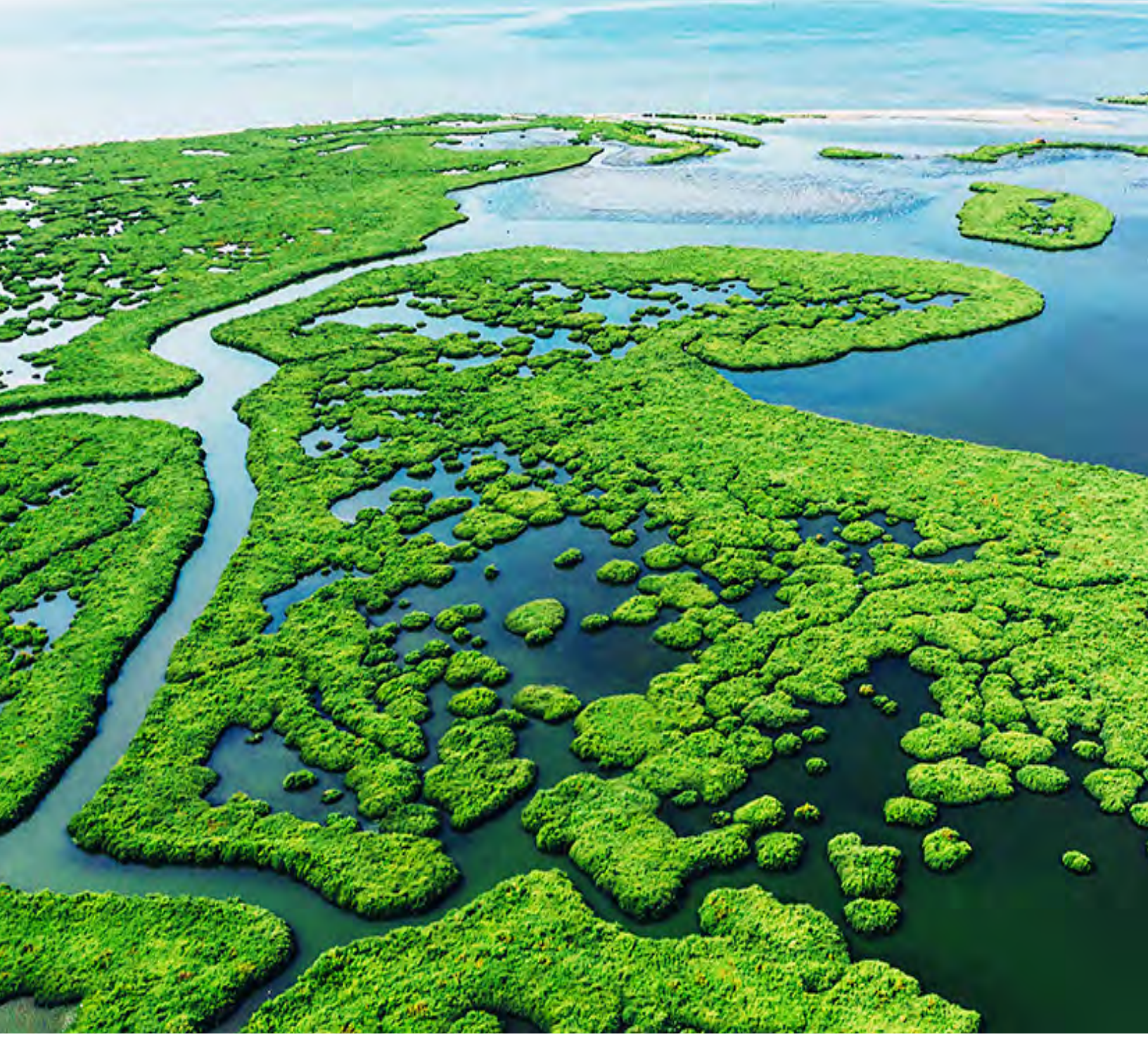

NATURE FOR INSURANCE AND INSURANCE FOR NATURE

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EXECUTIVE SUMMARY

Nature is facing a range of global threats that are accelerating biodiversity loss and degrading ecosystems, imposing rising costs on society. Global analyses suggest substantial impacts on the economy if loss of nature continues unabated. This has spurred efforts to make the economy nature-positive, a global goal of halting and reversing nature loss worldwide. One consequence of losing nature is the erosion of natural protections that help reduce disaster risks, adding stress on insurance markets, especially as climate-related economic losses rise. Investments in nature-based solutions that lower risks could thus help maintain insurability. In addition, because so much of the economy depends on access to insurance, the sector is uniquely positioned to accelerate nature-positive action across sectors. Nature thus helps insurance, and insurance can help nature.

While the insurance sector has not been engaged widely on nature-related topics, this two-way relationship is now receiving increasing attention. A growing number of studies, pilots, and new approaches have emerged, but questions remain about which solutions can deliver impact at scale and are fit for purpose. To explore solutions that are impactful, durable, and scalable, Environmental Defense Fund (EDF) convened a diverse group of nearly 100 experts in the spring of 2025 and also reviewed research and analyses that have been undertaken to date on the topic. Through these efforts, we identified promising opportunities, alongside challenges that must be addressed, so that nature can help promote more available and affordable insurance and insurance can support nature-positive activities throughout the economy.

Nature helps insurance.

Wetlands store floodwaters. Urban greening mitigates heat. Prescribed burns reduce catastrophic wildfires. These are examples of nature-based solutions that can lower the frequency of disasters and/or the losses when they occur. Since insurance is easier to provide and less expensive when risks are lower, investments in these approaches help support well-functioning insurance markets. Insurers can adjust their underwriting and pricing in response to the risk reduction services of nature-based investments, but this practice is still nascent and key barriers remain in updating the modeling and securing timely data on investments. In addition, nature-based solutions are often public goods, providing a wide array of benefits to many stakeholders, and premium reductions are not sufficient to finance most investments. Broader partnerships will be crucial: for researchers and the insurance sector to improve integration of nature-based approaches into business practices, for regulators to spur modelers to incorporate nature-based risk reduction, for government insurance programs—such as the National Flood Insurance Program—to reward nature-based risk reduction, for insurers to assist their clients with such investments, and for insurers to publicly advocate for nature-based solutions in areas where they do business.

Insurance can help nature.

Insurance underpins nearly every sector of the economy, from housing to infrastructure to agriculture. That makes it a powerful lever for driving more nature-positive approaches. Insurers have multiple tools at their disposal to support the transition to a more nature-positive economy, from their underwriting standards to their investment approaches to their client and policy engagement. Uptake is still limited, however, and several challenges must be overcome for more widespread deployment of these approaches. Insurers are concerned about losing business or political pushback and will not typically invest in low-profit margin activities, particularly those that are for the global public good. Startup costs for the insurer can also be high. New opportunities are emerging, however, including insurers finding important niches for new products that support nature-based approaches, new mission-driven business models, and applications to insure nature itself. In addition, pressure is growing for insurers to better incorporate nature protection into underwriting standards, to screen their investments for biodiversity and climate impacts, and to support nature-positive activities with their philanthropic funds.

Looking across the wide range of tools and approaches that could better link insurance and nature, five priority areas emerge for policy and research:

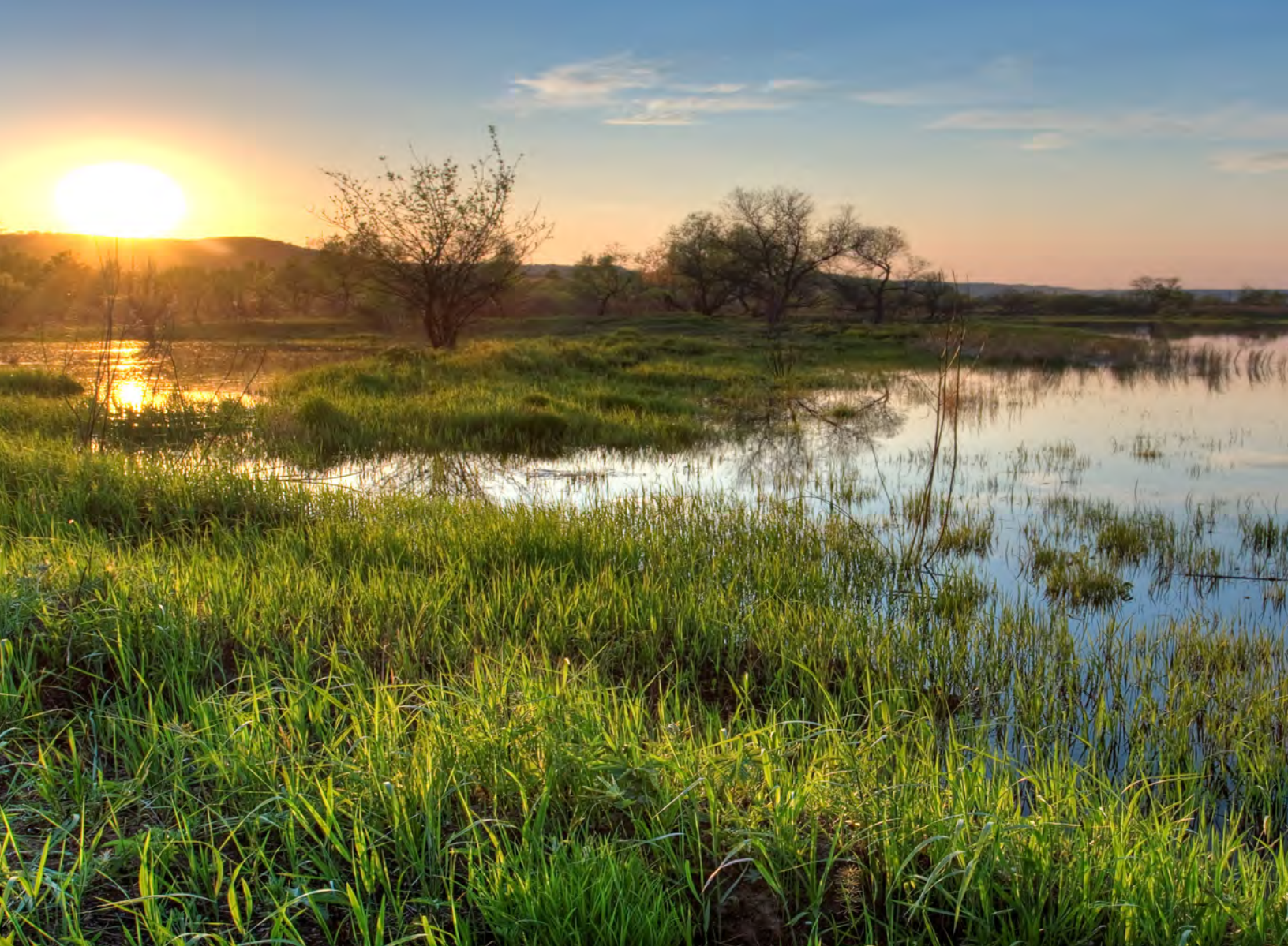
1. **Focus effort on environmental problems where insurance has a clear, comparative advantage.** NGOs, policymakers, and regulators should identify environmental challenges where insurance can be especially impactful. Insurance is not the right tool to address every environmental problem, and efforts should be targeted at those where it offers comparative value—such as potentially in global food systems—and prioritize engagements in those areas.

