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Underwriting earth

The restorative potential of nature-positive insurance

Contents

Key takeaways

- While insurers have made strides overall in assessing and addressing climate risk, far less has been done to acknowledge, quantify, and help mitigate losses tied to biodiversity loss and other nature risks.
- Losses of natural capital—the natural resources that are grown, harvested, or extracted that enable economic growth—have the potential to generate significant financial losses from economic activities that depend on nature for their operations.
- The costs of nature risks, if realized, could soon translate into increased claims, higher premiums, less profitability, lower demand for insurance products, and negative returns from investments across the industry.
- Looking through the lens of the insurance industry's history with and continued support of US farmers, and citing examples of efforts to prevent further biodiversity loss, we chart a path for the insurance industry to help address nature risk through technology-aided valuation, policy innovation, and client engagement.

Two sides of the same coin

Around the world, there is nearly unanimous concern among insurers about the implications of climate risk on their business.[1] Increasingly, they have, generally, begun to act on those concerns through innovation and investment: building new risk models to better understand and predict the impact of climate change on weather-related disasters, devoting substantial sums of capital to green infrastructure, offering individualized discounts to customers who invest in self-protection, and nudging local governments to invest in climate resilience by offering rebate options on catastrophe bonds, among other responses.

But, to date, the industry overall has done little to acknowledge, quantify, and help mitigate losses tied to nature risk. The fact is, the natural systems on which our society relies are being challenged, marked by the precipitous decline of terrestrial and aquatic biodiversity. About 650 species, for example, have gone extinct in the United States alone, with human-caused pollution one of the leading causes.[2] Deforestation is another pressing problem—since 2000, the planet has lost 12% of its tree cover.[3]

At stake for the insurance industry is the potential loss of what is called "natural capital"—the natural resources that are grown, harvested, or extracted that enable economic growth. Such losses can not only exacerbate global warming and intensify the impacts of climate change but also can generate financial losses from economic activities that depend on nature for their operations.

This makes nature risk the other side of the environmental risk coin, posing a significant challenge to insurers through their investments and liabilities. As underwriters, insurers will likely be affected by changes in climate and biodiversity and also by transition risks affecting the risks they insure. As investors, insurance companies tend to 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.

The costs of these risks, if realized, can quickly add up through increased claims, higher premiums, less profitability, lower demand for insurance products, and negative returns from investments (figure 1). The smooth functioning of the insurance industry is partially underpinned by the conservation, restoration, and sustainable use of nature.

But while more than half of global insurers and re-insurers believe that nature-related risk is material to their underwriting business, nature risk is not yet being widely assessed by underwriters.[4] Some have proposed insurers simply pull back from businesses that are increasing nature risks and eroding natural capital. However, that's not a viable solution, given how much society relies on such activities and the potential for wide-scale disruption.

The industry should adopt a more proactive stance—one that positions insurers as enablers rather than dissuaders. The insurance industry has already laid some of the groundwork for addressing nature risk, through many of the very same investments it has made in teams, frameworks, and processes to deal with climate risk. This paper provides a pathway for the industry to help protect natural capital both directly through investment and product innovation and indirectly through increased client engagement and exerting its influence with other key stakeholders.

Figure 1. Insurance impacts from biodiversity loss

				
Biodiversity loss impact	**Flood insurance:** Deforestation leads to increased flooding	**Crop insurance:** Pollinator extinction, water scarcity, and soil erosion threaten food production	**Liability insurance:** Significant biodiversity damage due to company actions	**Life and health insurance:** Human health is influenced by surrounding ecosystems
Potential underwriting risk	Physical damage of insured assets results in higher claims	Lower crop yields cause more claims and higher payouts	Insurers become liable for biodiversity damage	High mortality and mobidity ratios

