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The United Nations Development Programme and Generali have partnered to support the financial resilience of vulnerable communities, small and medium enterprises (SMEs) and global value chains to climate and other risks. Under this multi-year partnership, Generali and UNDP's Insurance and Risk Finance Facility (IRFF) are developing research and tools, incentivizing the development of innovative insurance solutions, and advocating for holistic resilience solutions that blend risk transfer and management. The partnership combines Generali's insurance expertise with UNDP's long-term focus on financing and development.

Through the partnership, Generali and UNDP are contributing towards the InsuResilience Vision 2025 to reach 500 million vulnerable people with coverage against climate and disaster shocks; protect 150 million vulnerable people through microinsurance solutions; and put insurance innovation at the heart of the UN's Sustainable Development Goals and 2030 Agenda.

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Authors
Alessandro Bonazzi, Benjamin Lowes, Irene Candian – Generali GC&C
Miguel Solana, Lauren Carter, Ceandra Faria – UNDP Insurance and Risk Finance Facility

UNDP Peer Reviewers
Jan Kellett, Saurabh Sharma, Sana Ehsan and Henry Akwitti

Insurance Development Forum Reviewer
Kipkorir Koskei

Case Study Contributions
Lorraine Njue – African Risk Capacity
Sarah Ebrahimi – Blue Marble
Daniel Perez Whitaker – CelsiusPro
Eric Allombert, Lukas Schönach – Descartes Underwriting
Carmen Reis, Yussel De Kraa – Swiss Re
Maya Dhanjal, Sarah Conway – WTW

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Project Management
Lauren Carter, Ceandra Faria – UNDP
Bianca Mihalcea – Generali

Copy-editing
Jennifer Clark and Justine Doody

Design
Froid

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Contents

Executive summary

Escalating global risks are highlighting the insurance industry's role in providing critical financial safety nets for countries and societies everywhere. At the same time, industry models and governance systems are being challenged to keep pace with accelerating technological change, economic uncertainty and several contexts of crisis.

The entanglement of multiple global challenges, or 'polycrisis', is posing an unprecedented threat to global development. Efforts and resources to reduce carbon emissions driving climate change have fallen short: an estimated 3.6 billion people now live in areas highly exposed to climate-related hazards (IPCC, 2023). Nature loss is already impacting communities and global supply chains, with an estimated US$5 trillion in nature-related risks threatening to accelerate climate change (Ranger et al., 2023). Record high public debt is crippling climate action in developing countries (UNCTAD, 2024) and the eruption of conflict across multiple regions is affecting global trade, significantly increasing displacement, spikes in energy costs and acute hunger (Kinnear, 2024; FSIN and Global Network Against Food Crises, 2024).

This report considers the need to tackle financial vulnerability and boost resilience in a fragmented, yet interconnected, world. The insurance industry has a critical role to play, acting as both a shock absorber for the financial impacts of rising hazards and as a critical enabler of investment – in climate adaptation, productivity and growth (Howden, 2024). However, the global protection gap for health, mortality, agriculture and natural hazards reached a record $1.8 trillion in 2022, influenced by rising numbers of climate-related hazards and extreme weather events (Swiss Re Institute, 2023).

This paper highlights the transformational role that parametric insurance solutions can and should play in closing the protection gap.

Global economic losses of $280 billion were recorded from hundreds of disasters in 2023, with 60% of losses uninsured (Swiss Re Institute, 2024). With coverage in developing countries and emerging economies estimated between 1% and 10% respectively (Insurance Development Forum, n.d.), governments, businesses and households are left carrying the full financial burden of recovery and reconstruction on their shoulders (Alayza, Laxton and Neunuebel, 2023).

As risks rise and evolve, leaders in governments and boardrooms alike are looking for risk management solutions to offer a 'financial safety net' against perils such as earthquakes, wind storms, or non-damage business interruption that are not always available or offered by traditional insurance. Parametric or index-based insurance is an alternative solution to this challenge, complementing traditional insurance to keep more businesses and communities insured. Because payouts are based on independently verified 'triggers' or 'parameters', disbursements are delivered faster, allowing swifter recovery from shocks.

This paper highlights the transformational role that parametric insurance solutions can and should play in closing the protection gap and helping to achieve the UN Sustainable Development Goals. It includes a range of insights and tools to increase governments', businesses' and communities' understanding of how parametric policies work, and how they protect people and assets in the event of hazard and shock. Industry case studies illustrate how parametric solutions are being deployed successfully across various sectors and risks (case studies from Generali Global Corporate & Commercial, Descartes Underwriting, African Risk Capacity, Blue Marble, CelsiusPro, Swiss Re and WTW). Additional tools include a checklist for organizations considering parametric insurance, from identification of key economic sectors to better understanding the claims process. For organizations considering adding parametric products to existing portfolios as part of sustainability programmes, case study-based examples provide a framework to measure the impact of parametric insurance policies.

Of critical importance to this work is the role of government. Drawing on examples from the work of the United Nations Development Programme (UNDP) at the country level, it is clear that the insurance industry cannot scale parametric solutions to build financial resilience without the appropriate ecosystem. Here is where the development system can and must significantly increase its investment in insurance market development, building awareness and establishing supportive governance mechanisms, market functions, regulations and policies that allow parametric insurance to contribute meaningfully to closing the financial protection gap.

1 NAVIGATING A WORLD OF RISING RISKS

Our world is facing a series of unprecedented challenges, from global health crises and persistent inequality to rising conflicts and political instability. Taking place against a backdrop of intensifying climate change and environmental destruction, these challenges have profound impacts on natural and human ecosystems, resources and infrastructure, people's health and well-being, and the very fabric of economies and livelihoods.

Extreme weather events, including droughts, floods and tropical storms (IPCC, 2021) are becoming more frequent, putting communities worldwide at risk. Across regions and countries, rapid urbanization, increased human displacement and rising income inequality are increasing exposure to these hazards. Approximately 3.6 billion people live in countries that are highly vulnerable to climate change (IPCC, 2023). As populations become more concentrated in larger urban areas, disasters can have catastrophic impacts as well as cascading effects across geographies and sectors (UNDRR, 2022).
The increased interconnectedness of today's world heightens the risk of widespread damage and disruption.

Least developed countries (LDCs) are disproportionally affected by natural hazards and climate change, with serious consequences for vulnerable individuals, small businesses and farmers. Disasters impact the economies of LDCs around 10 times more severely than those of the richest countries as a share of their gross domestic product (GDP) (UNDRR, 2022). These disruptions manifest in people's lives, causing economic hardship, health risks, displacement and social instability across regions and areas, as reflected in the current global debt crisis (Alayza, Laxton and Neunuebel, 2023).

Not all hazards are preventable, but their consequences can be reduced or minimized. Today, more than ever, greater focus and investment needs to be made to improve these communities' financial resilience, ensuring they are ready to respond when an adverse event takes place. Public and private sectors must collaborate on disaster preparedness. This involves supplying a combination of robust disaster risk reduction strategies and appropriate financial instruments – including insurance, for immediate relief and long-term recovery.