2. **Insurers should identify and scale the highest-impact tools.** There are many ways in which insurers can help promote or reward nature-based approaches throughout the economy. Insurers should identify those that have the greatest potential to drive systemic change and collaborate with NGOS and policymakers to implement them. For example, by directing a portion of their portfolios toward nature-positive projects, insurers could catalyze change in key sectors, help crowd in additional capital, and drive innovation.

3. **Require the integration of nature-based risk reduction into insurance underwriting and pricing models and support partnerships to create the necessary datasets to support this integration.** Regulators should mandate that insurers and catastrophe modelers incorporate nature-based risk reduction into underwriting and pricing. While there is growing evidence that nature-based solutions can lower disaster losses and modeling approaches to incorporate these benefits into loss estimation, modelers often lack localized, up-to-date data to account for all investments in nature-based risk reduction. Partnerships between the public sector and researchers could be leveraged to develop and maintain datasets required to make this integration meaningful and practical.

4. **Maintain cross-sector partnerships for continued learning.** Nature-focused organizations and policymakers need a deeper understanding of how insurance markets work, and what constraints insurers face. At the same time, most insurers lack in-house expertise in conservation or ecosystem services. Continued dialogue between these teams can unlock creative, pragmatic solutions that benefit both sides.

5. **Explore how insurance can play a role in driving more equitable disaster outcomes and investments in nature-based solutions.** Under-resourced communities often lack access to both nature-based protections and insurance coverage. Policymakers and researchers should explore how insurance can help deliver more equitable disaster outcomes and expand investments in nature-based solutions where they're needed most.



1. INTRODUCTION

Globally, we are experiencing dangerous declines in nature and natural resources, with plummeting populations of species, growing extinction rates, and loss of myriad ecosystem services. This loss of ecosystem services, from declines in soil health to decreases in freshwater availability, can cause economic losses for many sectors. One critical service some natural systems and nature-based investments provide is reducing losses from weather-related extreme events. As insurance market stress mounts in high-risk areas, the only long-term solution is greater investments in risk reduction, including nature-based approaches, since insurance is easier to provide and less expensive when risks are lower. In addition, insurers have a range of tools that can accelerate nature-positive approaches across sectors they insure or in which they invest. This report explores these complex challenges and aims to address related questions: can nature help insurance and insurance help nature? Can nature-based solutions help lower risks and stabilize insurance markets, and can insurance sector tools help put the economy on a path that is nature-positive, supporting greater conservation, restoration, and environmental improvements?

The insurance sector has not typically been engaged in nature-related topics, but that is beginning to change. Recent years have seen new commitments from insurers to improve ecological outcomes, such as AXA's deforestation policy (AXA n.d.), and the launch of new insurance products aimed at supporting ecosystem restoration and conservation efforts, such as insurance for forest-based carbon credits. There is also a growing body of research on the risk reduction benefits of nature that not only quantifies the loss reduction potential of natural systems, but also highlights the social and health benefits of nature and underscores the imperative to ensure equitable access to these broad benefits. While this shows progress, and there are several promising pilots, too often ideas have failed to move off the pages of reports and into the world of practice. There are not many implemented approaches yet that have had a substantial impact on ecological or insurance market outcomes and that are durable and can scale. We are still looking for the solutions that are widely fit for purpose and attempting to identify and adopt the needed regulatory and policy frameworks to enable such change.

Insurance provides critical financial protection against disasters. From prior research, we know that those with insurance have fewer unmet needs and financial burdens (You and Kousky 2024). Lack of insurance can widen income inequality post-disaster, while widespread insurance supports local economies and housing and mortgage markets (Kousky et al. 2020; Rhodes and Besbris 2022; You and Kousky 2024). Yet, as insurance becomes harder to obtain and more expensive, these critical financial benefits are becoming out of reach for many, slowing recoveries and widening inequality gaps post-disaster.

Insurers have lots of tools in their toolbox to support the transition to a more nature-positive economy. This includes their underwriting criteria, their pricing, the type of products they provide, how they invest their capital, their engagement strategies with clients, how they handle claims, and whether they use their political voice to support related public policy.

Nature can help reduce the risks from multiple types of disasters, from flooding to wildfires, helping preserve insurability and support the financial health of our communities. Nature-based approaches to lowering risks can be quite varied, ranging from passive conservation of systems—such as wetlands that act as natural reservoirs storing flood waters—to very active land management practices—such as prescribed burning and forest thinning to lower the risk of catastrophic wildfire in certain forests where fire has long been excluded by managers, leading to a buildup of fuel. As the risk of many weather-related disasters continues to increase with a warming planet, those and other investments in mitigating growing losses will be necessary for insurance market stability.

However, risk reduction is only one of the valuable services society gains from nature. The wide array of services nature provides are critical to our social and environmental well-being. As degradation and destruction of natural systems advance, society is paying the cost: the World Bank has estimated that loss of certain services will lead to trillions of dollars lost to global GDP just in this decade (World Bank Group 2021). Impacts will be the costliest in lower- and middle-income countries. Yet these economic risks from nature degradation and loss are often unpriced and unmanaged (Ranger et al. 2023). So while nature-based solutions can support insurance, to prevent mounting risks from nature degradation, insurance must also help nature.

Insurers have lots of tools in their toolbox to support the transition to a more nature-positive economy. This includes their underwriting criteria, their pricing, the type of products they provide, how they invest their capital, their engagement strategies with clients, how they handle claims, and whether they use their political voice to support related public policy (Kousky 2022a; UNEP 2024). The United Nations Environment Programme (UNEP) has defined nature-positive insurance as "risk management and insurance strategies, approaches, practices, products, services and solutions that address

nature-related dependencies, impacts, risks and opportunities in order to value, conserve, restore and wisely use biodiversity and ecosystem services; and to promote economic, social and environmental sustainability" (UNEP 2023). Insurance is not a panacea for addressing all of the degradation of nature, nor will more conservation alone solve all insurance market stress. But together, nature and insurance can play a critical role in addressing both challenges.

In search of those solutions that are impactful, durable, and scalable, Environmental Defense Fund (EDF) convened a cross-sector and cross-disciplinary group of nearly 100 experts in the spring of 2025 to take stock of what we know about the intersections between insurance and nature and to identify both the most promising policy paths forward, as well as the research agenda needed to support development of new solutions. We also reviewed research and analyses that have been undertaken to date on the topic. This report provides a summary of the opportunities and the challenges identified so that nature can help promote more available and affordable insurance (section 2) and for insurance to support nature-positive activities throughout the economy (section 3). The report ends with priority actions for policy and research.

Risk Management and Insurance

Insurance is one type of risk transfer (Kousky 2022b). Risk transfer is the practice of shifting the financial responsibility or burden of potential losses from one party to another. With insurance, the policyholder pays a price—called the premium—and receives a contract obligating the insurance company to compensate them in the event of a loss to cover damages. The insured is essentially paying for a promise that they will be given funds under certain possible future circumstances. Risk transfer is one component of risk management, which also includes risk assessment to understand the risk, risk communication and education, and risk reduction investments.

2. NATURE FOR INSURANCE

2.1 Background

Investments in nature can reduce the risks of many disasters. Coastal wetlands, mangroves, and coral reefs absorb wave energy and storm surge, reducing inundation and the extent, depth, and duration of floods. Forests on hillsides and watersheds can help prevent soil erosion, reduce landslide risk, and regulate water flow to minimize both flooding and drought conditions. Intact floodplains accommodate excess water during heavy rainfall, while healthy soils and intact wetlands increase water infiltration and reduce surface runoff. Urban green spaces can help manage stormwater, reduce urban heat island effects, and improve air quality. Managing forests through prescribed burning and thinning to undo the risk created from generations of fire suppression lowers the risk of catastrophic wildfire damage. Since insurance pricing and underwriting reflect risk, if natural systems or nature-based investments are lowering the risk of insured losses, insurance pricing and availability should, in theory, reflect that relationship.