Back to their roots

The US agriculture sector serves as a proving ground for these efforts. The US insurance industry has its roots in agriculture—many of its largest insurers began as collaborative risk pools for agricultural communities and remain mutual companies to this day, with agricultural interests on their boards. As one of the most at-risk industries from the perspective of both climate and nature risk, the US agriculture sector represents a major liability for insurance companies. In 2022, nearly 86% of US insured acres were protected at coverage levels exceeding 70%. Major weather and climate events that year resulted in difficult conditions for many farmers in affected areas, contributing to $19 billion in indemnities, which outweighed the $18 billion in gross premiums the industry collected.[5]

Crop insurance likely played a major part in helping farmers absorb the losses, while reinsurance agreements between the industry and the federal government may have helped support commercial insurance providers to address the spike in claims. Participation in the program appears to have increased steadily over the past few decades, spiking in recent years thanks to the introduction of new policies covering pasture, rangeland, and forage. This, in turn, has led to increases in total liability—as of 2021, it was equivalent to 31% of the total US agricultural sector production value.[6]

While the crop insurance program appears to have helped the industry address growing climate-related losses, it is not designed to tackle nature risk or promote solutions that help preserve natural capital. In fact, some growers and economists argue that the way it's designed acts as a disincentive for adopting sustainable farming practices (see the *A grower's perspective* section of this paper). An alternative exists in the Farm Service Agency's (FSA) Noninsured Crop Disaster Assistance Program (NAP), which helps level the playing field for organic and diversified farmers by providing financial support for non-insurable crops lost to natural disaster.[7]

Still, more should be done to address the symbiotic relationship between farms and nature. Agriculture relies on a range of economic inputs, which include sources of potential nature risk from food production and livestock. Most forms of agriculture depend on access to water, for example, but water quality can be affected by livestock, pathogens and parasites, and pesticides and herbicides. Farms often depend on biodiversity for services such as pollination or pasture cover and composition.[8] And yet, agriculture is the number-one driver of biodiversity loss around the world because land that is converted for such uses often can't sustain all animal and plant species that once made it their habitat.[9]

Business as usual for the agriculture industry means that producers are putting at risk the very resources the industry's success depends on. But growers also deal with the risk that changes to their production might not work as intended. The success or failure of farms each year can hinge on individual decisions about what to grow, where to grow, and how to grow. In light of this, many changes to traditional practices are seen by some growers as inviting too much risk, given the stakes involved.

This is a reason why unsustainable practices such as monocropping—the practice of growing a single crop year after year on the same land—are hanging on. Monoculture disturbs the natural balance of soil, robbing it of nutrients and decreasing varieties of bacteria and microorganisms needed to maintain soil fertility.[10] But such specialization often makes more economic sense for farmers because they can use the same equipment and sell to the same sources (e.g., a local grain dealer). Government policies also can play a part. Even in developed countries such as the United States, directives to use more land for biofuels have contributed to millions of acres being converted to monoculture crops such as corn that have not been grown on the land before.[11] From 2019 to 2020 alone, US harvested corn acreage increased by 2.7 million acres—an indication that diversified agriculture, and the benefits it provides (see the *Potential benefits of diversification* section), appear to remain elusive.[12]

These trends tend to have financial implications for the insurers that provide underwriting for agricultural clients. Along with severe weather events, reduced soil productivity resulting from extensive land use and lack of pollination can trigger not only more crop insurance claims but also claims tied to business disruptions in other industries that rely on agricultural inputs, such as food and beverage producers. And the impact doesn't stop there, as follow-on effects could also include lower financial returns tied to devaluations and defaults of insurers' investee companies that are caused by biodiversity and nature loss.

While agriculture is a primary driver of nature risk for insurers, other sectors are also contributing in this respect, from manufacturing to mining to real estate. Across the globe, more than 90% of non-life insurance premiums rely on sectors that are at high or moderate risk from nature loss.[13]

However, given its significant role in biodiversity loss, agriculture is as good a place to start as any when it comes to addressing nature risk. As stewards of risk management, insurance companies likely have sizable influence to reverse these trends, especially within the agriculture industry, with which they share an intertwined history. Moreover, the solutions that emerge on America's farms in the coming years could serve as valuable templates for broader underwriting innovation.

