500 employees. These companies will likely report under the International Sustainability Standards Board (ISSB) reporting standards. The UK Financial Conduct Authority (FCA) has already asked UK-listed companies to provide disclosures in line with TCFD recommendations on a comply or explain basis, with a start date of January 2021.

**The European Union (EU) requires certain large companies, including listed companies, banks, and insurers, to disclose information on how they manage social or environmental issues (EC, 2019).** In June 2019 the EU published guidelines on reporting climate-related information, and in April 2021 the European Commission adopted a Corporate Sustainability Reporting Directive (CSRD), which expands the scope of companies covered and requires audit or assurance of the reporting. The first set of EU reporting standards are expected to be adopted by October 2022. Corporate disclosures by individual companies would feed into reporting by investors such as asset managers, insurance companies, and pension funds.

**In March 2021, the US Securities and Exchange Commission (SEC) announced an enhanced focus on climate-related disclosures.** The SEC chair, Gary Gensler, has publicly stated that the SEC will propose a rule to require climate-related disclosures (SEC 2021). The SEC is already reminding companies of the need to consider climate-related topics, if material, in the risk section and in the management discussion and analysis (MD&A) of SEC filings (Littenberg and Rotter 2021). Companies are also being asked to consider climate disclosures that appear in their corporate social responsibility (CSR) reports. The SEC published its proposal on rules for climate risk disclosure in March 2022, and, following a comment period, is expected to adopt new climate disclosure rules, although there is still some discussion on the most meaningful way for companies to report on the second- and third-order effects arising from their value chains.

**It was announced in March 2022 that the ISSB will consolidate the work of the Value Reporting Foundation, Climate Disclosure Standards Board (CDSB), TCFD, and World Economic Forum.** ISSB standards are expected to be adopted worldwide, albeit with some differences driven by local regulators and in some cases on a voluntary basis. However, international companies listed on the stock exchanges in the UK, EU, or US will have to report on a consolidated global basis, and this can represent a blueprint for companies in emerging markets to follow. Investors and insurers may also be interested in biodiversity projects in developing countries as a way to diversify. Investor expectations, along with requirements of rating agencies or regulators for financial services business, may also lead companies in developing countries to undertake more reporting on climate and biodiversity issues.

**It is important to assess biodiversity-related financial risks in their own right but that is not to say a combined climate and biodiversity risk assessment cannot be done.** For example, climate-related risks could be impacted by biodiversity related dynamics, and vice versa. Leveraging the scenario testing developed for climate risk may help regulators to design scenarios for financial stability assessments addressing biodiversity risk. Many parties, such as NGFS-INSPIRE and the Intergovernmental Science-Policy Platform for Biodiversity and Ecosystem Services (IPBES), are calling for the introduction of synergies between climate and nature-based reporting standards. The complex interlinkages between climate and biodiversity risk and their potential economic and financial consequences need to be better understood in a holistic manner (NGFS-INSPIRE, 2022). The implementation and prioritization of nature-based disclosure and reporting requirements are still emerging and will be subject to each countries, internal capacity, jurisdictional context, and the actions of their governments. The NGFS will create a task force to mainstream the consideration of nature-related financial risks across its activities to explore, develop, and harmonize nature-related considerations (NGFS, 2022).

**The G20 Sustainable Finance Roadmap (G20 SFWG, 2021) highlighted the need to integrate nature and biodiversity in future work on sustainable finance.** The establishment of the Taskforce on Nature-related Financial Disclosures (TNFD) and the development of sustainability disclosure standards by the International Sustainability Standards Board (ISSB) are important developments in this area. For example, France introduced mandatory reporting on financial risks related to biodiversity loss, as well as dependencies on and impacts to biodiversity in 2022. From 2023, the EU disclosure framework requires disclosing the alignment with all six environmental objectives of the EU Taxonomy, including the protection and restoration of biodiversity and ecosystems.

## Rating agencies

**Discussions with leading global rating agencies make clear that though climate risk is an increasing area of focus, biodiversity is not yet really being considered except insofar as it relates to direct business risks, as in agriculture.** There is some demand by investors for ESG-type ratings, but these are not yet fully developed in the way that ratings for credit and claims-paying ability are. However, the discussion on the role of insurance-based instruments in ESG is increasing. For example, catastrophe risk insurance is being included in ESG considerations as shown by Jamaica's catastrophe bond that was recognized by Fitch as a fiscal risk mitigant (see Box 2 for more information). In addition, Moody's ESG announced in March 2022 that it is seeking feedback from market participants on its methodology for ESG assessments (Moody's ESG 2022). We believe that a more explicit consideration of biodiversity in financial strength ratings will help drive the market and not only make insurers themselves more conscious of biodiversity impacts, but also increase the opportunity for insurance risk mitigation solutions.

### Box 2: Jamaica cat bond

**The Government of Jamaica via World Bank Treasury issued a catastrophe ("cat") bond in July 2021, thereby securing financial protection of up to US$185 million against tropical storms and hurricanes for three Atlantic hurricane seasons ending in December 2023.** The cat bond involved close collaboration with development partners: the UK-funded Disaster Protection Program provided technical assistance during the preparation phase; premium financing in the amount of US$16 million came from the Global Risk Financing Facility (GRiF), funded by the UK and Germany, and US$5 million from the United States Agency for International Development (USAID).

**Fitch recognized the transaction as a fiscal risk mitigant.** The transaction demonstrated that cat bonds can positively impact credit ratings, which in turn translate into lower and more stable costs for sovereign capital. In September 2021, in a special report on the transaction, Fitch Ratings stated that the cat bond "significantly strengthens [Jamaica's] natural disaster risk-mitigation strategy."