Photo credits: UNDP Peru

2 INSURANCE AS A SHOCK ABSORBER


Photo credits: UNDP Timor

In a world of rising and interconnected risks, insurance plays a crucial role in recovery efforts by providing necessary funds in the aftermath of a crisis. Through risk transfer solutions for a range of clients, from governments to businesses to individual households, insurance also contributes to economic stability. As risk experts, insurance carriers can also help governments, businesses and communities assess, predict, prevent, mitigate and recover from disasters (The Geneva Association, 2023). Being prepared makes policyholders less susceptible to unforeseen catastrophes and as a result, insurers can provide policyholders with increased financial security, which then facilitates economic activity. Paired with enhanced collaboration and more education on risks, this can encourage policyholders to invest in climate adaptation, for example by building flood barriers (Khoo and Yong, 2023).

Although insurance can improve financial resilience and incentivize better risk management, the protection gap remains large (see box 1), especially in developing countries. In 2023, insurance covered only 40 percent of the $280 billion in economic losses caused by natural catastrophes (Swiss Re Institute, 2024). The percentage of insured losses varies significantly by region, with estimates indicating coverage of 50 percent in developed countries, 10 percent in emerging economies and only 1 percent in Africa (Insurance Development Forum, n.d.). To improve coverage, the insurance industry is using technology and data to develop more detailed and scalable risk models as well as parametric products.

Box 1:

What is the protection gap?

The protection gap is defined as the difference between insured and uninsured losses. It is a global issue that impacts developed and developing nations in distinct ways (UNDRR, 2019). Developed countries, with their accumulated assets, are prone to higher absolute losses. By contrast, developing countries often face larger relative losses and greater human costs (Andrianarimanana, 2015). Uninsured losses can be catastrophic, particularly for vulnerable communities that lack economic stability. Therefore, it is crucial that the insurance industry, the development sector and governments work together towards closing this gap to foster resilience and enable sustainable development.

However, tools and products alone are insufficient: to close the protection gap, better enabling environments, market conditions and risk modelling are needed. Achieving this requires the involvement of many stakeholders, including governments, insurance providers, businesses and communities.

Insurance holds a unique and influential position in the economic ecosystem, since most industries rely on insurance in some form to carry out their business. By working with governments and development partners, insurance carriers are strategically positioned to implement risk transfer solutions that promote sustainable development and improve resilience across a wide range of sectors and regions. The potential for insurance to support sustainable development has been underestimated, especially the role it can play in assessing risks from natural hazards, building financial resilience and promoting broader risk management, including through investments in climate adaptation and resilience.

3 WHAT IS PARAMETRIC INSURANCE?

Innovative technologies have enabled more accurate and responsive risk assessment and insurance models.

Parametric insurance is a type of insurance that provides cover based on the occurrence of a pre-agreed set of adverse conditions, rather than on the amount of actual losses or damages incurred. Policyholders may be governments, businesses, communities or individuals, and the perils covered may be any of a wide range of loss-causing events, including severe weather events and natural hazards.

Traditional indemnity insurance is based on assessed losses. For each claim, the policyholder's losses must be determined before payouts are made. In parametric insurance, payouts are made based on triggers such as temperature, wind speed, wave height or rainfall. These triggers are linked to a predefined index or parameter that is independently verified using third-party data. When an event that fulfils that parameter occurs, payouts are issued.

Innovative technologies such as satellite imagery, drones and new generations of weather stations have made it easier to monitor the occurrence of triggering events, giving even more momentum to new parametric insurance coverages. Combined with data provided by policyholders, such as the precise location of insured sites, these technologies have enabled more accurate and responsive risk assessment and insurance models.

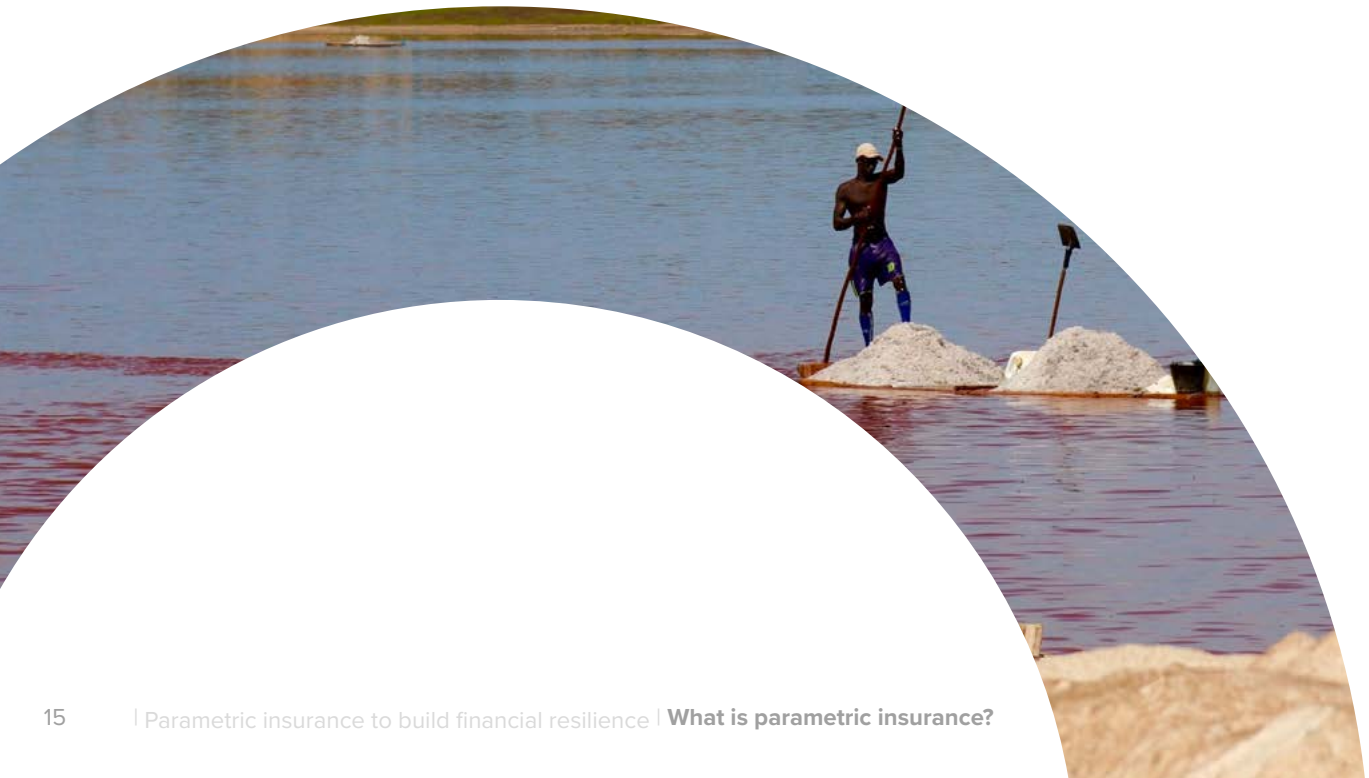
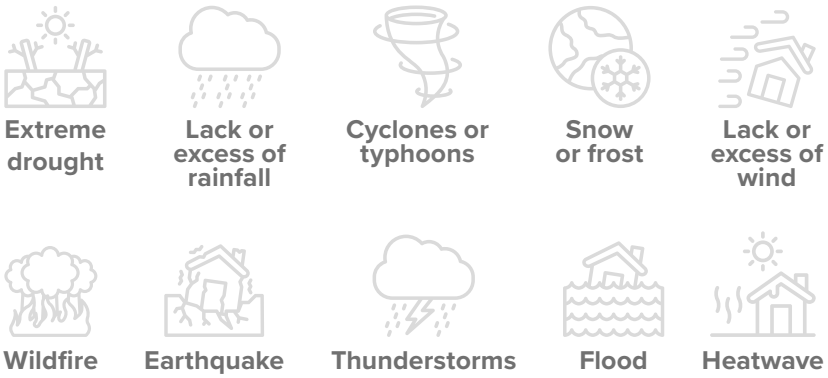