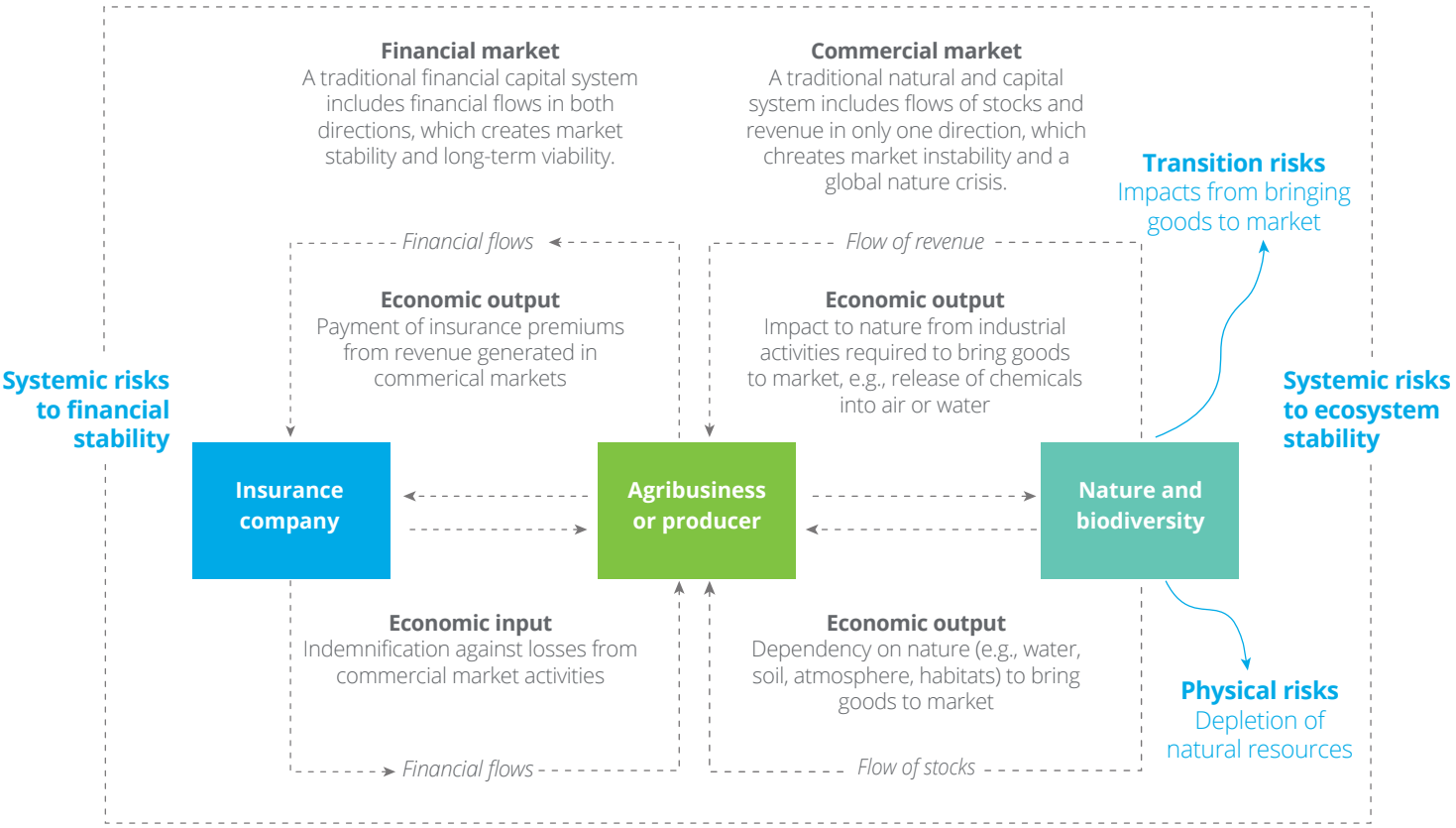
Potential benefits of diversification

Farmland diversification can contribute significantly to protecting natural capital through the following changes:[14]