**The cat bond forms part of Jamaica's risk layering approach to addressing climate and disaster risk.** The approach draws on a suite of instruments, including the National Disaster Fund; the Caribbean Catastrophe Risk Insurance Facility (CCRIF) parametric insurance against hurricanes, excess rainfall, and earthquake; and the contingent parametric credit line from the Inter-American Development Bank.

*Source: Fitch Ratings 2021.*

## Drivers of biodiversity investments for governments

**There is an opportunity for the insurance industry in relation to government-issued bonds.** Including parametric coverage for acute catastrophe risk provides a useful example that could be leveraged for biodiversity solutions as demonstrated by Belize's blue bond with a "catastrophe wrapper." So far, the market for such bonds is quite small, and the focus for governments and investors in emerging markets has been on debt restructuring. But as the situation in Belize shows, innovation is taking place. See Box 3 for more information.

### Box 3: Belize's blue bond "catastrophe wrapper"

**In December 2021, a parametric insurance policy combined with a sovereign debt transaction (a "blue bond") was placed on the market for US$364 million.** The blue bond was arranged by Credit Suisse, and the "catastrophe wrapper" was created by Willis Towers Watson (WTW) (with risk capacity provided by Munich Re) as insurance protection for Belize's loan repayments after hurricane events. With such a safeguard as part of the country's 20-year sovereign debt structure, the parametric transfer of risk will strengthen Belize's sustainability and resilience to climate shocks, helping to prevent credit rating downgrades and reduce the time it takes for the economy to recover following a shock.

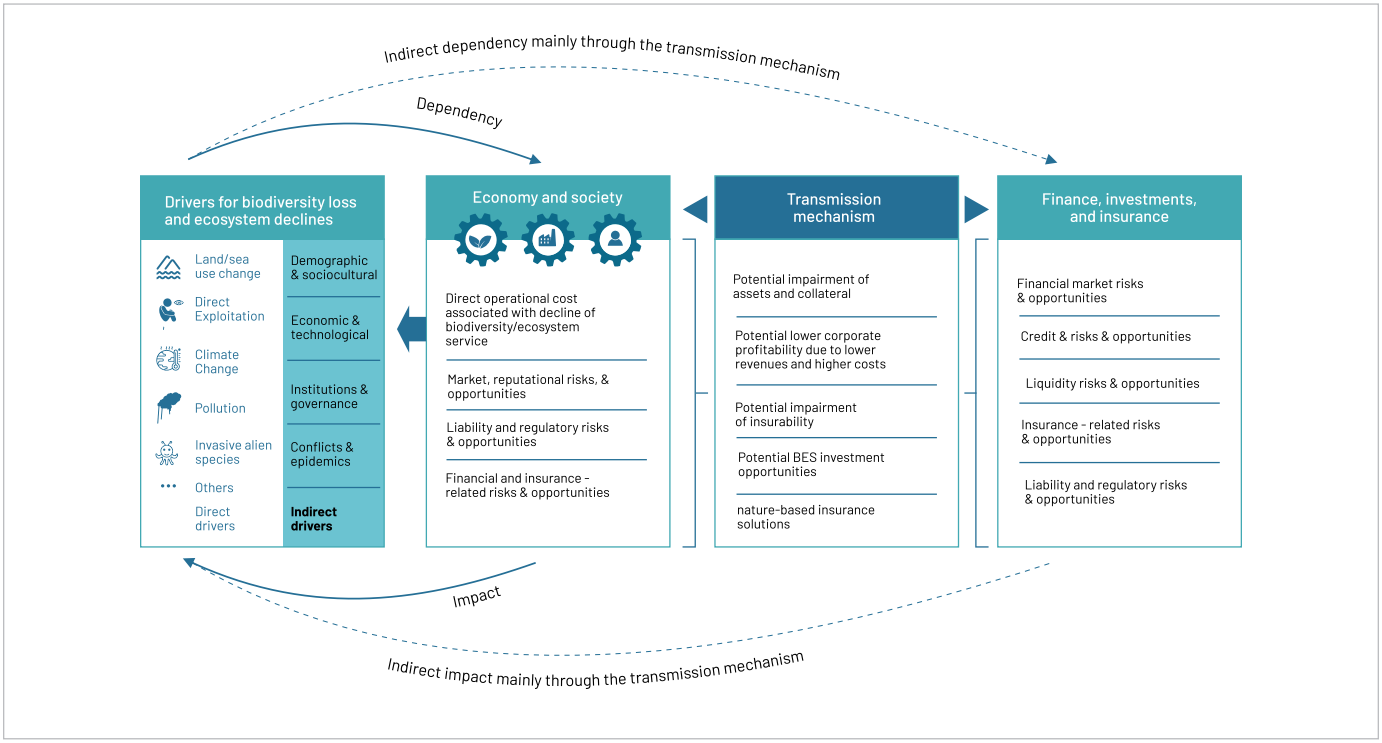
**The transaction with the Government of Belize facilitated the reduction of the country's debt burden while generating approximately US$180 million for marine conservation.** The proceeds of this transaction are being used to meet Belize's commitment to protect 30 percent of its ocean, and to establish a regulatory framework for coastal blue carbon projects. This transaction demonstrates how parametric insurance can be used to support biodiversity goals while protecting loan repayments to help promote economic stability.