There is a growing body of research that documents these risk reduction benefits across the globe (e.g., Sudmeier-Rieux et al. 2021). A recent review by the White House, for example, found broad evidence for the effectiveness of these solutions, noting they can generate co-benefits, can be used alone or in combination with gray infrastructure, are typically highly cost-effective, and can provide greater protection and lower costs over time as natural systems are established (Mason et al. 2024). Another recent review demonstrates that the broad benefits of risk reduction often outweigh the costs (Vicarelli et al. 2024). Unfortunately, underserved communities often face higher risks and fewer nature-based investments. For example, lower-income households in the U.S. spend a larger share of their income on energy (Ayala & Dewey 2024) and have less tree canopy (e.g., Pearsall 2017).

Insurers, however, need evidence not of the broad effectiveness of nature-based approaches, but how changes in natural systems or investments in nature-based solutions directly relate to insured losses. There are several studies that link the existence of certain natural systems to changes in property damage or model reductions in average annual losses. Most of this work to date has focused on flooding, where the benefits of nature-based solutions have been recognized for some time. Prior studies have documented that wetlands lower economic damages from flooding, reducing property losses (Al-Attabi et al. 2023; Narayan et al. 2017; Taylor and Druckenmiller 2022). For example, a 2020 analysis of eighty-eight tropical storms and hurricanes impacting the United States between 1996 and 2016 found that counties with coastal wetlands experienced less property damage; this study valued this at $1.8 million per year per kilometer squared of wetlands on average (Sun and Carson 2020). This benefit was larger for weaker storms, and the authors estimate that wetland losses increased property damage from Hurricane Irma by $430 million. In another example, a recent working paper finds that loss of one hectare of upstream wetlands increases flood insurance claims by a small amount; based on the estimate, cumulative wetland loss since 1985 has increased flood insurance claims by more than 7%, or over $8 billion (Gourevitch et al. 2025). Globally, coral reefs have also been found to substantially reduce coastal flood damages (Beck et al. 2018).

In 2021, The Nature Conservancy (TNC) and Munich Re published a study that demonstrated that models used by insurers for flood risk can account for nature-based solutions to flood risk—in this case, a levee setback project on the Missouri River (Munich Re and The Nature Conservancy 2021). The setback project allows the river to flow more naturally and over a wider area, which in turn benefits plants, fish, mammals and birds. The setback project also reduced flood risk for the areas behind the levee. TNC and Munich Re demonstrated that a nature-based approach to flood risk can be accounted for in insurance modeling and reduce average annual losses by 20%–30%.

A similar analysis has been done for a nature-based approach to reduce the risk of loss from wildfire. TNC and WTW analyzed a landscape-scale ecological forestry project in Placer County, California, to estimate the reduction in wildfire risk (Martinez et al. 2021). The Placer County Water Agency was a partner on the project and has assets in and around the treated forest and purchases insurance for its hydropower and water supply facilities and assets. The study team found that some of those assets were built to be wildfire-resistant and the forest treatment had less impact on their risk. For those structures susceptible to wildfire damage, however, the forest treatment reduced risk substantially and could be translated into a 44% average premium reduction. For surrounding homes, there were also benefits, which, in aggregate, were sizable. The study demonstrated how ecological forestry could be accounted for directly in insurance modeling and pricing and the method is more widely

applicable. However, there remain institutional hurdles to harnessing savings across thousands of different beneficiaries to pay for greater risk reduction.

One key barrier to expanded investments is that the risk reduction benefits of nature tend to be what economists refer to as public goods, meaning they provide benefits to everyone and no one can be excluded from those benefits. If the benefits cannot be privately captured, everyone wants to enjoy those benefits without paying, that is, "free-ride" on others paying to provide the benefit. This can result in undersupply of public goods if left to the market. Since the benefits from nature tend to be public goods, there is far less conservation and restoration than would be optimal. In addition, nature-based systems provide a wide array of benefits. When all are taken together, the benefits can far exceed the costs. Often, however, there is not one entity that would pay for all the services—beneficiaries may only want to pay for particular services that are of concern to them or the specific benefit(s) they receive. This applies to insurers and policyholders, as well. Even if they receive some benefit from investment in nature-based solutions, since the total project benefits are wide-ranging and many different parties obtain benefits, insurers or policyholders will typically be unwilling to shoulder the full costs of nature investments.

The Engineering With Nature (EWN) program of the US Army Corps of Engineers (USACE) has analyzed research methods for evaluating the wide diversity of benefits nature-based solutions can provide. This may help with developing governance structures for collective action among multiple beneficiaries all obtaining different benefits from a natural system. In some of the successful examples from the workshop, discussed below, insurance was integrated into collective approaches. The solutions will also need to be supported with greater education on the benefits derived from nature, since another ongoing challenge is simply lack of awareness and understanding of the risk reduction benefits provided by natural systems, including by some in the insurance sector.

A final challenge is ensuring the benefits of nature-based solutions, restoration, and conservation projects are evenly and effectively distributed. When risk reduction is measured in avoided property values, it can bias projects toward higher-income areas. Prioritizing projects equitably across communities and identifying where the largest gains in reduced risk can be achieved with limited budgets are important areas for policy analysis. Unfortunately, without public or philanthropic support, under-resourced communities are typically unable to fund such investments on their own.

2.2 Solutions: Opportunities and Challenges

Integrating Nature into Underwriting and Pricing Models

When nature-based approaches provide risk reduction benefits, those should be captured in insurance sector underwriting and pricing. Not only does that reward loss reduction, creating both a financial incentive and an information signal to policyholders, but it is also important for how individuals and communities view their insurance. Some workshop participants noted that when insurance market outcomes do not reflect the investments households and communities make in protection, it undermines trust and confidence in the sector and potentially in the nature-based solutions. This can lead to individuals forgoing important financial protection; create ongoing tension and political disagreement between insurers, consumer groups, and regulators; and possibly decrease support for investments in conservation and nature-based solutions.

A first step to insurers' incorporating nature-based risk reduction in underwriting and pricing is quantifying the avoided insured losses provided by natural systems. This has been recognized by research, but the practice of doing so is still nascent. For example, a study from Swiss Re Institute found that coastal wetlands in Florida reduce the frequency of flood insurance claims from lower severity storms that are responsible for around 40% of all flood claims (Swiss Re Institute 2025). And ongoing research by the Center for Coastal Climate Resilience at the University of California, Santa Cruz, in partnership with Guy Carpenter, AXA, and Munich Re is quantifying the benefits of mangroves in the Philippines. The research has found that near Sagay City, mangroves are providing risk reduction that could translate into a 12% reduction in hurricane insurance premiums. While these benefits have yet to be incorporated into insurance, the research evidence serves as an important starting point.

Though the research continues to point to benefits, nature-based solutions largely continue to be viewed as having nominal impacts on avoided insured losses, and this has been hard to dispute with few rigorous and causal research studies. Insurers need detailed evidence of the exact amount a specific nature-based investment lowers insured losses. This has been modeled for some natural systems and nature-based interventions, as discussed above, but the necessary level of granularity does not exist for all natural systems and interventions. Workshop participants also noted that most insurance and related firms, such as brokers or modelers, are reluctant to make changes to their operations based on localized, non-causal, or non-observational studies. Future research needs to empirically identify when, where, and what type of nature-based investments can substantially lower insured losses, and then that needs to be directly integrated into industry catastrophe models (see box). More studies are also needed that can take certain models that have been used for small geographies and scale them to the markets in which insurers operate. **Insurers could partner with researchers on these studies and share their claims data through data-sharing agreements to allow closer examination of the relationship between nature-based investments and claims.**

What Are Catastrophe Models?

Dating back to the early 1990s, catastrophe models are sophisticated, simulation-based models used by the insurance industry to quantify the potential damages from a range of natural disasters including hurricanes, earthquakes, floods, and wildfires. These models combine a module that simulates the hazard with detailed information about insured properties and an understanding of how aspects of the hazard relate to impacts in order to estimate potential losses. Insurance companies use these models to guide underwriting, set rates, determine how much coverage to offer in high-risk areas, inform reinsurance purchases, and maintain adequate capital reserves.

Building on the existing evidence, however, there are already efforts underway to drive the needed changes to insurer underwriting and pricing. One is a new pilot, discussed at the workshop, that priced insurance based on investments in forestry practices that lowered the risk of catastrophic wildfire (Jones 2025). TNC, WTW, and University of California, Berkeley, Center for Law, Energy & the Environment (CLEE) collaborated on the design and structuring of a new wildfire resilience parametric insurance policy. Parametric insurance pays a predefined amount based on occurrence of an objective measurement of the hazard

(see box). This insurance was purchased by the Tahoe Donner community, a 6,500-home community spread across 7,500 acres of forested land in the Sierra Nevada of northern California, near the town of Truckee. The underwriting for this policy took account of improved forest management, leading to an almost 40% reduction in premium. The policy, which is triggered based on acres burned, provides $2.5 million in insurance coverage for 1,345 forested acres. Though the homeowners association can use the funds as needed post-disaster, it has indicated it would likely use them to rehabilitate the burned acreage. Most importantly, the insurance was written taking account of forest management practices in an area where other insurers are not renewing or writing new insurance. The next step in this project is to place additional wildfire resilience insurance, either traditional indemnity or parametric policies, with other homeowners associations, large commercial property owners, and municipalities, and to encourage direct writers of home insurance to also take forest management into account in their underwriting and pricing.

There are also efforts underway for crop insurance to reflect agricultural practices that help reduce crop losses from natural disasters. For example, led by the Illinois Corn Growers Association and the University of Illinois, a proposal is advancing through the U.S. Department of Agriculture Risk Management Agency (the U.S. has a federal crop insurance program) that applies insurance rate adjustments for farmers in select states who plant cover crops before commodity row crops. Planting cover crops has been shown to improve the ability of agricultural soils to drain during severe precipitation events and hold onto moisture during dry conditions. This insurance rating adjustment proposal would align crop insurance premiums for producers growing cover crops with risk reductions measured by University of Illinois research using data from the federal crop insurance program.