- **Healthier soil:** Diverse crops and cover crops help anchor soil (reducing erosion caused by wind and water), improve soil structure (translating to healthier crops and better water management), and increase soil organic matter (which enhances soil fertility and its ability to store carbon).[15]
- **Reduced pollution:** Farms rely less on chemical fertilizers and pesticides when diverse crops and integrated pest management strategies are put in place, while healthy soil with good structure helps safeguard water quality by capturing and processing pollutants before they reach water bodies.[16]
- **Enhanced biodiversity:** Diversified farms provide habitats for a wider range of pollinators and other species by offering varied vegetation structures and flowering seasons.[17]
- **Increased resilience:** Diverse farms are better able to withstand droughts, floods and other extreme climate events because different crops have varying tolerance levels; crop rotation disrupts pest life cycles, minimizing the risk of widespread outbreaks.[18]

Figure 2. Nature dependencies in commercial activities

The mismanagement of natural capital can create systemic nature risks, which tend to undercut the flow of revenue from the underlying assets or resources generated by clients in both financial and commercial markets. Evaluating a client's nature dependencies (its access to the natural capital it relies on to brings its goods and/or services to market) and how the loss of natural capital could affect its creditworthiness and ability to pay its premiums can give insurers a truer sense of the total financial and environmental burden posed by its commercial activities.



A natural path forward

Insurers will likely need to work through some major challenges as they seek to adjust for nature risk in their underwriting and client relationships.

Biodiversity-related risks are often systemic risks that are difficult to measure and come saddled with potential knock-on effects that can vastly increase financial losses and may render standard insurance practices ineffective. The profitability of underwriting 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. But a lack of data and information, including relevant methodologies, can make such analysis difficult.

Despite these obstacles, the industry likely has the capacity to innovate and evolve—much in the same way that it appears to be transforming to help address climate risks. Most insurers have built teams, risk-identification processes, and other frameworks and processes focused on climate risk.

These resources and approaches can be extended to nature risk with the appropriate guidance—which now exists due to the Taskforce on Nature-related Financial Disclosures (TNFD) and others. Informed by this work, there are five important ways that insurers can promote investment in biodiversity: natural capital valuation, asset protection, liability reduction, facilitating capital flows from financial markets, and policy advocacy.

Natural capital valuation

For decades, the insurance industry has used catastrophe risk models, which use past events and historical data to estimate what future losses could look like, but many of these do not take nature risk into account.[19]

Climate models already provide a new path here, as they use forward-looking simulations to generate projections of key inputs such as temperature, precipitation, and other weather-related conditions and events to help define the potential for physical losses.[20] Similarly, after Hurricane Andrew caused $30 billion in damages in 1992 and forced 11 insurers into insolvency, the industry adopted catastrophe models that used significant computing power to simulate thousands of stochastic events into the future and estimate risk and potential losses across many possible scenarios for a given geography. The more adequate pricing and reinsurance that resulted from these efforts allowed every insurer to survive when Hurricane Katrina made landfall in 2005, even as losses from the storm nearly tripled Andrew's losses.[21]

Technological advances are already helping to resolve data-related problems in agricultural insurance. Remote sensing, advanced modeling, and picture-based recognition solutions have enabled the underwriting of groundwater and soil quality as metrics for crop insurance. Today, a farmer can use an app enabled with geotags and visual aids to take and submit regular photos of a specific crop parcel to document crop growth, which experts can use at the end of the season to estimate crop damage.[22]

Several frameworks also now exist to account for the economic value of natural assets. One is the Natural Capital Protocol (the "Protocol").[23] The Protocol enables organizations to identify, measure, and value their direct and indirect impacts and dependencies on natural capital through a nine-step process involving four stages (figure 3).