*Source: Evans 2021.*

**In "Biodiversity and Ecosystem Services: A Business Case for Re/insurance," the Swiss Re Institute (2020) argues that declining biodiversity poses a threat to the insurance and reinsurance industry by increasing the frequency and/or severity of losses.** For example, coastal erosion leads to increased losses from hurricanes or floods; and loss of forests, which play a role in purifying air, lead to increased respiratory disease. The report describes the Swiss Re Institute Biodiversity & Ecosystem Services (SRI BES) Index, which maps key biodiversity and ecosystem services globally; these should feed into risk selection, risk pricing, risk management, and risk accumulation or diversification. The report points out that biodiversity degradation can have knock-on impacts in other areas: destruction of coral reefs may lead to coastal erosion and increasing impacts from storms and tsunamis; loss of pollinating insects may have a negative impact on production of crops, including fruit, coffee, and cocoa.

Photo by Tom Fisk from Pexels

**Figure 4: The interplay between ecology and the economy and the corresponding transmission mechanism to financial services**




*Source: Swiss Re Institute 2020.*
*Note: BES = biodiversity and ecosystem services.*

**Investing in biodiversity and ecosystem restoration can reduce the risk of damage from natural catastrophes.** Reducing the risk of damage may have an impact not only on the cost and availability of insurance for people, families, and corporations, but also on the cost of capital for both companies and governments.

# Challenges and Opportunities

## Dealing with systemic risk

**Reinsurers have been able to gain a capital advantage from diversifying large, catastrophic risks and there are lessons to be learned for biodiversity risk.** Insofar as climate change is a systemic global issue, diversification may be more challenging in the future. Even if risks are not directly correlated, many may be caused by the same underlying factor, a rise in temperatures; and the sheer number of weather-related losses occurring at the same time may be overwhelming. Investors in the capital markets can better hedge, for example by investing in sectors or regions that benefit from warmer temperatures (English wine, anyone?). However, there is a risk to governments and sovereign credit ratings, particularly for smaller or poorer nations impacted by multiple climate-related natural disasters. Insurance may have a role to play here. In 2016 Mexico became the first government to utilize cat bonds, and in 2020 the World Bank (specifically the International Bank for Reconstruction and Development, or IBRD) issued four cat bonds that will provide the Government of Mexico with financial protection of up to US$485 million against losses from earthquakes and named storms for four years.

## Data

**Failure to account for mitigate and adapt to nature related risks, including those associated with biodiversity loss, could have significant implications for macroeconomic and financial stability.** This was highlighted by both NGFS-INSPIRE and IPBES based upon recent work, they confirm that there is ground for considering the impacts and dependencies on

nature, including biodiversity and ecosystems, as a source of material risk from a macroeconomic and financial stability perspective. We believe there is a need to develop this evidence base further to identify both the direct and indirect financial and economic impact of nature-based risks. If done, this could create additional incentives for insurers to develop products to address nature-based risk.

**The magnitude of the physical and transition risks linked to biodiversity loss are more difficult to assess than for climate change.** Notably, biodiversity loss driven by multitude of factors (e.g., environmental degradation) while climate change is largely determined by greenhouse gas (GHG) emissions. Understanding the impacts of biodiversity loss is also difficult due to the complexity of ecosystems and of the processes involved as well as to the non-linearity and irreversibility of some of these developments.

**Emerging markets suffer many nature-related losses, which are often uninsured; relief comes from governments, backed by international aid organizations - or not at all.** For these markets, the data needed to start developing and pricing products are lacking, but this gap may be partially filled by technology. The Internet of Things and crowdsourcing may help gather information that could be used to develop index products. Still, reliably testing this approach in a way that is acceptable to international investors may take some time.

**Enabling the valuation of natural capital and its ecosystems in monetary terms is a much-needed step toward ascertaining a market price to underpin financial solutions.** It is the first step toward protection, as it allows policy makers to include ecosystems in a cost-benefit analysis and enables the financial sector to estimate the loss of natural capital - and perhaps more importantly its systemic impacts.

**The Dasgupta (2021) review commissioned by UK Treasury in 2019 argues that the current calculation of gross domestic product (GDP) is no longer fit for purpose and instead presents the case for natural capital accounting (NCA).** What GDP calculations fail to include is the degradation of the biosphere. Quantifying natural assets using NCA enables governments to understand the full value that these ecosystems provide, while knowledge of losses attributable to development activities can inform policies for sustainable management. From a finance perspective, if biodiversity loss can be priced, then many opportunities open up to estimate future losses and develop indices and economic loss models that could be used to underpin financial transactions.

**Despite the need to develop NCA methodologies, they currently remain experimental.** One region where the development of NCA is underway is the Caribbean. The Darwin Plus initiative is providing finance to five countries to establish NCA and thus incentivize investments in adaptation and mitigation. See Box 4 for more information.

Photo by Eberhard grossgasteiger from Pexels

### Box 4: Caribbean overseas territories natural capital accounting program

**In 2021, as part of the Darwin Plus initiative, work commenced to develop natural capital accounting tools and practices that are aligned with the United Nations System for Environmental Economic Accounting (UN SEEA).** The work covers five UK Overseas Territories: Anguilla, the British Virgin Islands, Cayman Islands, Montserrat, and the Turks and Caicos Islands.

**The NCA work provides a framework that enables the valuation of nature by translating ecological and scientific data into economic terms, so that they are comparable with other economic data (such as GDP).** This provides an evidence base to support environmentally and economically sustainable decision making. For example:

- **The evidence base allows investment in nature to enhance and sustain the value nature provides.**
- **It supports action on climate change, including mitigation, adaptation, and resilience.**
- **It promotes delivery of international initiatives, such as the UN Sustainable Development Goals.**
- **It supports a green post-COVID economic recovery, focusing on a sustainable tourism sector.**

This work is led by eftec with the Joint Nature Conservation Committee and the New Economics Foundation and is funded by the UK government.