Figure 1

Parametric insurance at a glance

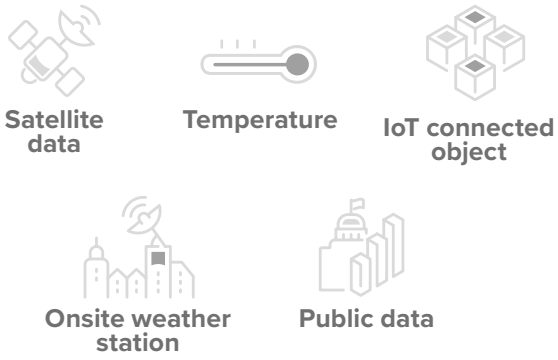
1 Coverage Scope

Parametric insurance can cover a wide range of perils including:



2 Measurement Requirement

It requires the ability to measure the peril intensity with a third-party data source:



3 Index Design

An index is created in collaboration with the policyholder, featuring a pre-agreed trigger.

This index can be based on historical events to ensure effective coverage and provide multiple layers of protection.

4 Event Validation

When an event occurs, the insurer uses the third-party data source to validate whether the policy trigger has been met and determines the payout amount.

5 Quick Payouts

Since no loss adjuster is needed, claims can be processed and paid significantly faster, typically within 10–20 days.

For example, compare the use of traditional and parametric insurance for farmers. A farmer holds a traditional indemnity insurance policy. When the farm is hit by drought, the claim for damages to her crops has to be assessed by the insurance provider, a lengthy process that may delay recovery. Another farmer in the same area holds a parametric insurance policy. When satellite data shows that rainfall has fallen below a certain percentage of the historical average, a payout is automatically triggered, meaning no lengthy claims process has to take place and the farmer can quickly begin to recover from the loss, buying new seeds and continuing to pay for household expenses.

Table 1

Key differences between traditional and parametric insurance

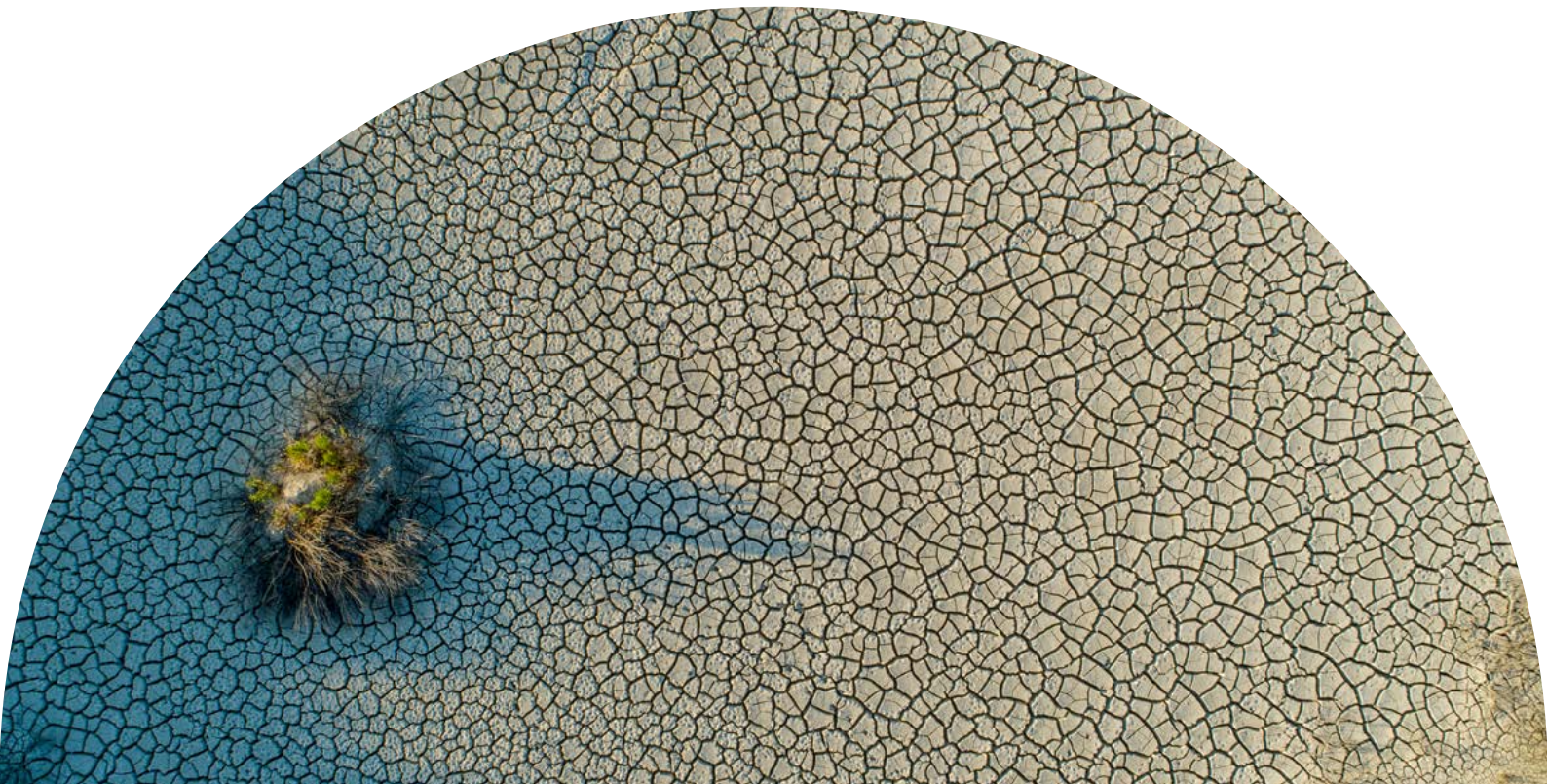
	Traditional insurance	Parametric insurance
TRIGGER	Payment is triggered by physical damage to an asset or an actual loss	Payment is triggered by the occurrence of an event, based on third-party data provider
CLAIMS PROCESS	Payout is calculated from an individual claims assessment by a loss adjuster	Predictable and transparent claims payout is based on a predefined index
PAYOUT TIMEFRAME	A long process that can vary depending on the complexity of the loss (on average 3–18 months)	A short process, since triggers are predefined and easily verifiable (on average 10–20 days)
STRUCTURE	Standard products and contract wordings, with some customization possible	Fully customizable products to fit policyholders' needs and budget
MORAL HAZARD	Payout and full compensation based on reported losses, disincentivizing adequate preventative measures	Payout based on the occurrence of an event, incentivizing preventive measures. Moral hazard may arise if policyholders receive payouts without incurring losses, mitigated by requiring a declaration of loss statement

Modern parametric insurance has its origins in the 1990s, when it was developed as a tool to aid vulnerable communities. Developing countries in Asia were among the first to create index-based insurance products (Clere, 2022), protecting farmers and agricultural communities from the impacts of severe weather events by enabling them to receive swift payouts triggered by an event such as too much or too little rainfall. A significant milestone in the evolution of parametric insurance was the establishment of the Caribbean Catastrophe Risk Insurance Facility (CCRIF) in 2007, the first sovereign-level use of parametric insurance. The CCRIF pioneered the multi-country risk pool, using parametric policies to help Caribbean and Central American nations mitigate the financial impacts of natural hazards. This innovative approach to insurance has since evolved and expanded, offering a robust solution for governments, businesses and organizations to enhance resilience in vulnerable communities across the world.