Building on initial pilots like these, conference participants highlighted multiple potential paths forward for greater incorporation of nature-based risk reduction in insurance underwriting and pricing. They noted that a near-term opportunity could be a **partnership between researchers and insurers to better integrate nature into catastrophe and other insurance models.** Such a partnership could help incorporate current findings into improvements in the propriety industry models. Some of the models have not been built to incorporate nature's benefits; thus, new modeling investments are needed that could be informed through academic partnerships. For instance, such models do not account for the impact of waves, nearshore bathymetry, habitat fragility, and reefs, which limits the ability to account for certain nature-based solutions (Kelso et al. 2024). Researchers could help fill these gaps.

In addition, participants suggested a need to **identify or develop data platforms that could allow for timely accounting of new investments in nature in an easy and cost-effective way for modelers to identify and integrate the investments.** For some solutions, there is existing data that is sufficient, such as the National Land Cover Database, the California Department of Forestry and Fire Protection's (CAL FIRE's) database of forest treatment projects, but other investments—such as localized stormwater management investments—may require new data collection to identify and compile such information for modelers. Even when data is available, many models may not be updated frequently or on a cadence that aligns with any investments that communities or individuals may make in nature-based solutions or restorations—a limitation that can exist for other loss reduction investments as well.

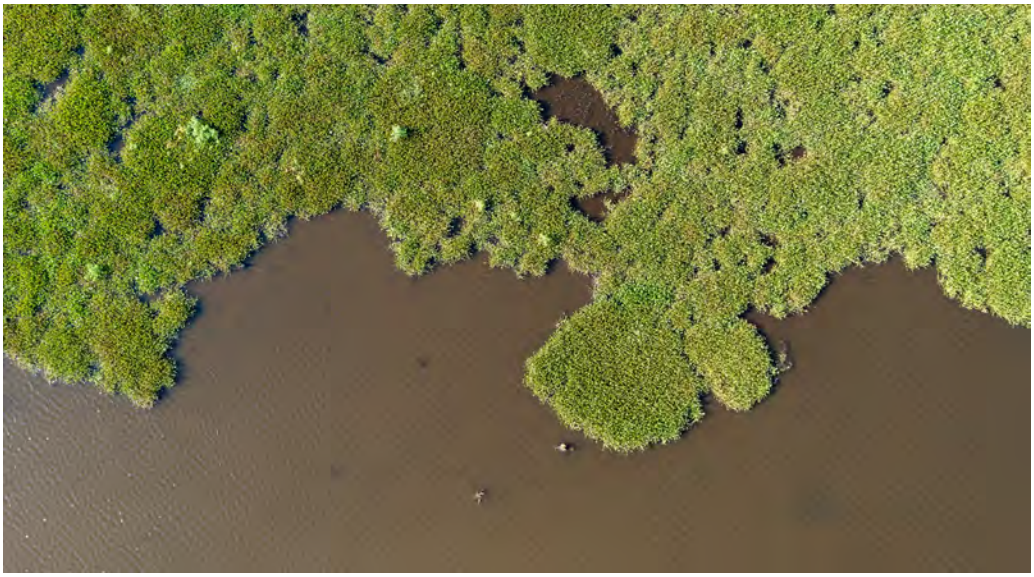
Participants also noted that model vendors need to see a strong demand signal that their models account for risk reduction, including risk reduction provided by nature-based approaches. The direct clients of the model vendors are typically insurance companies. **Communities and policymakers, however, can pressure regulators and insurers to request such changes in the models and ask for transparency in how risk reduction is accounted for in the models.** The California insurance commissioner, for example, has required catastrophe models to account for mitigation measures, including landscape-scale risk reduction, such as forest management, prescribed fire, and nature-based flood risk reduction (California Department of Insurance 2024). Colorado enacted legislation in early 2025, with the leadership of the insurance commissioner, to require that models used by insurers for underwriting and pricing take into account property, community, and landscape scale mitigation—such as landscape-scale forest management (Colorado General Assembly 2025).

Several workshop participants also offered a word of caution. They noted that even if nature-based solutions were incorporated fully into pricing, it may not result in substantial decreases in insurance premiums. There are several reasons for this. Some studies show that nature-based solutions, at least for coastal flooding and storms, are most effective for lower-severity storms, not catastrophic ones, although the extent of hazard reduction for severe events is still uncertain and could depend on context. A recent study finds that the loss of one hectare of upstream wetlands increases individual claim amounts by only 0.01%–0.03% on average (Gourevitch et al. 2025). For that to translate into sizable insurance savings, very large areas would need to be restored. Such levels of new restoration are rare. Other types of investments, such as green infrastructure in urban areas, could have more sizable impacts, but on lower-severity events that occur more frequently. For floods, these may be covered in a U.S. flood insurance policy and could drive more sizable premium reductions. For other perils, however, high-frequency events are not cost-effective to insure and may not be covered.

In addition, many insurers believe they are already underpricing in the highest-risk areas due to regulatory restrictions. **As such, there is skepticism that new efforts to account for the risk reduction benefits of nature would lead to substantial reductions in premium, although perhaps it would lessen the rate of increase in premiums.** It was also highlighted that such investments could be critical to maintaining insurability or the availability of coverage at all. Indeed, several participants stressed that given declining insurance availability in many locations, securing coverage is critically important for communities, and a necessary reframe of public conversations might be about availability and not price.

Nature for the NFIP

Workshop participants discussed unique opportunities with flood insurance in the United States. The National Flood Insurance Program (NFIP), managed by the Federal Emergency Management Agency (FEMA), provides flood insurance policies for owners and renters in participating communities. Communities voluntarily join the NFIP by adopting and enforcing minimum floodplain management regulations; any resident is then eligible to purchase a policy through the program. The NFIP was designed to fill an insurance gap that had emerged following several widespread and costly floods along the Mississippi River during the first half of the twentieth century, which resulted in private-sector insurers limiting coverage for flood-related damages. Today, standard homeowners insurance policies do not cover flood-related damages; instead, such coverage is available through the NFIP. Federal requirements also mandate that certain properties carry flood insurance:



those located in the FEMA-mapped 100-year floodplain, the Special Flood Hazard Area (SFHA), who have a federally backed mortgage or have received federal disaster assistance. As this is a federal program; it has its own unique dynamics with respect to nature-based risk reduction.

Until 2021, flood insurance pricing was based on FEMA's flood maps. Prices varied based on location in the SFHA and whether the property had been built to FEMA floodplain management standards, as well as several other aspects of the property (Kousky et al. 2017). With the adoption of Risk Rating 2.0 in 2021, however, the NFIP began using industry catastrophe models as the core of its rate setting to better price risk at a property. This was the first substantial update in the methods used to calculate insurance pricing since the program's inception. Risk Rating 2.0 considers multiple factors that can influence flood risk for each individual property and uses an approach much more consistent with the private sector, considering a variety of physical features, such as proximity to a flood source, height of the first floor, and replacement cost of a structure. However, floodplain management standards and mandatory insurance purchase requirements continue to rely on the FEMA flood maps, which do not provide as detailed or comprehensive a view of flood risk.

This new reliance on catastrophe models by the NFIP to assess risk and price insurance may be more consistent with private-sector standards, but many of these models are proprietary, with limited transparency into how risk is calculated. It is unclear how well the existing industry models reflect nature-based investments. Certain retrofits and adaptation investments, such as levees and elevating homes, are better captured by the models and pricing practices, but even these measures face difficulties in timely reflection in rates. And Risk Rating 2.0, while better reflecting actual risk, makes it difficult for communities to calculate the impacts of all types of mitigation on flood insurance premiums to inform individual and municipal decision-making.

An example of challenges associated with capturing nature-based solutions in NFIP pricing is the work being conducted in Dauphin Island, a barrier island on Alabama's coast. The Water Institute, as discussed at the workshop, is assessing the risk reduction benefits of sixty acres of marsh restoration to this location in Alabama. The organization is working with an engineering team, reinsurers, and Dauphin Island residents to translate those benefits into

insurance savings and promote more affordable insurance offerings. However, unless catastrophe models better reflect the benefits from nature-based solutions, the avoided losses of such marsh restoration efforts will not be automatically accounted for in NFIP prices. **The NFIP could, however, request that the model vendors it uses demonstrate that they account for nature-based risk reduction. Alternatively, the program could adopt post-modeling adjustments to its pricing to account for nature investments.** Such an approach has been proposed based on the method used to account for levees in the program's premiums (Shabman and Reed 2022). Several stakeholders at the workshop expressed interest in working together to **identify pathways for the NFIP to reflect the risk reduction benefits of nature-based solutions.**

Pricing through Risk Rating 2.0 is not the only path toward the NFIP's rewarding the risk reduction benefits provided by natural systems. This is because the NFIP is not just an insurance program; it also establishes minimum floodplain management standards, produces flood hazard maps, offers flood mitigation grants to communities, and incentivizes greater community-based flood risk management through a program called the Community Rating System (CRS). With the CRS, residents of communities can receive premium reductions when their local government adopts certain flood risk reduction measures, including certain nature-based solutions, such as floodplain buyouts. Not all green approaches receive credit, however, and only those communities that participate in CRS receive these discounts. **One recommendation has been to explicitly add habitat restoration that expands wetlands to the list of actions that receive CRS credit** (Kelso et al. 2024). That said, CRS's administrative and capacity challenges are well documented, often making it difficult for under-resourced communities to participate. Resolving these barriers is necessary to ensure that communities can benefit from these types of discounts. CRS is also not well structured for investments that cross community boundaries. The NFIP also offers grants through its Flood Mitigation Assistance grant program, which could prioritize nature-based solutions to flood risk reduction.

As society's risk managers, the insurance sector can provide authoritative assessments of the risk reduction benefits of natural systems and lend political support to such projects.