*Source: eftec, "Caribbean Overseas Territories Natural Capital Accounting Programme", https://eftec.co.uk/project/caribbean-overseas-territories-natural-capital-accounting-programme.*

**The financial materiality of underestimating or inaccurately pricing biodiversity-related risks could pose a threat to the solvency of the insurance industry and lead to an increase in exclusions of uninsurable risks.** Due to the challenges around data, the industry may need to work with some independent third parties to collect data and to help develop generally accepted taxonomies. In addition, if not addressed this could result in basis risk whereby payouts either over pay or under pay versus the actual risk incurred.

**In order to develop financial solutions that both address and incentivize investments in biodiversity risk, more data and modeling capability is needed.** For decades, the insurance industry has used catastrophe risk models, which use past events to make estimates of what future losses could look like, but many of these do not currently take climate change into account. Rather than rely on historical, backward-looking data, climate models provide forward-looking simulations of the interaction between energy and matter in the ocean, atmosphere, and land, based on emission levels of greenhouse gases (AON, 2020). While the future is uncertain, climate models enable the projection of temperature, precipitation, and other weather-related conditions and events over the next several decades - important information that helps define physical loss.

**A Coastal Risk Index has been developed to measure coastal risk and strengthen the case for using nature-based solutions to increase resilience and sustainably manage biodiversity.** AXA XL is working with IHE Delft and the University of California, Santa Cruz to develop a Coastal Risk Index (CRI) that integrates the protective benefits of coastal ecosystems into insurance risk models for the first time (AXA XL, 2021). The Index enables the assessment of coastal flooding in the context of climate change, modelling flood hazard and storm surge in current conditions and future climate scenarios up to 2050. The Index will enable insurers to price and transfer risk more accurately as well as support investors and the development sector in mapping both future liabilities and investment opportunities where nature-based solutions provide resilience benefits. In addition, the CRI can be used to inform policymakers decisions by improving their understanding of the exposure of their communities to coastal hazards while demonstrating the importance of proactive coastal ecosystem management in building resilience.

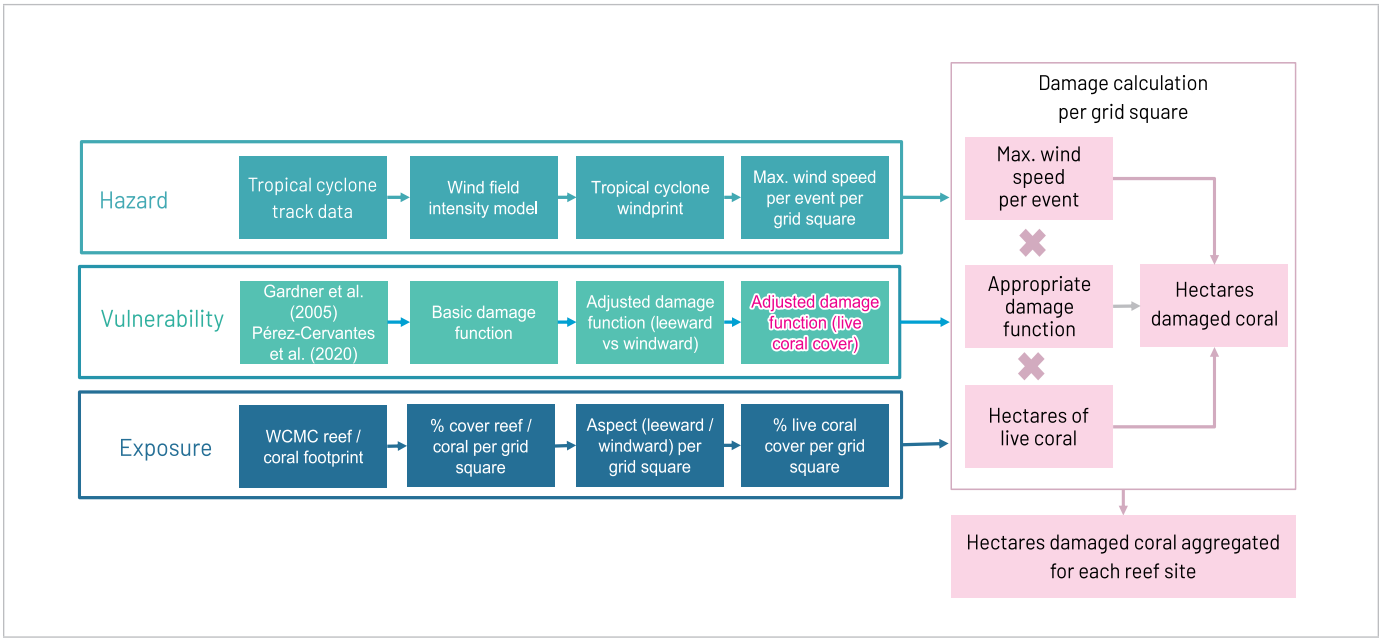
**Risk management can be enhanced by combining the results of both catastrophe and climate risk models, but more needs to be done to incorporate biodiversity risk.** If captured by modeling, the interlinkages between climate and biodiversity risk could arguably enhance risk management and mitigation strategies by taking a holistic view and providing clarity on

adaptation investments, portfolio risk profiles, real estate values, and insurability. The discussion below will present some of the emerging products that the insurance sector has developed for biodiversity risk.