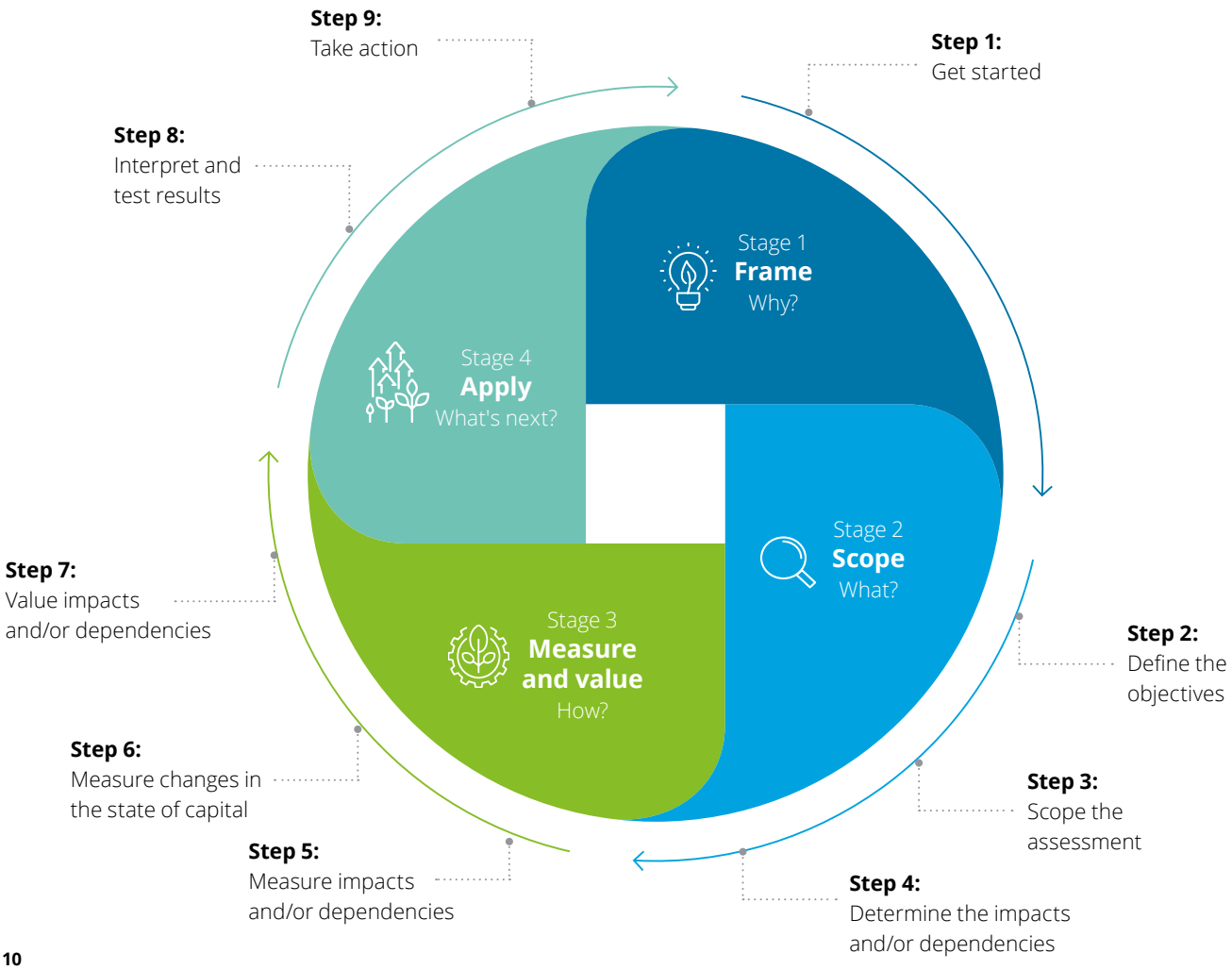
Asset protection

Property insurance is already being used to protect and regenerate natural assets such as forests and mangroves or to mitigate the risks of projects, including those designed to protect against climate change or promote biodiversity.