Encouraging and Financially Supporting Nature-Based Risk Reduction

Beyond accounting for nature-based risk reduction through premiums and underwriting—their core business activities—insurers have additional approaches to support such investments when they help lower their risk of future claims. Some of these are within an insurer's core business model, and others fall outside but nonetheless could support the expansion of nature-based approaches to lower risk and thus, if well targeted, could also provide business benefits.

First, insurers could provide technical assistance to clients around investments in nature-based solutions that lower their risk. Commercial property insurer FM (formerly FM Global) provides an example. A mutual insurer, FM provides detailed risk reduction advice to its clients based on its own testing on loss prevention products and services. FM's priority is to reduce risk first and then offer insurance for what cannot be mitigated. Such a model could be adopted by other carriers and could include focused advice on the adoption of nature-based risk reduction measures. While nature-based solutions might be easiest and most cost-effective for large corporate clients, guidance could still be given to households about approaches such as rain gardens to manage excess stormwater and planting trees to reduce heat.

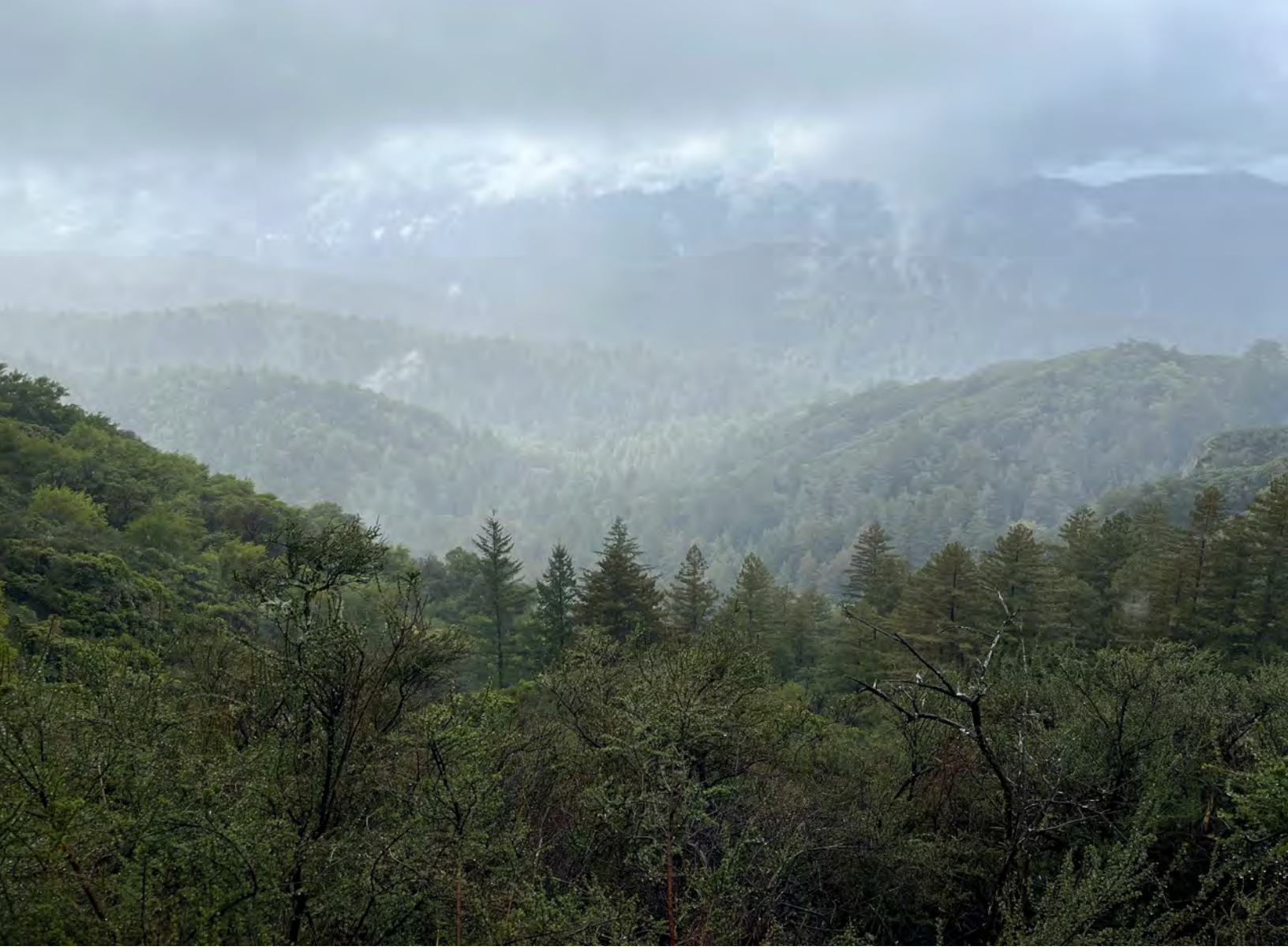
Insurers could also target their philanthropy at investments in nature-based solutions that could lower risks in areas where their firm writes substantial amounts of insurance and could benefit from the risk reduction. One example is Nature Force, a collaborative

effort to expand investments in natural systems that reduce flood risks. Led by Ducks Unlimited Canada, the effort is funded by a collective of sixteen property and casualty insurers in Canada. Currently in its first phase of deployment, the program has three projects focused on wetland restoration that prioritize conservation and flood mitigation. Work not only focuses on the physical restoration but also raises awareness in communities about the importance of natural infrastructure in resilience and the connections to insurance. Another example of using philanthropy comes from Zurich Insurance Group, which, in 2020, began supporting Instituto Terra, a non-profit organization in Brazil, to regrow and restore forest along Brazil's eastern coast. Through the Zurich Forest project, the organization established a grant program for one million seedlings to be planted over eight years. While this aligns more with the concepts of insurance for nature, it stresses the ways that insurers could also use their philanthropy to provide critical funding for nature-based solutions in vulnerable communities that have limited resources, helping to ensure that these projects are well-distributed and the benefits are felt equitably, including in low-income communities.

Finally, insurers can use their political voice to advance strong public policies that support investments in nature-based solutions to effectively manage increasing disaster risks. As society's risk managers, the insurance sector can provide authoritative assessments of the risk reduction benefits of natural systems and lend political support to such projects. For instance, insurers in the United States could lobby states to improve wetland protections in the face of federal rollbacks. They could voice their protection for state and local policies that expand urban greening, conserve coastal ecosystems, or expand forest management for wildfires.

Challenges and Opportunities Associated with Furthering the Use of Nature-Based Approaches to Lower Risks of Insured Losses

Opportunities	Challenges
• Researchers, modelers, and insurers could establish partnerships to better understand the impacts of various nature-based solutions and then include them in underwriting and pricing. • Regulators could encourage or require accounting for nature-based risk reduction in insurer pricing and support this effort by facilitating data platforms to aggregate information on such investments. • The National Flood Insurance Program could increase incentives for nature-based flood risk reduction through its pricing, Flood Mitigation Assistance grants, and the CRS. • Insurers could advise clients on investments in nature-based solutions to manage risks. • Insurers could advocate for public investments in nature-based solutions in the communities where they are writing coverage or provide philanthropic support.	• Industry catastrophe models do not account fully for all nature-based solutions to risk reduction. • There is not a cost-effective way to integrate new risk reduction investments across wide geographies in a timely way into industry models. • There is little motivation for modelers to upgrade their products to better reflect nature-based investments because it could be costly and does not generate more profit. • Nature is a public good, and policyholders alone cannot pay for many nature-based solutions that have wide-ranging and distributed benefits.



3. INSURANCE FOR NATURE

3.1 Background

While nature reduces risks for insurance, it also provides myriad other benefits to society. Healthy natural systems are essential to global food security, underpin our protection against disease, filter our air and water, secure the livelihoods of billions of people, and contribute positively to non-material aspects of our quality of life. But all of these benefits are under serious threat. We are in the middle of a global mass extinction event, with one million plant and animal species facing extinction within decades and with extinction rates tens to hundreds of times higher than the past 10 million years (IPBES, 2019). Population sizes of mammals, birds, fish, amphibians, and reptiles have declined 68% since 1970 (Almond et al. 2020). Scientists predict climate-driven extinctions alone could claim a third of species in the next fifty years (Roman-Palacios and Wiens 2020; Thomas et al. 2004). Scientists and economists around the globe are now sounding the alarm about the impacts this could have on our economy and human well-being.

The global review of the economics of biodiversity, led by Partha Dasgupta for the UK Treasury, concluded that our current exploitation and degradation of the natural world is creating substantial costs and threatening our long-term economic prosperity (Dasgupta 2021). The World Economic Forum has estimated that more than half of the world's gross domestic product, at $44 trillion, is highly or moderately dependent on nature (World Economic Forum 2020). Loss of biodiversity creates risks to the real economy, which are then transmitted to financial and insurance markets (UNDP Sustainable Insurance Forum, 2021). The risks for insurers are multifold, including risks of higher claims payments, lower investment returns, higher operating costs, reputation impacts, and/or increased regulatory and transition risks (Chandellier and Malacain 2021). For example, decline in pollinators could decrease agricultural yields and trigger higher claims payments, or an insurer that supports environmentally harmful activities could be targeted by activists and suffer reputational impacts.

These growing economic risks have led to a global movement to put the world on a path that is nature-positive, a global goal to halt and reverse nature loss by 2030 (Locke et al. 2021). Insurers have five primary levers for supporting conservation, restoration, and nature-positive approaches throughout the economy: (1) creating new risk-transfer products, (2) developing new business models, (3) accounting for nature degradation in underwriting, (4) applying a nature lens to investments, and (5) insuring nature itself (Kousky 2022a).

3.2 Solutions: Opportunities and Challenges

New Products

Workshop participants discussed several innovative types of insurance products that can support nature-positive activities. These cross sectors and environmental challenges.