## Product Innovations

**A hurricane risk model for coral reefs was developed by Willis Towers Watson for the Mesoamerican Reef (MAR) to underpin a parametric insurance program that supports recovery of the MAR after a hurricane.** The model itself leverages the techniques applied in estimating the probability of damage in the built environment by looking at the coral reef's hazard, exposure, and vulnerability to define the probability of damage from hurricanes of different magnitudes. Such an analysis quantifies (for example) the likelihood of a tropical cyclone hitting a specific section of the reef and the loss that the reef would sustain to provide an estimate of damage per hectare (Figure 5).

### Figure 5: Hurricane reef damage model




*Source: Young 2022.*
*Note: WCMC = World Conservation Monitoring Centre.*

**The MAR secured US$2.5 million in financial protection for coral reef sites in Mexico, and Belize, with reinsurance capacity provided by AXA Climate.** In the event of a severe tropical cyclone event, where intensity in the covered reef area (captured through peak wind speed) exceeds a specified threshold, the parametric insurance product is triggered, releasing the payout to the MAR Fund. The MAR Fund, through its Emergency Fund, then deploys this money to support early reef restoration and recovery activities with pre-agreed partners following written protocols. See Box 5 for more details.

Photo by Veronica Reverse from Unsplash

### Box 5: Mesoamerican Reef product

**The Mesoamerican Reef is classified as critically endangered by the International Union for Conservation of Nature (IUCN).** It has a 50 percent chance of collapse within the next 50 years.

**In partnership with the Mesoamerican Reef Fund (MAR Fund), and supported by the InsuResilience Solutions Fund (ISF), Willis Towers Watson has developed a parametric product that provides MAR with financial protection against hurricanes to ensure quick recovery.**

**Extending along the coastlines of Mexico, Belize, Guatemala, and Honduras, the MAR is home to hundreds of species of fish, mollusk, turtles, crocodiles, manatees, and of course coral.** The reef structure itself and the organisms that inhabit it directly support millions of people living along the coast. It is estimated that the reef's ecosystem services are worth US$4.7 billion annually. This includes direct benefits to commercial fishing and tourism sectors and the reef's protection of coastal developments from high water levels and waves.

**The MAR Insurance Program is a parametric insurance program that pays out in the event of a severe tropical cyclone event.** The parametric insurance product is triggered if peak wind speed in the specified reef area exceeds a pre-agreed threshold. A payout is then released to the MAR Fund within days. Through its Emergency Fund, the MAR Fund transfers any payout received to predefined organizations (local conservation agencies, government agencies, etc.) that make the required purchases and payments for the early action response, including removal of debris, reattaching of coral fragments, and the like.

*Source: Keshavan and Pollard 2021.*

**A payout of US$800,000 was made to the Government of Quintana Roo following Hurricane Delta in October 2020, demonstrating the value of parametric reef insurance.** This is the first time that a coral reef has benefited from an insurance payout to repair damage sustained from a hurricane. The Government of Quintana Roo first purchased the insurance policy developed by Swiss Re in 2019 and - with the support of Global Parametrics reinsured by Hannover Re - renewed it in 2020 to attain US$1.9 million in cover for the Mexican Reef Protection Program. This cover provides financial protection for 160 km along the coast and is one of the first examples of a nature-based insurance for a coral reef. The funds for the insurance policy came from the Coastal Zone Management Trust, which was established in 2018 by the Government of Quintana Roo with support from The Nature Conservancy and other partners. The solution is designed to enhance and protect an environmental asset by providing the funds for quick restoration, while also mitigating the impact to the local economy (Sheehan 2020).

**The supply of parametric reef insurance products is increasing with new research, which suggests that coral reefs in Hawaii and Florida could be insured,** the former against damage from hurricanes and the latter (potentially) against hurricanes, marine heatwaves (associated with bleaching), and sedimentation from stormwater runoff (Berg et al. 2020). These products could serve a new line of business if they are in demand and affordable.

**Combining parametric and indemnity insurance policies to provide cover against acute and chronic impacts to biodiversity was explored to help finance mangrove restoration.** Beck et al (2020) suggest that a parametric insurance policy based on wind speed is most feasible and could be paired with a traditional indemnity policy to cover both short-term and longer-term restoration actions. This could offer increased resilience and protect against coastal flooding. While this has great potential to cover acute and chronic impacts to ecosystems, to date, no product has gone to market.

**Financial protection against acute shocks to biodiversity should be combined with other instruments to address chronic degradation to ecosystems to help restore and prevent further damage to ecosystems.** For example, the products listed above have been designed to provide cover to repair damage to the coral reefs from the acute shock of hurricanes. However, to fully protect coral reefs as an asset these instruments should be combined with other financial instruments e.g. blue bonds that can be used to help restore and maintain the reefs to directly address the impacts from the chronic impacts of rising sea temperatures which are arguably more detrimental in their impacts to the coral reefs and their ecosystems.

## Affordability

**Insurance premiums have to cover expenses as well as claims.** As new risks emerge and as new types of policies are developed, insurers may need to incur significantly more costs for research and development. Increased disclosure, including of indirect exposure, is overall a positive driver, but it is not without costs, and these may slow down the full adoption of really meaningful reporting, especially in developing countries.