As the CCRIF demonstrated, parametric insurance can be a useful tool to protect enterprises and communities in regions around the world that are susceptible to extreme hazards (Artemis, 2017). The rapid and precise insurance coverage offered by parametric insurance makes risk management easier to plan. Parametric products are also adaptable, meaning they can be tailored to each policyholder's unique needs and budget. For example, the trigger can be unique to each policy, with different levels of triggers correlated to expected damages. A parametric policy may initially pay out when rainfall exceeds 50mm within a given period of time, and provide a larger payout if the rainfall exceeds 100mm, reflecting the increased expected damages. In this way, and with no need for loss adjusters, parametric insurance can act as a form of immediate disaster relief for affected communities, businesses and individuals (Jarzabkowski et al., 2019).

Parametric insurance has significant potential to bridge the protection gap, extending coverage to policyholders and communities previously unreachable by traditional insurance. As an example, parametric insurance does not require losses to be assessed, which makes it possible to conduct business in areas where there is no network of claims adjusters and where policyholders' claims histories may not be readily available. This could particularly be the case in rural areas and in emerging markets. While parametric insurance does require historical data related to the hazard being covered, this information is becoming increasingly available, as governments and organizations take steps to increase data availability.

Insurance plays a crucial role in development, since uninsured losses can trap vulnerable populations in a cycle of poverty (Global Index Insurance Facility, n.d.). Parametric insurance can quickly stabilize the income of businesses and communities impacted by a variety of hazards, leading to improved livelihoods, better protected assets and enhanced long-term risk management. Expanding from its original focus on agriculture, parametric insurance is now finding applications in a range of sectors, including renewable energy, manufacturing, tourism, protection of natural capital, construction and the hospitality industry, a broad portfolio made possible in part because it does not focus on asset type but instead provides compensation for the full spectrum of financial loss (Descartes Underwriting, n.d.). This demonstrates that parametric insurance has the potential to provide a financial safety net for a broad range of risks, contributing to stability and resilience across many different sectors (Smirnoff, 2024).



Understanding basis risk in parametric insurance

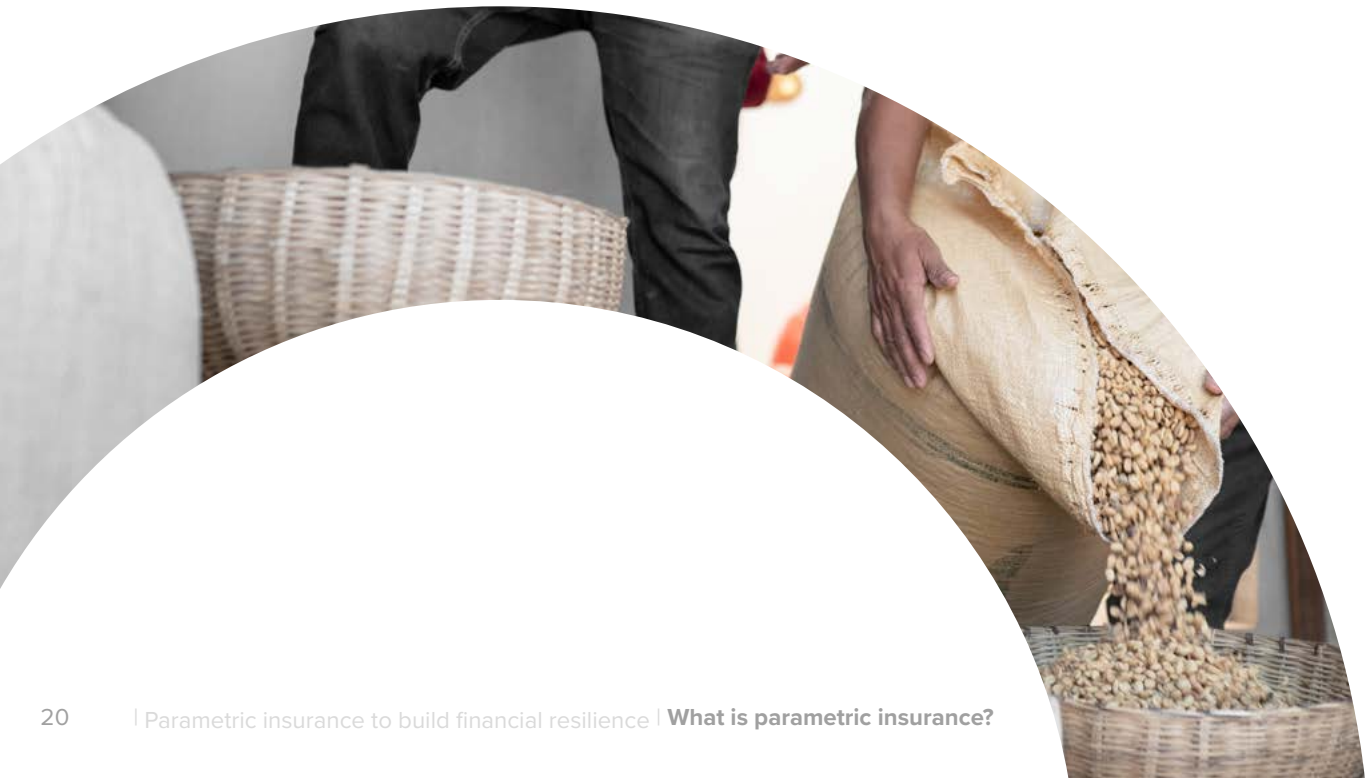
Parametric insurance introduces a new type of basis risk, arising from the correlation between the index used and the actual loss incurred.

Basis risk in insurance refers to the potential discrepancy between the compensation provided by insurance and the actual loss suffered by the insured. This issue is not exclusive to parametric insurance; in traditional insurance, policy exclusions, sub-limits, deductibles and loss adjustment can all mean that payouts are not precisely equal to losses. However, parametric insurance introduces a new type of basis risk, which arises from the correlation between the index used and the actual loss incurred.

This discrepancy can occur in two situations:

- Negative basis risk: This occurs when an actual loss happens, but the parametric trigger is not activated or does not match the extent of losses, resulting in a payout less than the total loss.
- Positive basis risk: This happens when parametric insurance is activated, but the payout is greater than the actual loss incurred, leading to overcompensation for the policyholder.

In the case of positive basis risk, the beneficiary of the policy could potentially end up with more than they had before the triggering event took place. This contradicts the principle of indemnity, which is the basis of insurance. This principle ensures that policyholders are compensated only for the actual financial loss they suffer, without making a profit.



The scenarios presented in figure 2 illustrate negative and positive basis risk in natural hazard situations.