One emerging application is agriculture. In the United States, the outdated federal crop insurance is hindering farmers' ability to adapt to climate change, locking them into production systems that are increasingly unsustainable in areas experiencing extreme heat and water stress. **Modernizing crop insurance to protect farmers from the financial risks of extreme weather and reduce the risks of transitioning to climate-resilient practices and cropping systems can help reduce greenhouse gas emissions, conserve vital natural resources like soil and water, and support long-term rural economic prosperity.** Globally, new insurance products are emerging to support sustainable approaches and the livelihood of farmers in countries without robust insurance markets or safety nets.

Innovation driven by data improvements, advanced predictive modeling, and artificial intelligence is opening up new product solutions. For example, NatureX is developing a nitrogen-risk insurance program to remove the financial downside risk of cutting use of synthetic fertilizer, a driver of water pollution. This is a parametric insurance policy that pays farmers when seasonal weather conditions indicate a likely yield penalty from reduced nitrogen. A proof of concept has been completed in Queensland, Australia, where even after paying the premium, farmers saw a cost savings from lower fertilizer use. Naturex is now applying this concept in the Mississippi River basin. The Kansas Water Institute and EDF are exploring how OpenET evapotranspiration data can streamline crop insurance claims, enabling irrigated crop producers to turn off their irrigation pumps earlier when the crop is lost without risking loss of insurance coverage. Growers Edge, a fintech company, is also collaborating with food companies to deliver crop plan warranties that shield farmers from

the financial risks of adopting conservation practices. There are also efforts to adjust the federal crop insurance program itself to provide better products for sustainable practices.

Parametric Insurance

Many consumers will be familiar with indemnity insurance, which includes standard homeowners, renters, and car insurance. With this type of insurance, the policyholder is reimbursed for the actual cost of damages based on a process of loss adjustment and subject to the terms and conditions of the policy. In contrast, with parametric insurance, sometimes called index-based insurance, the policyholder receives a predefined payout when a certain trigger is reached. Triggers can take many forms but are often independent measurements of the hazard, such as wind speed. Because there is no claims adjustment process, payouts are typically very fast and can be used flexibly for any type of loss. Parametric policies have been used for years around the globe to provide a complementary type of risk transfer to indemnity insurance. Larger institutions have used parametric policies to cover non-property economic losses, and they have been used as a basis for microinsurance, which enables small payout and small premium policies for lower-income policyholders.

New products to better support environmental practices have emerged in other sectors, as well. One area is human–wildlife conflict. Since 1980, programs in fifty different countries have been established to make payments to farmers or ranchers if wildlife destroy crops or livestock in order to reduce retaliatory killings (Ravenelle and Nyhus 2017). There has been increasing interest in harnessing insurance as a solution. In 2018, the International Institute for Environment and Development (IIED) and partners launched an insurance product for small-scale farmers and pastoralists that sustained damage from wildlife in Kenya. In 2020, this product was expanded to Malaysia. These pilots gathered lessons for expansion of such efforts on many topics including assembling the right partners, assessing the risks, determining who will pay the premium, ensuring fair and timely payments, reducing moral hazard, and limiting transaction costs (IIED 2023).

New environmental regulations can also spur creation of insurance products to support compliance. One example discussed at the workshop comes from England, where 2024 legislation requires developers to produce a minimum of 10% biodiversity net gain by the end of the project, and the habitat they create or enhance must be maintained for a minimum of thirty years. If the improvements cannot be achieved on site, there are provisions to realize these off-site—locally or further afield—by contracting with farmers or NGOs or creating a land bank for conservation purposes, for example. Biodiversity net gain is a material consideration in the planning process, as a developer can only start a project after the consenting authority is satisfied biodiversity enhancements can be delivered. If planners or landowners breach the obligation to maintain a habitat for the thirty-year period, they are liable to an injunction ordering them to rectify the situation. Insurance products are now emerging to cover compliance and liability risks (Marsh 2024). The introduction of these biodiversity requirements also opens up new opportunities to increase urban flood resilience, as biodiversity net gain projects can be designed to also provide risk reduction benefits. This has been assessed in an innovation lab hosted by the London School of Economics as part of the EU-NATURANCE project, which aims to identify ways for insurance to harness the resilience benefits of nature. Working with Flood Re, the

innovation lab identified opportunities for linking the biodiversity net gain scheme to urban flood risk management, an approach that is now tested in cities such as Hull (LSE, 2024)

Other new products that target a variety of populations and risks were discussed at the workshop. Ecosystems Insurance Associates offers insurance and surety bonds to guarantee performance standards of wetlands and stream restoration projects required under U.S. regulations. They also provide similar guarantees for nutrient credit banks, conservation banks, permittee-responsible mitigation, and natural resource damage assessment restoration and pay for performance contracts, including flood control, coastal resilience, and any other regulated ecosystem restoration project. New insurance products are also emerging to protect the integrity of carbon credits. Additionally, there are new products focused on socially vulnerable communities. The Ocean Risk and Resilience Action Alliance (ORRAA) and the conservation organization Rare are piloting livelihood insurance for small-scale fishers in the Philippines. And new concepts are emerging, such as insuring urban trees against pests and disease (Roudaut and Halberstadt 2024), since urban canopy plays a critical role in managing urban heat (Ettinger et al. 2024) and, according to the World Health Organization, heat is the leading cause of weather-related deaths—with heat exposure greater in lower-income communities (WHO 2024).

A challenge that emerged during the workshop related to new product development concerned lack of demand. **First, products must be designed to address the clear needs of the beneficiaries.** This requires a deep understanding of the context to develop a product that enables greater environmental outcomes. Insurers may not have the needed expertise and/or may not be willing to invest resources in product development with limited or uncertain demand; NGO partners have proven effective in undertaking initial scoping and product design work (Kousky and Wiley 2023). **In addition, an ongoing challenge across all the applications is designing a product that beneficiaries are willing to pay for and can afford to purchase.** For human–wildlife conflict insurance, governments or international aid agencies have often paid the premium (IIED 2023; Wilson-Holt and Steele 2019). In other cases, philanthropic organizations may pay premiums. In some situations, premiums may be subsidized at first to demonstrate value to policyholders, with the hope they are willing and able to pay the premium themselves once they experience the value of the insurance product. Identifying when and how philanthropy or the public sector can sustainably pay the costs of premiums for those who cannot afford them is still an open question.

New Business Models

The workshop highlighted a couple novel business models that support greater conservation activity. For example, Terrafirma Risk Retention Group LLC was created by the Land Trust Alliance to provide financial protection against legal costs land trusts can be forced to pay if any of their conservation easements or other land rights are challenged. Historically, securing coverage for this risk in the private market was difficult, as most insurers were unwilling to provide the coverage because the potential customer pool was small, and most insurers were not familiar with the risks. Terrafirma's organizational structure is unique. It is a charitable risk pool under the U.S. tax code owned by the participating land trusts in a manager-managed limited liability company. It is a tax-exempt risk retention group organized under the federal statute to provide certain coverages for similar groups, here 501(c)(3) land conservation organizations. A risk retention group is a type of captive insurance company, which is an insurance company owned by the same entity it insures. Captives are a useful solution for risks that are difficult or too expensive to find coverage for in the market. A key service of Terrafirma is to fund and provide integrated

tools, techniques, tips, and training on good risk management, prevention and conservation practices that can ultimately reduce the costs of and exposure to litigation. To date, 562 land trusts are insured members of Terrafirma, collectively insuring a total of 12.07 million acres. Terrafirma has paid out a total of $8.5 million toward land trusts' legal costs and fees to defend conservation values.

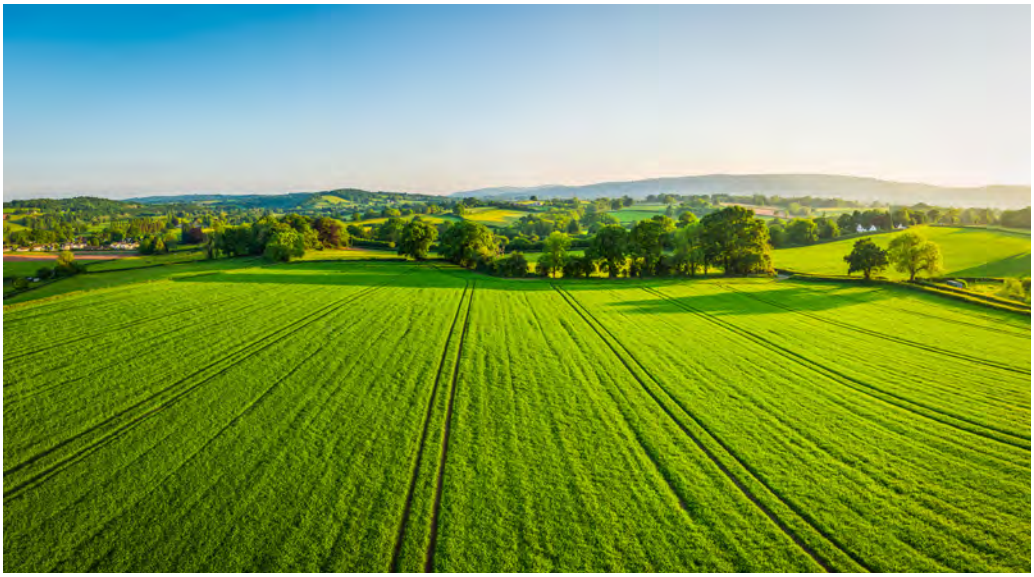
New brokerage firms are also emerging to support nature-positive activities. Conservation United, one of the first, is a broker dedicated to serving conservation organizations and nonprofits. They help groups secure better-priced and better-tailored coverage. Premiums for the Planet is also harnessing the collective power of insurance purchases to make policyholders a united voice for positive climate and environmental action. By joining, companies help accelerate the industry's shift toward more sustainable investing and underwriting, often while finding opportunities to reduce costs, enhance protection, and strengthen long-term business resilience.