**The four regional risk pools (see Box 6) currently use traditional catastrophe risk modeling for cover related to acute physical climate risks, such as tropical cyclones, excess rainfall, and drought; but going forward they could invest in incorporating biodiversity considerations.** Arguably, these facilities are well placed to invest in incorporating climate scenario modeling, as well as biodiversity implications of some IPCC scenarios, into their existing models. This approach could help protect their regional economies, which often depend upon biodiversity ecosystems for livelihoods and economic gain.

### Box 6: The role of regional risk pools

**At present there are four regional risk pools in existence:** CCRIF SPC (Caribbean Catastrophe Risk Insurance Facility Segregated Portfolio Company), which serves the Caribbean and Central America; PCRIC (Pacific Catastrophe Risk Insurance Company), which serves the Pacific Island Countries; ARC (African Risk Capacity Group), which serves the continent of Africa; and SEADRIF (Southeast Asia Disaster Risk Insurance Facility), which focuses on South East Asia.

**Regional risk pools are created by the governments of developing countries and their development partners to implement parametric insurance solutions that help governments handle a variety of disasters, such as earthquakes, droughts, floods, and hurricanes.** Risk pools enable countries to amalgamate environmental risks into a diversified portfolio, so that countries retain some risk through joint capital reserves while also transferring excess risk to reinsurance and capital markets. This approach not only makes member countries' portfolios more stable and less capital-intensive - and hence cheaper to reinsure; it also incentivizes member countries to invest in risk reduction efforts.

**While sovereign parametric insurance affords important co-benefits, including rapid payouts during times of disaster, one of the main barriers to adoption is cost.** Consequently, regional risk pools are working to improve affordability by implementing prudent capitalization structures and risk-retention policies, diversifying risk exposures in terms of geography and peril, and facilitating access to concessional premium financing. Some scenarios might also achieve economies of scale. Increased affordability, alongside the diversification of risk exposures, can provide the foundation for making biodiversity risk transfers more affordable and impactful down the line.

*Source: World Bank.*

**Regional risk pools could leverage their capital to ensure that products designed to promote and protect biodiversity are cost-effective for their members.** Parametric solutions can be seen as expensive, and these costs need to be carefully managed to ensure that they are affordable, especially for developing country governments that tend to have higher dependencies on their ecosystems than developed countries. However, it should be noted that risk pools need to reinsure which will impact the price but the capital held by these entities could be used to manage the price if reinsurance proves to be expensive. As such risk pools can use capital more efficiently and have greater buying power with reinsurers than a country acting alone. All four risk pools have received considerable contributions to their capital from development partners, and it would be worthwhile to ascertain whether this same capital could be used for nature-based insurance - e.g., coral reef policies. The CCRIF has introduced the first ecosystem livelihoods product via the Caribbean Ocean and Aquaculture Sustainability FaciliTy (COAST) initiative (see Box 7 for more information), but much more could be done.

### Box 7: COAST

**The Caribbean Ocean and Aquaculture Sustainability FaciliTy (COAST) initiative demonstrates the use of parametric insurance to provide livelihood protection against climate hazards.** Recognizing the social and economic importance of the fisheries sector for countries in the Caribbean and the devastating effects climate change will have on the industry, the COAST initiative is a first-of-its-kind climate risk parametric insurance mechanism that promotes food security, the livelihoods of fisherfolk, resilient fisheries, sustainable management of coastal infrastructure, and disaster risk reduction in the region. COAST was developed with technical assistance from the World Bank and with financial support from the US State Department, CCRIF, and the Caribbean Regional Fisheries Mechanism (CRFM). The COAST insurance policy has two triggers: (i) a livelihood protection trigger, which pays out if at the end of the policy year the total modeled losses caused by the adverse weather are greater than the pre-agreed threshold; and (ii) a tropical cyclone trigger, which pays out if the modeled losses caused by the wind and storm from the cyclone footprint exceed the pre-agreed threshold.

**This initiative enables early action to support rapid livelihoods recovery after an event.**

*Source: CCRIF SPC 2019.*

**The African Risk Capacity Group's multifaceted approach to promoting resilience and adaptation - which includes providing parametric insurance and investing in disaster risk management in member countries - could be expanded to include biodiversity[1].** In March 2022, ARC announced that Mali will benefit from a US$7.1 million climate risk insurance payout from ARC Ltd. to the United Nations World Food Programme (WFP). This payout facilitates the provision of cash assistance to 161,000 women, men, and children affected by climate shocks. Over 20,000 children ages from 6 to 23 months, along with pregnant women and breastfeeding mothers, will receive nutritional support and services. In addition, the payout will be used to reinforce communities' resilience to climate shocks, through community asset–building programs such as pastoral wells, water towers, and fishponds that will help diversify production and livelihoods and reduce the impact of future rain deficiencies. This payout demonstrates how collaborative action through ARC, the Government of Mali, and WFP can work to provide comprehensive financial cover for protection and preparedness (ARC 2022).

## Liability risk

**With evolving legislation, claims under liability policies due to harmful impacts on biodiversity could increase.** The exposure would however depend on the type of liability policies underwritten by the company, as well as the development of a legal framework around biodiversity.

**Catastrophe bonds are increasingly being used to cover the liability risk associated with the risk of wildfires.** Many utility companies are now seeking to use cat bonds as a way to manage their liability risk from wildfires, recognizing that faults in their equipment could cause a fire and equally that a fire could damage their utility plants.