Figure 2
Comparing basis risk

Scenario	Traditional	Parametric (Covers hurricanes within 20 km of site)
1 A hurricane comes within 10 km of the site, causing damage	The value of the claim will be based on the actual loss value assessed by a loss adjuster.	The insured will receive a payout based on the category of the hurricane. This payout may or may not align with the actual damage incurred, illustrating the concept of basis risk.
2 A hurricane comes within 10 km of the site, causing minimal or no damage	The value of the claim will be based on the actual loss value assessed by a loss adjuster.	The insured will receive a payout based on the category of the hurricane. In this case, the payout might exceed the actual damage, representing a positive basis risk.
3 A hurricane comes within 30 km of the site, causing damage	The value of the claim will be based on the actual loss value assessed by a loss adjuster.	As the policy only covers events coming within 20 km of the insured site, no payout will be received, irrespective of the losses suffered. This scenario exemplifies negative basis risk, where an actual loss occurs, but the insurance is not triggered.

Eliminating basis risk has been a challenge in the design of parametric policies, particularly when it comes to correlating payouts with actual damages. However, strategies have been developed that can help minimize basis risk, ensuring more accurate payouts that closely match the actual losses suffered. These strategies include implementing a well-tailored index with layered triggers that are specific to the policyholder's risk profile, using reliable data sources to improve the accuracy of payouts, and employing enhanced modelling techniques to better predict losses, among others (PwC, 2024).
Basis risk can also be reduced by creating hybrid solutions that combine both traditional and parametric insurance.

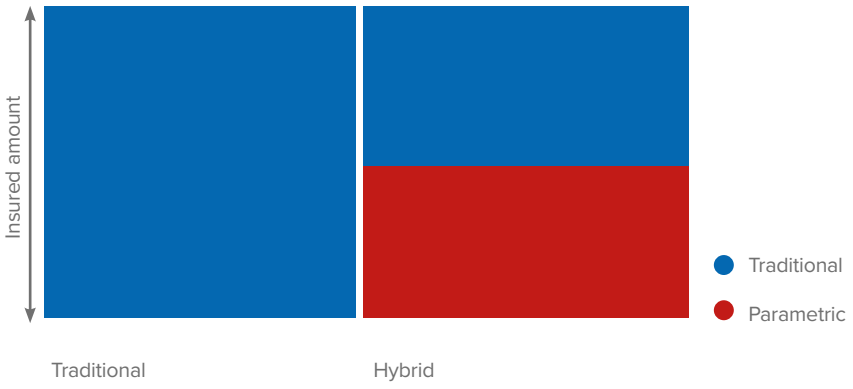
How parametric and traditional insurance can form a hybrid solution

Parametric insurance is extremely adaptable, which means that parametric products can be designed in ways that complement traditional indemnity products. Layering parametric insurance and traditional indemnity products can help create comprehensive risk management solutions tailored to the unique set of risks faced by a particular government, business or community.

Parametric insurance has the benefit of speed, which is particularly useful in scenarios where immediate access to funds is crucial for recovery. It can serve as a short-term cash flow solution following an event, providing immediate financial relief. Subsequently, traditional indemnity insurance can step in to offer a more comprehensive coverage based on actual losses suffered, ensuring that policyholders receive adequate compensation for their losses. Figure 3 illustrates a hybrid risk management approach compared with a traditional policy. In this model, parametric insurance swiftly addresses the first, urgent losses, while traditional insurance covers the remaining, higher losses, together providing a more complete coverage solution.

Figure 3

A hybrid risk management solution combining traditional and parametric insurance



This hybrid approach, combining the strengths of both parametric and traditional indemnity insurance, provides a robust safety net, ensuring that policyholders can recover swiftly from any adverse events.

A hybrid insurance approach allows for greater flexibility and customization, while also minimizing the impacts of basis risk in parametric policies. Insurers can tailor policies to meet the specific needs and risk profiles of policyholders, resulting in a more personalized and effective insurance solution.

What perils can parametric insurance cover?

Parametric insurance provides coverage for various perils based on pre-agreed triggers. Table 2 presents a selection of perils, categorized into natural hazards, risks relating to agriculture and risks relating to business, with examples of how the triggers for payouts could work.

Table 2

Potential risks covered by parametric insurance

Natural hazards

Hazard covered	Structure/ parameter	Triggering event for payout
Flood	Parametric flood insurance can be structured around a flood gauge or using satellite data near the insured location to monitor water levels	Water level rises above a certain threshold
Earthquake	Parametric earthquake insurance can be structured around the peak ground acceleration reported at the insured location during an earthquake	Ground shaking meets or exceeds a certain level
Hurricane	Parametric hurricane insurance can be structured around the wind speed related to a tropical cyclone reported at the insured location	Wind speed meets or exceeds a certain level
Tornado	Parametric tornado insurance can be structured around the wind speed of the tornado reported at the insured site	Wind speed meets or exceeds a certain level
Hail	Parametric hail insurance can be structured to protect businesses like solar energy sites from hailstorm losses, using sensors, satellite imagery or radar data to monitor hail at insured sites	Size of hail above a certain level is recorded, or a predefined percentage of an area is impacted by hailstorms
Wildfire	Parametric wildfire insurance can be structured to provide payment following a severe wildfire event, using satellite imagery to monitor damage	Satellite imagery shows a certain proportion of a predefined area as burned or encroachment of fires onto a defined area

Business risk

Hazard covered	Structure/ parameter	Triggering event for payout
Water level volatility	Parametric insurance for water levels can be structured to provide coverage for businesses that rely on water transport, using satellite data and water gauges to monitor levels	Water level of rivers drops to a level that interrupts transport
Storm surge	Parametric insurance for storm surge can be structured around the risks associated with significant wave height for coastal businesses, using wave sensors and satellite data to monitor changes	Wave height meets or exceeds a certain level
Falling renewable energy yield	Parametric insurance for renewable energy yield can be structured to provide coverage for businesses in the renewable energy sector, based on monitoring of energy sources such as wind speed and solar radiation	Energy yield decreases due to natural resources like wind speed or solar radiation falling below a certain level
Non-damage business interruption	Parametric insurance can be structured to provide coverage for non-damage business interruption risks, caused by events that disrupt supply chains without causing physical damage	Predefined events such as an earthquake at a core supplier's site

Agriculture risk

Hazard covered	Structure/ parameter	Triggering event for payout
Drought	Parametric drought insurance can be structured by using satellite data to measure soil moisture levels or by monitoring rainfall data	Rainfall or soil moisture falls below a predefined level
Excess rainfall	Parametric insurance for excess rainfall can be structured by tracking rainfall data via satellites	Amount of rainfall exceeds a certain threshold compared to historical averages
Frost	Parametric frost insurance can be structured to provide coverage for businesses like farms that are vulnerable to frost, using weather stations to monitor temperatures compared to historical averages	Temperature near the site falls below a certain level
Crop yield variations	Parametric agriculture insurance can protect against crop yield variations due to climate risks, leveraging official yield data and satellite imagery	Yields or vegetation health fall below predefined thresholds

4 HOW PARAMETRIC INSURANCE CAN ADVANCE THE SUSTAINABLE DEVELOPMENT GOALS

By enabling a swift response to climate-related events and other natural hazards, insurance contributes to building resilient communities and infrastructure, addressing key aspects of sustainable development and supporting the achievement of the 2030 Agenda and the Sustainable Development Goals (SDGs). Parametric insurance has a crucial role to play in addressing sustainability and climate risks. It provides fast payouts to governments, businesses and communities based on preset triggers, allowing rapid recovery from climate events like hurricanes and floods, which is particularly valuable for vulnerable communities.