New business models could also include new types of partnership. For example, prescribed fire is necessary to restore forest health in many forest ecosystems of the western United States, and it also helps reduce the risk of catastrophic wildfires. Since there is a low probability managers could lose control of these beneficial fires and cause nearby property to burn, liability insurance is needed. This type of coverage is becoming more costly and harder to get as climate change increases wildfire risk. Many insurers also lack a deep understanding of the risks of prescribed fire. Partnerships with state certification safety programs, burn associations, and fire councils can help lower risks and educate insurers about the risks of prescribed fire. Partnerships between states and those conducting prescribed burns, such as California's Prescribed Fire Liability Claims Fund, show promise for expanding insurance protection (Knobloch 2025) and potentially mobilizing more insurers to return to the market. The California fund pays claims from landowners and others whose property is damaged by approved prescribed fires. Its existence has enabled prescribed fires to resume in California despite the absence of insurance for prescribed burners. Importantly, it has also enabled brokerage American Risk Management Network to persuade four specialty insurers to return to the California market and write insurance coverage for prescribed fire practitioners in California and the other forty-nine states as well.

Building on these successes, workshop participants discussed **possible expanded applications for new business models. Captives or other risk pools could be harnessed more broadly,** for example. Since captives are owned by their policyholders, they have an incentive to support the mission of those groups. They retain premiums so surplus could be invested back in the policyholders for greater investments in nature-based solutions. Groups like local governments, neighborhood associations, or like-minded nonprofits could also come together in collective pools to support their investments in nature-based solutions. And tailored brokers or advisors could be expanded to help with nature-related activities throughout the economy. **The startup costs for vetting, designing, and launching entirely new mission-driven enterprises, however, can be high, and for those supporting nature-based public goods, philanthropy or the public sector may be needed to cover the costs of initial concept development as private market profits may be limited, suppressing private investment.**

Nature in Underwriting

Much extractive or polluting economic activity in ecologically sensitive areas is insured. This can give insurers leverage to reform industry practices to better protect nature by



adopting nature-friendly underwriting criteria. A few global insurance and reinsurance firms have begun to do this. Both AXA and Chubb highlighted their efforts at the workshop. In addition, there are coalition activities to encourage insurers to adopt underwriting practices to reform particularly harmful activities or sectors.

AXA has committed to not insuring certain types of harmful activities. Starting in 2021, AXA began restricting property and construction insurance for businesses in countries deemed high risk for biodiversity impacts (identified in partnership with the World Wildlife Fund), high-risk commodities (soy, beef, palm oil, timber), and facing high or severe deforestation controversies. As part of the implementation, they work closely with clients to encourage the adoption of best practices that minimize deforestation. Additionally, AXA has committed to protecting Natural World Heritage Sites (classified by UNESCO) by ensuring it does not support, through insurance underwriting, businesses in sensitive sectors (oil and gas, mining, large-scale hydropower, large-scale infrastructure) that are developing activities incompatible with the preservation of ecosystems in these vital sites. Chubb introduced conservation criteria for oil and gas extraction projects in 2023. Relying on the World Database on Protected Areas, Chubb no longer underwrites oil and gas extraction projects in certain locations, including nature reserves, wilderness areas, national parks and monuments, habitat or species management areas, and protected landscapes and seascapes that have been designated for protection by state, provincial, or national governments. Chubb is also developing engagement strategies to work with clients to improve their environmental impacts in sensitive areas. Engagement can be critical if firms can simply go to another insurer that does not restrict insurance based on environmental impacts.

The use of underwriting has also been explored as an incentive for better behavior in fisheries. ORRAA and Global Fishing Watch developed a tool for insurers to help identify ships engaged in illegal fishing. They estimate that illegal fishing costs the global economy over $20 billion annually and is leading certain stocks to the point of collapse. Several insurers have now restricted insurance for vessels engaged in illegal fishing (Oceana and UNEP PSI 2018). Such underwriting not only removes financial protection for environmentally harmful and illegal fishing activity; it also protects the insurer, as illegal fishing vessels can produce substantial liabilities for insurers.

Two other specific topical areas where insurers have been urged to withhold coverage are hydropower and plastics. Insurers could screen coverage from hydropower projects that contribute to the collapse of freshwater species and threaten the habitat and other benefits of free-flowing rivers and streams (World Wildlife Fund 2022). The World Wildlife Fund has suggested insurers decline coverage for hydropower in protected areas and develop careful assessments to screen other projects. Since hydropower is also free of carbon emissions, careful trade-offs must be made in its deployment. Plastic pollution is a growing ecological and human health threat and a contributor to climate change. Insurers could similarly withhold coverage for plastic operations and simultaneously expand coverage for plastic alternatives (UNEP 2019).

Encouraging other insurers and reinsurers to follow the lead of these examples and make use of targeted underwriting criteria could help create a powerful signal for improved environmental practices. **Workshop participants noted that partnerships between industry and conservation organizations could identify effective and strong underwriting criteria to help protect sensitive natural systems and preserve biodiversity.** Such a partnership would help insurers gain conservation expertise and enable conservation organizations to learn from insurers about their opportunities and constraints to drive improved ecological outcomes with their clients. The partnership could identify high-quality and actionable data, underwriting restrictions, and client engagement approaches.

Workshop participants noted that partnerships between industry and conservation organizations could identify effective and strong underwriting criteria to help protect sensitive natural systems and preserve biodiversity. Such a partnership would help insurers gain conservation expertise and enable conservation organizations to learn from insurers about their opportunities and constraints to drive improved ecological outcomes with their clients.

Nature in Investing

Insurers are large holders of capital. For example, the National Association of Insurance Commissioners (NAIC) has reported that the U.S. insurance industry reported $8.5 trillion in total cash and invested assets at the end of 2023 (Wong 2024). A growing movement is pressuring large investors, including insurers, to exclude from their portfolios firms and projects that are destructive to nature, seek out investments that are nature-positive, and be an active shareholder to encourage the refinement of firm practices to reduce environmental impact. This can help meet global needs for substantial expansion of financing for nature-based solutions. **More than 80% of funding for nature-based solutions comes from government; insurance could be a catalytic force to attract more private capital to this investment approach** (Pinkerton et al. 2024).

Several insurers are adopting these approaches. AXA, for example, has altered its investment strategy to be more nature-positive. AXA introduced a deforestation policy in 2021, building on previous efforts to mitigate deforestation. It incorporates three screening methods: assessing exposure to high-risk commodities, monitoring controversies related to biodiversity and land use, and evaluating the impact of corporate activities on forests. The company has limited investments in firms that drive biodiversity loss in sectors such as palm oil. AXA also screens firms that have major controversies around their biodiversity impact. As another example, Aviva has joined the Plastic Solutions Investor Alliance and worked to encourage companies like Unilever to make substantial commitments to cutting plastic use in their products.

Insurers could also take more proactive steps with their investments. For example, MassMutual has used some of its investments in a climate tech fund that invests exclusively in firms driving climate solutions. AXA launched a Climate & Biodiversity Impact Fund in 2019 and a Natural Capital & Impact Fund in 2022. **Similar funds could be created by more insurers to drive greater change through their investments.** Insurers could also

align their portfolios with a net-zero emissions trajectory; this supports nature and helps protect communities from costly climate impacts.

There are coalitions emerging to encourage investors to support nature-positive activities, and insurers could engage with these groups to make changes to their portfolios that would also focus dollars in firms driving positive environmental change. For example, Nature Action 100 is a global investor-led engagement initiative that aims to support greater corporate ambition and action on tackling nature loss and biodiversity decline. There are more than 230 investors representing nearly $30 trillion in assets under management.

Insuring Nature

Ecosystems can be viewed as natural assets that can be insured against damage similar to how property is insured. That is, insurance could be purchased to provide funds when an ecosystem faces some type of damage so that the required financial resources are available for restoration efforts. One prominent example of this is a parametric insurance product purchased to protect a coral reef against storm damage. An NGO, TNC, Quintana Roo State Government in Mexico, and the Cancun and Puerto Morelos Hotel Owners Association created the state-owned Coastal Zone Management Trust (CZMT) to finance the maintenance of the region's coral reefs and beaches. Working with Swiss Re in 2019, the CZMT purchased a parametric insurance product on behalf of the State of Quintana Roo that pays when wind speeds exceed a certain threshold in a defined geographic area. Hurricane Delta triggered the policy in 2020, releasing $850,000, and Hurricane Beryl triggered another payout of $430,000 in 2024. The payouts enabled specially trained teams of scuba divers and snorkelers to reattach broken corals, helping the reef to continue to provide storm surge mitigation benefits to coastal communities. This model has been replicated in Hawaii, Guatemala, Honduras, Belize, the Philippines, and Fiji. Other similar models have also emerged. For example, AXA has supported a parametric insurance product in San Crisanto in Yucatán, Mexico, to support Mayan families in restoring mangroves after a hurricane.

Replicating and expanding this effort faces several challenges (Kousky and Light 2019). First, as noted above, natural systems are often public goods. Due to this and the novelty of insuring ecosystems, it is not always clear who would or should purchase insurance for an ecosystem or which entities can legally serve as the policyholder. One of the innovations of the Quintana Roo example is the creation of the CZMT that united beneficiaries to all support efforts to maintain the area's reefs and beaches. Another innovation was demonstrating that the CZMT held an insurable interest in the reefs and could therefore legally purchase an insurance policy on a public good. In a replication of this effort in Hawaii, TNC serves as the policyholder with an interest in protecting the natural system and is working with the Hawaii Emergency Reef Restoration Network to repair damaged reefs and build broad support for reef retraction among the many beneficiaries. Both approaches also provided an institutional structure to manage the payouts and the post-disaster restoration work.