**Wildfire risk has encountered challenges in its pricing, leading to delays in placement.** In September 2021, the Los Angeles Department of Water and Power (LADWP) took two months to secure US$30 million of wildfire insurance cover, at a higher-than-envisaged coupon rate, from its second catastrophe bond issue via Power Protective Re. Ltd. The product embeds liability protection in this cat bond deal as well recognizing that the assets insured may themselves cause wildfires. This demonstrates that while wildfire insurance or reinsurance capacity is available from the ILS market agreeing on pricing may be difficult, as ILS funds and investors are demanding higher returns for the California wildfire peril after recent losses. It is worth noting that this is a new peril and pricing may change as we learn more on the risk itself.

1. The African Risk Capacity Group consists of the ARC Insurance Company Ltd. and ARC Agency, a specialized agency of the Africa Union.

**Combining ecological action with financial protection can make good economic and financial sense and help overcome the pricing issues associated with wildfire risk.** For example, an ecological forestry approach linked to parametric wildfire losses could reduce losses for the insurance and reinsurance sector. A study by The Nature Conservancy and Willis Towers Watson (2021) found a 41 percent decrease in residential insurance premiums was possible when ecological forestry techniques such as forest thinning and prescribed burning were applied to a relevant area. Without such ecological measures, the risk of wildfire continues to grow.

## Claims and reserving

**Biodiversity loss could lead to a higher frequency or severity of claims and greater geographic or sectoral concentration of claims** (e.g., increased infrastructure damages under property and casualty insurance). We are already seeing such increases in lines of business impacted by climate change, such as wildfires. Some of these claims may be long term, particularly in liability, life, and some health lines, leading to potential for under-reserving, which could threaten the future profitability and even solvency of some players.

**Wildfire catastrophe bonds demonstrate the challenges in estimating reserves and managing claims, as the first issuance in 2018 led the company to bankruptcy one year later.** The California utility PG&E issued the first-ever cat bond to cover only wildfire, raising US$200 million. Unfortunately, a series of wildfires led PG&E to file for bankruptcy in 2019, and a settlement for the payout was reached two years later. Cat bonds are still being used as a medium for insurance against wildfires, but the experience of PG&E highlights the need to improve wildfire risk modeling and increase understanding of its complexities.

## Investment risk

**The insurance industry is exposed to the same risks on the asset side of the balance sheet as other financial institutions - specifically credit risk, market risk, and liquidity risk.** One way to mitigate these risks is to tackle the root causes of the vicious circle of biodiversity degradation, by halting activities that negatively impact biodiversity in the first place and promoting activities that are beneficial to its conservation and restoration. For insurance companies, it is challenging to ensure consistency between the approach to biodiversity on the asset side as an investor and on the liability side as an underwriter. Insurance companies not only manage their own investments, but also hold large portfolios on behalf of life assurance policyholders, where the impact of biodiversity on long-term financial performance also needs to be considered.

**Furthermore, banks and insurance companies operate under various regulatory regimes related to risk-based capital.** It is not yet clear how biodiversity or related instruments would be treated in capital modeling. There are potential levers that policy makers or regulators could use to incentivize or disincentivize capital allocation on both the asset and liability sides of the balance sheet. This could include changes to the risk-based capital requirements for certain types of assets or lines of business, as well as greater disclosure requirements on nature-based considerations and the regulators engaging more actively in discussions with re/insurers about how they are considering climate and nature in their strategy and operations. Such considerations, alongside rating agency requirements and investor expectations, could drive the insurance industry to play a greater role in managing biodiversity risks.

Photo by Skyler Ewing from Pexels

# Conclusion

**The insurance sector can help promote financial resilience to biodiversity risks, and it can go even further to incentivize investment in much-needed adaptation.** Leveraging experience from the climate and disaster risk industry this paper has discussed some innovative insurance-based solutions designed to protect and repair natural assets when an acute shock happens, and others that have incentivized adaptation measures by combining the insurance requirements with the need to reduce the residual risk faced by the natural asset. However, there is still a great deal more that needs to be done and can be done by the insurance sector. Some these steps are summarized below.

1. **Policy makers and regulators need to do more to incentivize market participation.** While some products are emerging, the demand for these products is not yet known. The insurance industry has expertise to offer in developing solutions and should play a more prominent role in discussions about and in development of policies. Parametric solutions are expensive but can be of benefit when combined with other adaptation investments to reduce residual risk. Donor financing may be available for premiums but this may not be sustainable in the long run.

2. **The challenges in pricing biodiversity risk, which is notably separate from public accounts, should be addressed.** The Dasgupta report highlights this issue, and there are several frameworks that exist to account for the economic value of natural assets; but these have not yet been linked to the core public accounts of nations. Add to this the fact that historically informed cat models that project future risks are still working on incorporating scenario-based climate models that may or may not include biodiversity, and this task becomes more complex. A case can be made for further investment to value the public benefits we all receive from natural assets.

3. **In order to adequately address biodiversity risk, the public and private sectors will need to work together, with regional risk pools helping to develop cost-effective solutions.** Regional risk pools exist to serve the needs of their members, and if nature-based insurance is in demand, then risk pools are well placed to invest in research for product development. In addition, risk pools have been well capitalized by donors, and some of this capital could be used to help manage biodiversity risk and ensure its cost-effectiveness. If risk pools do not take up this mantle, there is a case for creating public-private partnerships to address this risk.

4. **Insurers can play a role as both underwriters and investors to simultaneously promote investment in biodiversity - positive activities and help discourage biodiversity-negative activities.** The insurance industry can impact the market by the way it allocates capital, both on the investment and the underwriting side. This can be both by discouraging biodiversity- negative activities by excluding certain sectors as many insurers already have with coal for example, and by actively seeking opportunities to deploy to activities that are neutral or biodiversity-positive. Insurance can also be used as part of a range of solutions to mitigate risk and encourage investments that protect or enhance the natural environment.