One such policy was recently put in place in Fiji to help protect the coral reef system of the South Pacific Ocean's Lau Group of islands; the island communities can receive payouts of up to $450,000 for reef restoration and community assistance if cyclones hit.[24] Another is in effect in Kochi, India, providing all-risk coverage for a canal restoration project, including the planting of mangroves, the construction of wetlands, and using porous surfaces for canal walls to prevent periodic flooding and related pollution.[25]

This approach to protecting natural assets could be emulated in the American heartland. For example, insurers could offer financial incentives to farmers who adopt nature-based solutions (NBS) to help restore wetlands and improve the resilience of agricultural land.

Figure 3. Natural capital protocol



Liability reduction

Rather than pull back from insuring challenging sectors such as agriculture, the industry can tap existing relationships to catalyze meaningful change and reduce the potential for claims through policy incentives that support the protection of natural capital.

Policy innovation has introduced parametric techniques to link liabilities to the severity of weather events—the same opportunity to innovate exists to bring capital market investors into the fold in the biodiversity space (see the *Making uninsurable risks insurable* section).

In the agriculture sector, US insurers can look to provide incentives for farmers who take steps to promote soil quality, much in the way that some providers in the country are now offering discounts for homeowners in fire-prone states who take steps to protect their houses from wildfires.[26]

A handful of states already have programs in place for incentivizing the planting of cover crops.[27] One such program is up and running in Indiana. The program rewards farmers who plant nutrient-rich cover crops by providing a reduced premium on their crop insurance. To date, the partnership with the US Department of Agriculture's Risk Management Agency has led to more than 35,000 acres of cover crops in the watershed, with more than 100 farmers participating.[28]

Facilitating capital flows from financial markets

Insurers can be instrumental in redirecting financial flows toward both climate objectives and the protection and restoration of nature. However, for that to be able to happen, the value of nature needs to be integrated into underwriting.

In Europe, insurers are offering environmental impairment liability (EIL) coverage for preventive environmental measures, expanding their purview beyond instances of pollution.[29] Such policies have emerged as a hybrid insurance solution that covers gaps in most third-party liability insurance that excludes impacts such as biodiversity loss. Studies have shown these approaches could be improved further to incorporate a broader range of sustainability risks, such as ecosystems degradation or destruction.[30]

New forms of policies the US agriculture sector could employ include carbon credit insurance—an emerging mechanism that could be used to insure farmers against shortfalls in expected carbon sequestration yields from improved soil health or no-till agriculture. Another example is supply chain disruption insurance, which could be used to cover farmers in the event of unforeseen breaks in the supply chain caused by environmental events or outbreaks of disease.

Policy advocacy

Insurers have a pivotal role to play in protecting and rehabilitating natural capital, but policies and regulations can help to incentivize market participation in insurance solutions. Industry members should be more involved in developing the taxonomies and reporting requirements for measuring biodiversity.

They can also lend their voice to advocating for policies that support the adoption of nature-based solutions, promote risk-sharing mechanisms such as public-private partnerships where governments would share the burden for nature-related losses, and incentivize sustainable practices through tax breaks for adopting regenerative agriculture methods or implementing biodiversity-friendly practices like cover cropping.

A grower's perspective

A third-generation farmer in Arroyo Grande, California, grows a wide array of produce on his 1,000 acres, including different varieties of lettuce and cabbage, broccoli, spinach, cilantro, lemons, oranges, avocados, and strawberries. His farm is well known for its specialty Asian vegetables such as bok choy.

As a year-round operation, most of the farmer's land is rarely idle, but winter does provide some opportunities to plant cover crops since production is slower then. He plants triticale or rye to slow erosion but also because it provides him with compost to make the rest of his crops heartier.

"The soil is the base of your pyramid, and compost builds the soil back up," the farmer said. "In my experience, there's a night-and-day difference when I add compost. My moisture level is stabilized better, my nutrient retaining capacity has improved, and the ground works better. You can see it in healthier plants with thicker leaves. They're all small things, but put together they add up to big benefits that are worth a lot more to us than the couple hundred bucks per acre we could make from selling it for forage like hay."