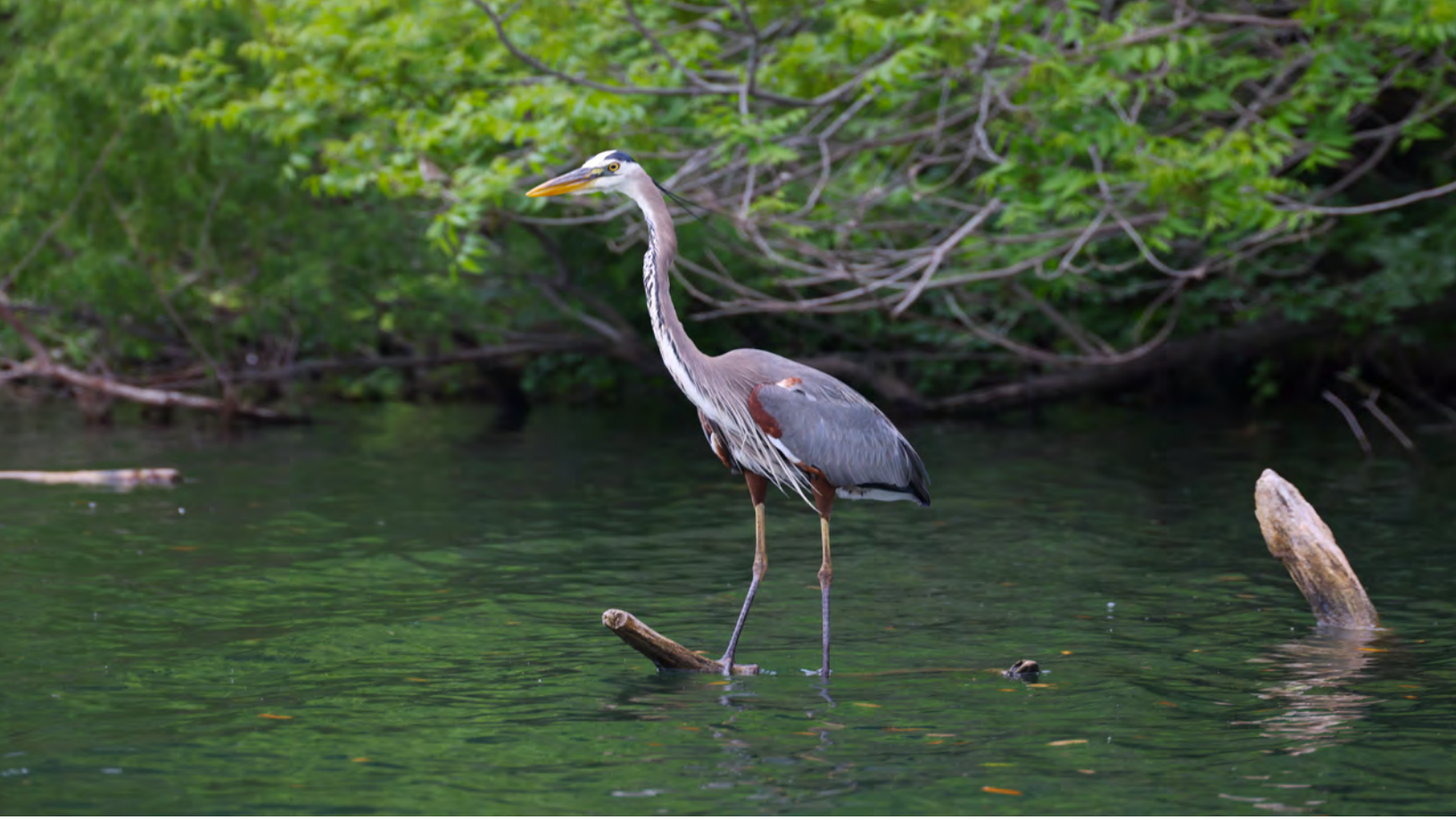
A second challenge is identifying where insurance protection is useful for conservation or restoration. Insurance cannot be provided against slowly accumulating threats; it can typically only be provided for more acute disasters. Indeed, the largest threats to corals globally are ocean warming, ocean acidification, and sea-level rise—not damage from storms. Scientists predict that without immediate cuts in emissions and other drastic protection measures, corals could disappear this century. The UNEP estimates that 90% of corals could be gone by 2050 due to climate change (UNEP 2021). Insurance is not a tool to

protect against these global and existential threats to reefs. Understanding where insurance can drive significant environmental improvement and when and where it is not the best tool is essential for identifying and scaling impactful models across the globe.

Finally, insurance has to be cost-effective. Insurance is most cost-effective for infrequent disasters where large sums of dollars are needed after the event to support rebuilding. For smaller or more frequent disasters, it could be more cost-effective to cover any needed restoration or repair work rather than pay an annual premium. That is, insurance is more beneficial if there is a large post-disaster financial need for restoration to be met. This, in part, depends on the ecological system. Some ecosystems should be left on their own to recover after wildfires, for example. In other situations, it may be ecologically or economically beneficial to pay for the replanting of native grasses and shrubs to stabilize soil and help prevent mudslides and erosion. An insurance policy could pay for such activities.

Opportunities and Challenges for Insurance Tools to Support Nature-Positive Activities throughout the Economy

Opportunities	Challenges
• NGOs and communities can partner with insurers and brokers to design new risk transfer products that support their specific environmental needs. • NGOs and communities could explore captives or risk pools for niche insurance coverages tied to conservation, restoration, or other nature-based activities. • Conservation groups could partner with insurers and reinsurers to develop robust conversation underwriting criteria to help protect ecologically sensitive areas. • Insurers could screen ecologically harmful investments out of their investment portfolios and actively invest in nature-positive firms and projects.	• Many beneficiaries are unwilling or unable to pay the premiums for insurance and insurance must be cost-effective for the policyholder. • Philanthropy or the public sector may need to support the initial concept development for new products or business models when they are designed to support nature-related public goods. • Insurance cannot protect against slowly accumulating threats like ocean warming and ocean acidification. When these are the environmental impacts of concern, other approaches are needed. • Insurers are concerned about losing business or political pushback if they are too aggressive in policies around nature.



4. NEXT STEPS: GUIDELINES FOR A POLICY AND RESEARCH AGENDA

The insurance sector is relatively new to nature-related issues and is still defining its role. The connections between insurance and nature, however, are clear and can form the foundation of new partnerships and strategies. Natural systems help reduce risks and support stable insurance markets, while insurance sector tools can help steer the economy toward more nature-positive approaches, supporting greater conservation, restoration, and environmental improvements. Discussions at EDF's April 2025 workshop, along with findings from related research, crystallized a wide range of opportunities and challenges. There is not one approach, one tool, or one solution. Instead, there is a patchwork of tools and strategies as discussed in the previous sections. When taken together, these can drive more investments in nature-positive activities, including investments in nature-based solutions that lower disaster risks. Across the discussions, five guidelines for future policy action and for additional research emerged:

1. **Focus on problems where insurance has a comparative advantage.** NGOs, policymakers, and regulators should concentrate on environmental challenges where insurance is strongly positioned to make a difference. Insurance is not the most impactful solution to all environmental problems and there has now been sufficient research and experimentation to identify and focus attention on the environmental systems and problems where it can add real value. For example, one analysis suggests

that the global food system is the primary driver of biodiversity loss, and insurance can play a significant role in driving conversion to regenerative practices (Pinkerton et al. 2024). Other threats, such as ocean acidification from continued and rising greenhouse gas emissions, are not going to be effectively tackled by insurers.

2. **Insurers should focus on tools with the greatest potential for impact.** Insurers have many tools in their toolbox, but some have greater potential for sizable near-term impact. There were myriad new products and business models that were discussed. While some target niche sectors or activities, they can have outsized influence in those domains. Another approach that emerged as promising for wider impact was insurers as large investors. By directing a portion of their portfolios toward nature-positive projects, insurers could catalyze change in key sectors, help crowd in additional capital, and drive innovation. This is a new and evolving space, and insurers, with their substantial holdings of capital, could be leading voices on developing the most impactful approaches for others to emulate. All estimates suggest much more private capital is needed for nature-based solutions, and the assets under management by insurers could play a meaningful role in bridging this gap.

3. **Regulators should require insurers and modelers to incorporate nature-based risk reduction into underwriting and pricing models and support partnerships to create the necessary datasets for this integration.** Aligning insurance and nature will require changes to how nature-based solutions are accounted for in insurance-sector models. This will require changes in some modeling approaches and establishing partnerships to create needed datasets that can enable cost-effective and easy integration of local investments into models. New startups are already emerging that aim to capitalize on improved data and accounting of such measures; these could prove to be market disruptors that drive more widespread recognition of nature-based approaches by the sector. A cross-sector coalition focused on identifying strategic and actionable pathways was considered by multiple workshop participants to be a critical next step.

4. **Maintain cross-sector partnerships for continued learning.** It has become clear that meaningful progress and higher levels of impact can only be achieved through cross-sector partnerships and continued dialogue. Insurers often lack environmental expertise, while conservation groups may not fully understand global insurance market dynamics. Continued dialogue could help unlock creative solutions neither side might develop on their own.

5. **Explore how insurance can play a role in driving more equitable disaster outcomes and investments in nature-based solutions.** Insurance plays a critical role in community resilience, but rising risks are driving up costs and limiting access, especially for under-resourced and vulnerable communities. Nature-based solutions can help address this, delivering co-benefits like cleaner air, protection against extreme heat, and flood protection. But those same communities often lack the capacity to invest in such solutions, making it crucial for policymakers and researchers to explore how insurance can support more equitable disaster recovery and nature-based investment, ensuring the benefits reach those who need them most.

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