By offering timely financial aid, it promotes equitable risk management, and it bolsters financial resilience for sustainable projects, ensuring they can continue even in the face of climate-related setbacks.

Parametric insurance supports several SDGs, including the examples below, which feature in the case studies in this report:

Parametric insurance and the Sustainable Development Goals

Goal 1

No Poverty

Parametric insurance protects low-income communities through providing quick payouts in emergency situations, shielding them from the financial impact of disasters and helping to prevent them from falling into poverty.

Goal 2

Zero Hunger

Parametric insurance can protect farmers and communities against potential crop failures due to adverse weather conditions, ensuring they have funds to buy food and replant crops.

Goal 3

Good Health and Well-being

Parametric insurance can foster proactive risk management in vulnerable communities, reducing event-related injuries and fatalities. Swift post-event claims responses minimize secondary health issues.

Goal 5

Gender Equality

Parametric insurance can help provide financial protection for women, particularly in developing nations where work is often informal, from extreme climate events, enhancing their financial resilience, security and independence (Suzumu and Chanel, 2024).

Goal 7

Affordable and Clean Energy

Parametric insurance can help protect important energy infrastructure as well as mitigate the risk of low energy production. This provides stability for policyholders and promotes further renewable energy investment.

Goal 8

Decent Work and Economic Growth

Parametric insurance can contribute to sustained, inclusive and sustainable economic growth by providing businesses with a safety net against unforeseen events. This can help maintain productivity and employment levels during times of crisis.

Goal 9

Industries, Innovation and Infrastructure

Parametric insurance encourages investment in resilient infrastructure by offering coverage for related risks. It provides a financial safety net, reducing potential losses from disasters or unforeseen events and making infrastructure investment less risky and more attractive.

Goal 10

Reduced Inequalities

Parametric insurance's quick payouts and ability to operate on micro-scales can provide resilience to vulnerable communities disproportionately affected by extreme events, preventing increased poverty and ensuring stability.

Goal 11

Sustainable Cities and Communities

Parametric insurance can help protect communities, especially in developing regions, from the impacts of natural hazards, thereby decreasing economic losses and enhancing financial stability, resilience and overall well-being.

Goal 12

Responsible Consumption and Production

Parametric insurance, by offering a financial safety net, encourages farmers to embrace sustainable methods such as reducing the use of harmful fertilizers, cultivating drought-resistant crops and implementing efficient irrigation systems (CSIRO, 2024; Kumbhat, 2024).

Goal 13

Climate Action

Climate risk insurance can provide financial protection against losses due to climate change-related events such as intense storms, drought, flooding or heat stress.

Goal 14

Life Below Water

Parametric insurance can protect critical marine conservation areas from natural hazards, providing quick financing for restoration projects and helping to restore ecosystems to their normal function (InsTech, 2023).

Goal 17

Partnerships for the Goals

Through partnerships with governments, non-governmental organizations (NGOs) and other stakeholders, parametric insurance can help mobilize resources and share expertise, contributing to the global partnership for sustainable development.

5 PARAMETRIC INSURANCE CASE STUDIES

Parametric insurance has already been deployed across various sectors and hazards, demonstrating real-world impact. Each of the following case studies of parametric insurance at work is based on policies within the portfolio of Generali GC&C, in partnership with Descartes Underwriting, or from the contributions of IDF members African Risk Capacity, Blue Marble, CelsiusPro, Swiss Re and WTW.

Parametric insurance case study footprint

Malawi

Agriculture – Drought

Photo credits: UNDP Rwanda

Agriculture

Drought

Malawi

Key SDGs

Country profile

Malawi is heavily reliant on agriculture, which contributes 22.1 percent of the country's GDP as of 2023 and employs over 80 percent of the active population, 59 percent of whom are women (CIAT, 2018; World Bank, 2024b; World Bank, n.d.). With production mostly rain-fed, the sector is susceptible to climate risks such as drought, which can cause crop failure and economic hardship, particularly for smallholder farmers. As drought risk rises to due climate change, protective measures are key to maintaining socioeconomic stability.

Description

The policy insures several districts of Malawi against agricultural drought risk, preventing food insecurity.

Policy structure and trigger

The insurance policy, supported by a risk pool, uses a trigger based on the Water Requirement Satisfaction Index (WRSI), developed by the Food and Agriculture Organization (FAO) to monitor crop performance. The WSRI calculates the ratio of actual to potential loss of soil water from evaporation, reflecting water stress on crops. When WRSI values fall below certain thresholds, indicating insufficient water supply during critical growth stages, it activates a trigger for insurance payouts. Payouts are made at the end of the sowing season if the amount of water required for successful sowing is deemed to be insufficient.

Results

The policy provides payouts in the middle of the agricultural season, immediately at the end of the sowing season, much earlier than traditional parametric insurance products. Earlier detection and even earlier payouts mitigate drought impacts and reduce population vulnerability by allowing for response to begin before the end of the agricultural season. This proactive approach helps protect livelihoods, prevents negative coping mechanisms such as asset selling and ensures food security.

Mexico

Social services – Earthquake

Social services

Earthquake

Mexico

Key SDGs

Country profile

Earthquake-prone Mexico, where 36 percent of the population lived in poverty in 2022, relies heavily on its social services (CONEVAL, 2023). These are already stretched: 50.7 percent of the population are deemed vulnerable due to limited access to social services. When disasters such as earthquakes happen, social services are at their most important, and also at their most overstrained (CONEVAL, 2023). After the 2017 earthquakes, only an estimated 22 percent of $5.8 billion in losses were covered by insurance, demonstrating a large protection gap (Aon, 2017). Mexico's social services need to be strengthened and made more resilient to ensure rapid recovery after disasters and maintain socioeconomic stability.

Description

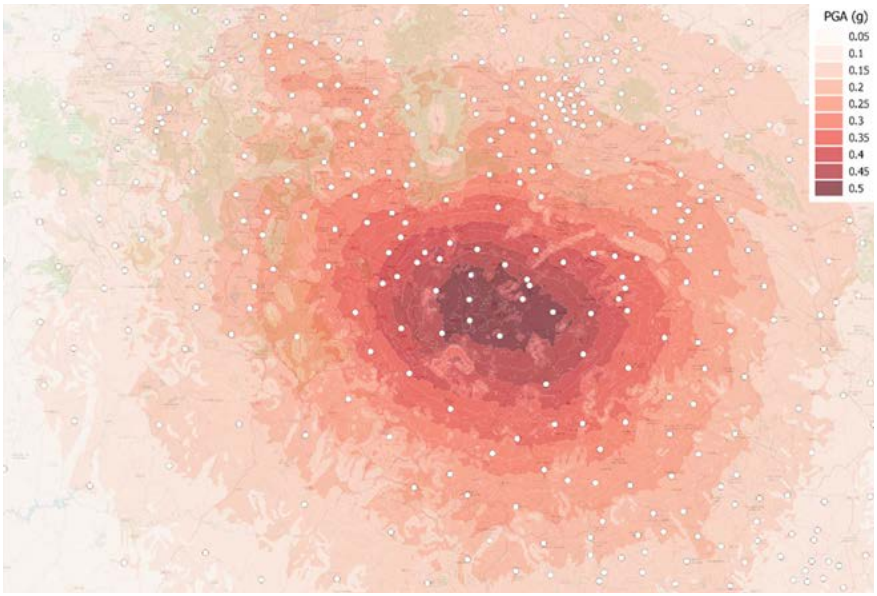
The policy protects a collection of buildings distributed throughout Mexico. These sites administer services related to the local population's public health, pensions and social security.