Not every grower in his area understands that philosophy. All they see, he says, is the extra up-front expense, coming on top of all their other costs, including rent that can run up to $3,500 per acre in his region. Then there's the increasing raft of regulations that has many farmers, including himself, hiring full-time compliance staff.

"It's death by 1,000 cuts," he said. "I used to spend most of my days out in the field making farming decisions, but today I spend most of my time in the office on risk management, protecting the company from liability."

Some grant funding is available through programs such as California's Healthy Soils Initiative, but he sees a pathway for insurers to get more involved by offering premium discounts for adopting sustainable farming practices that support stronger soil. He also believes the crop insurance program needs to be reformed to better incorporate rotational crops and other sustainable farming practices. As it stands now, he said the program favors farmers whose choices result in total crop losses, instead of just reduced yields, due to high loss thresholds. Some economists have argued that high subsidies for crop insurance premiums encourage monoculture over crop rotations.[31]

"It doesn't make sense to sign up for crop insurance when the likelihood of you hitting the threshold is almost impossible for rotational crops or vegetables," he said.

Even if policy innovation spurs positive change that reduces risks for farmers from doing the right thing for their land, he sees two other fixes as prerequisites. "Less regulation and more education," he said. "That's what we need."

Guiding the way: Insurance as a catalyst for change

Erosion of natural capital presents a challenge. Unlike climate risk, these challenges are systemic and long term, with potentially significant cascading effects that tend to be difficult to quantify and price effectively.

The insurance industry, however, appears positioned to play a pivotal part in unearthing the complexities of nature risk. Time and again it has been involved in fostering financial resilience and aiding communities to recover, adapt, and evolve from catastrophic events. Leveraging its deep-rooted expertise in the agriculture sector, and by honing its risk assessment and pricing responsibilities, the insurance industry can become a forerunner and ambassador for sustainability.

Knowing where to start addressing such risks can be difficult, though, so we are providing a three-phase framework to help industry members help organize their thoughts around the challenge and engage with third-party specialists where appropriate for further guidance and execution.

1. **Prepare:** Insurers should fully understand where they stand in terms of their role and exposures to natural capital degradation—typically realized through the exposure of their customers. Only once this understanding is in place can a nature-positive strategy that protects the company from nature risks be possible. At this stage, leadership buy-in should be acquired to build adequate resources and move forward.
2. **Integrate:** Once these preparations have been made, insurers should work to strengthen their analytical capabilities and integrate nature-related policies into their decision frameworks. This can enable natural capital risks to inform the pricing or products to high-risk customers.
3. **Engage:** Forward-thinking organizations will likely move beyond these first two steps by advising their higher-risk clients on how to introduce better nature and biodiversity practices, either through traditional consultative engagement or more modern approaches such as parametric insurance. For this industry, sustainability can mean taking responsibility for your assets and your people and bringing them along on this journey with you; and that should start with engaging clients and companies with the highest-risk operations.

Making uninsurable risks insurable

Parametric (or index-based) insurance policies insure the policyholder against the occurrence of a specific event by paying a set amount based on the magnitude of the event versus the magnitude of the losses incurred. Parametric insurance pays out when a predefined parameter is breached—such as when hurricane wind speeds reach a certain level—avoiding claims when those conditions aren't present.

Parametric policies are used to offer financial protection against losses that are often hard or even impossible to get insurance to cover. They got their start in agriculture, as the concept emerged in the late 1990s to help protect farmers and agricultural communities in developing nations in Asia against severe weather events.[32] Today, they are increasingly being used by companies in the renewable energy, manufacturing, tourism, and construction industries to manage weather volatility.[33] But they're increasingly being extended to help with marine conservation efforts,[34] and insurance experts believe parametric insurance policies will become more widely adopted for agriculture and natural catastrophe risks going forward.[35]

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