5. **While nature-based insurance can incentivize investments in adaptation and facilitate access to rapid liquidity, it will not address all risk.** Insurance is not a silver bullet and will not resolve the biodiversity risks we face overnight. Rather, insurance plays a limited but important role by incentivizing adaptation and providing financial protection for when an acute climate or biodiversity shock happens.

**The risks from biodiversity are only now gaining attention, and much hope is placed on the outcomes of the Biodiversity COP in the third quarter of 2022.** If global agreements are reached with specific targets that can inform regulatory practices, then the insurance sector has great opportunities to develop the market for insurance-based solutions for biodiversity risk. Without such agreements, efforts to develop insurance for biodiversity will continue to be driven by a few key investors with vested interests or by corporates in the context of increased disclosure requirements.

**Re/insurers who embrace the challenges of biodiversity will benefit from the opportunities it presents.** Some re/insurers have already embarked upon this journey, but to bring this work to the forefront we need more than niche investors. The insurance industry can support biodiversity both as underwriters and investors, by the allocation of capital to and from different sectors as investors and underwriters and by developing new solutions. However, more policy levers are likely required to generate reporting and investing incentives, beyond the current ESG framework. The world is watching.

**Beyond the twin crises of biodiversity loss and climate change, we now face a polycrisis that also includes disasters and pandemics like COVID-19.** We hope awareness of these multiple crises translates into the development of innovative products that truly address systemic risk - by developing pricing models that more explicitly take account of biodiversity risk and that are accepted by the financial markets. How we choose to protect and interact with natural assets now will play a critical role in societies' resilience for generations to come.

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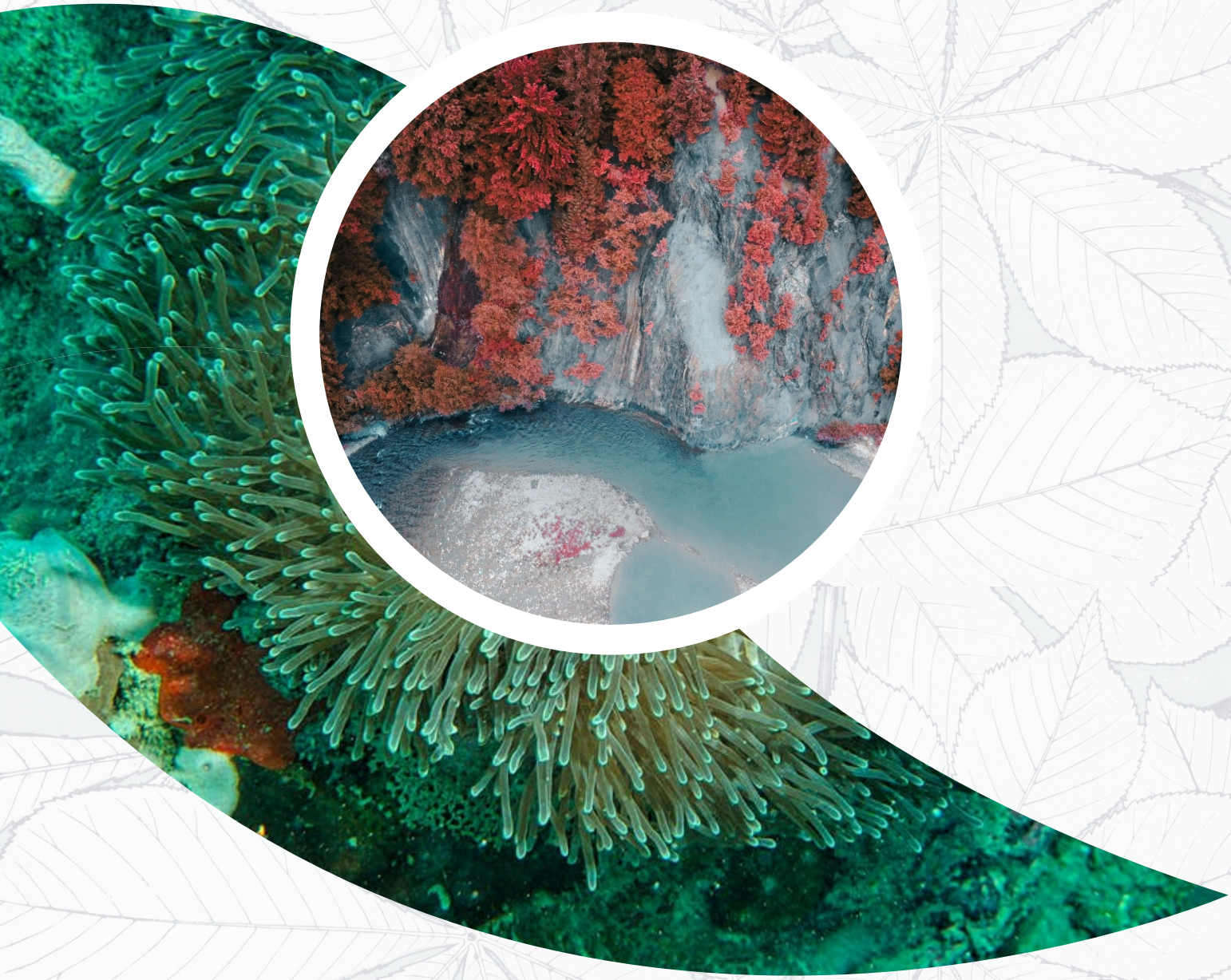

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