Policy structure and trigger

Peak Ground Acceleration (PGA) is a measure of how much the ground shakes during an earthquake. When the United States Geological Survey (USGS) completes a map showing an earthquake's PGA, each location on the map is given a PGA value. Figure 4 shows an example of a USGS map showing an earthquake's PGA, as well as the insured locations in the earthquake-affected zone.

Figure 4

A USGS map illustrating Peak Ground Acceleration (PGA) near insured locations



Note: The color gradient indicates the intensity of ground shaking. Insured locations are highlighted in white.

The PGA value is used to calculate potential insurance payouts, as follows:

- Each building at a location is assigned a PGA value using the map
- The value of each building is then multiplied by a certain payout coefficient, which varies depending on the PGA value
- The results for all buildings are added together to give a total payout amount
- After the total is calculated, relevant limits or deductibles (amounts that policyholders must pay out-of-pocket before insurance coverage kicks in) are applied.

For example, 10 buildings are located in areas where PGA values are recorded. Five of these buildings are in an area with a PGA value of 0.5, and the other five are in an area with a PGA value of 0.7.

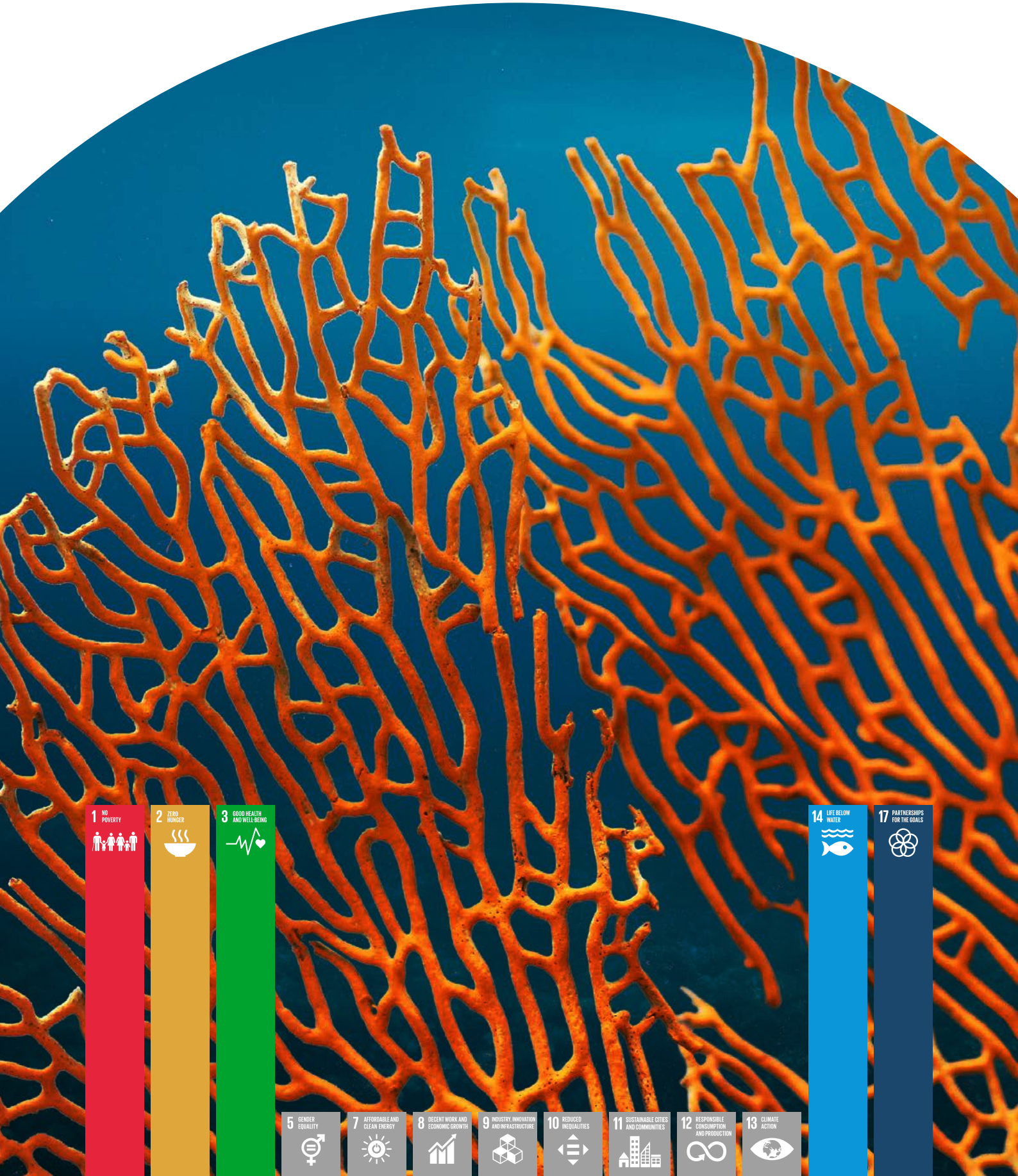
The payout for the five buildings in the 0.5 PGA area is calculated as 40 percent of the combined value of these buildings. Similarly, the impact for the five buildings in the 0.7 PGA area is calculated as 65 percent of their combined value. By adding these two amounts together, the total for all 10 buildings is obtained. The payout will be this combined total, less any limits or deductibles.

Results

The insurance payout helps social services recover quickly after an earthquake, which means they can rebuild and repair any infrastructural damage and continue to provide financial support to vulnerable communities.

Fiji

Coral reef – Tropical cyclone



Coral reef

Tropical cyclone

Fiji

Key SDGs

Country profile

The Lau Islands, located on the eastern side of the Fiji archipelago, comprise 60 islands and islets spread over 114,000 square kilometres of ocean. Changes to the frequency and severity of tropical cyclones threaten coral reefs and the livelihoods of the indigenous people of Lau, who depend on the reef ecosystem as a source of food and income. There is little climate risk protection available in the region and very few households carry insurance policies.

Description

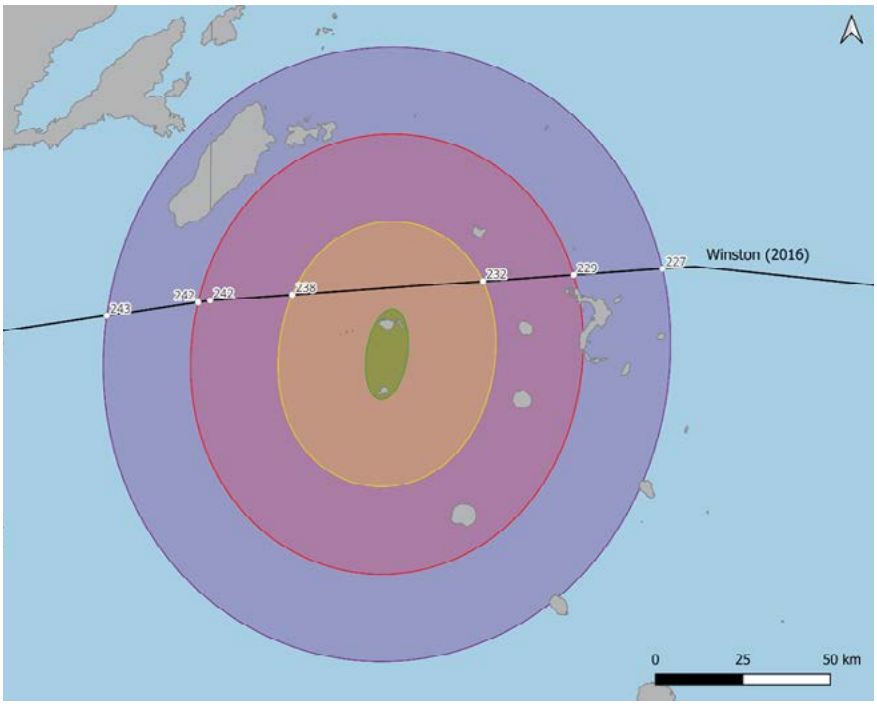
Fiji's first coral reef insurance programme covers tropical cyclone risk around three islands in the Lau Seascape.

Policy structure and trigger

The programme is designed using a "catastrophe in nested circles" or "gridded parametric" structure, as illustrated in figure 5. Payouts are based on the spatial distribution of event intensity across the covered geography. In this case, there is an ellipse around the islands and reef area (the green zone in figure 5), ringed by three progressively larger buffers. The trigger is maximum wind speed (measured by peak 10 - minute sustained wind speed in km/h) based on the cyclone category, which is calculated based on the Australian Bureau of Meteorology's cyclone scale.

Figure 5

A category 5 cyclone, Cyclone Winston, crossing the payout boundary in 2016



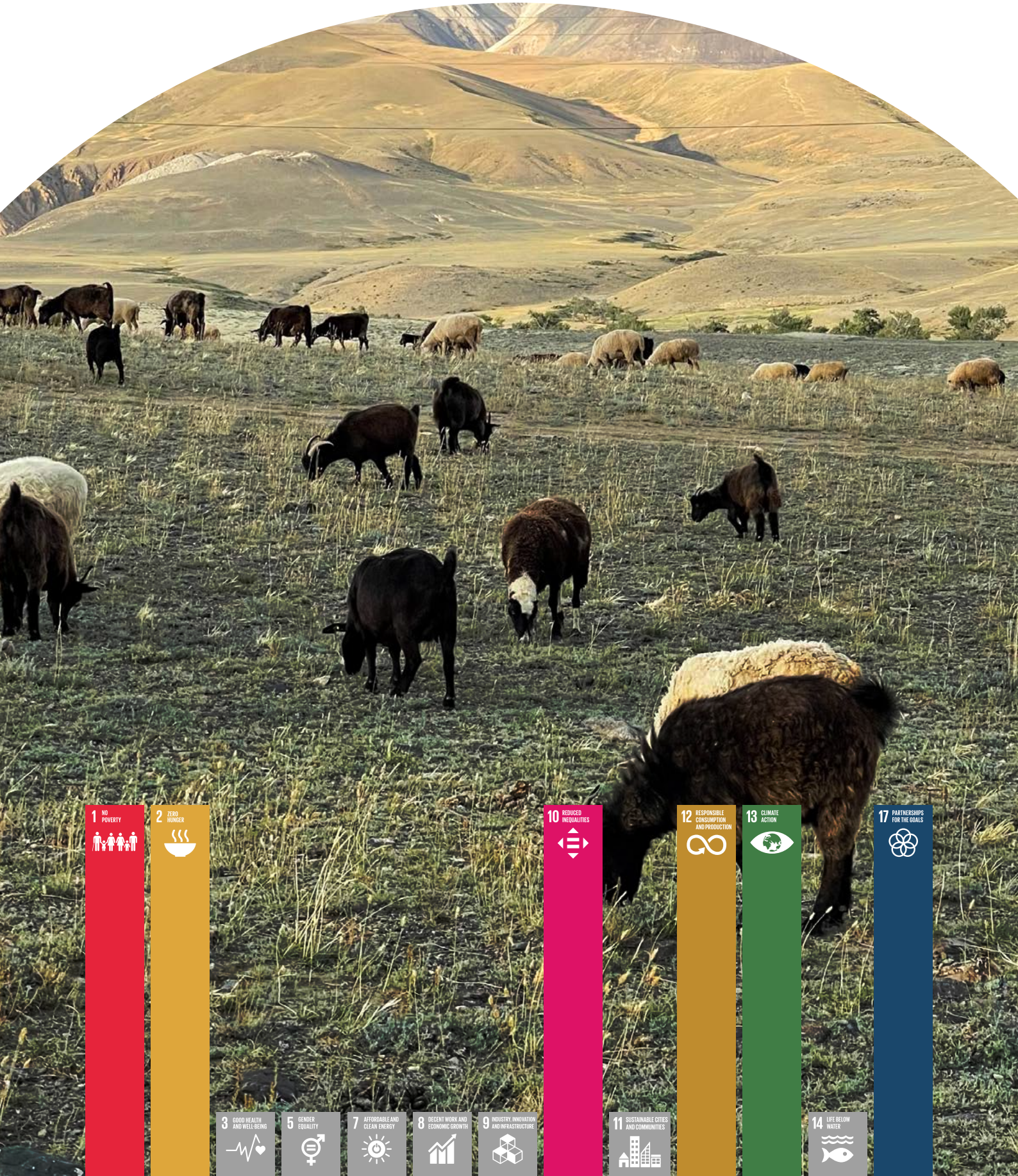
Results

This programme aims to help communities in the Lau Islands to withstand the adverse impacts of cyclones and effectively manage natural resources. If a triggering event occurs, the policyholder will use the payout to lead rapid reef response activities (e.g., debris clean-up, reattaching broken corals) and support community assistance to alleviate food and water security concerns caused by storm damage.

These response activities will prevent the overharvesting and further degradation of Lau's reef system during recovery from a cyclone, enhancing community and reef resilience.

Kyrgyz Republic

Livestock – Extreme drought



Livestock

Extreme drought

Kyrgyz Republic

Key SDGs

Country profile

The Kyrgyz Republic is a small, mountainous country with a population of 7.1 million, of whom 62 percent live in rural areas and depend significantly on agriculture and livestock breeding. More than half of the rural population is poor or vulnerable to poverty, and livestock is key to ensuring food security and providing these vulnerable households with a safety net. However, agriculture and livestock in the Kyrgyz Republic are under threat from climate change, which is increasing the incidence of droughts and extending winters, causing lower yields across multiple crops, especially livestock fodder.

Description

Four local governments in Naryn province in the east of the Kyrgyz Republic are covered by a community-level weather index insurance policy against extreme drought. This policy provides financial support to over 3,200 livestock-rearing families during drought conditions.

Policy structure and trigger

The policy measures soil moisture in the root zones of fodder crops using a remotely sensed dataset. It offers drought coverage from 1 June to 30 September, divided into two phases: Phase 1 (June and July) and Phase 2 (August and September). The data are evaluated at the end of each phase. If the data indicate a payout should be made, the payout is automatically issued to the policyholder, which in this case are local governments, without requiring a claim to be filed. The payouts are then distributed to marginalized livestock breeders. Claims are typically processed within two weeks after the end of each phase.

Results

The policies aim to provide timely financial support during adverse weather, stabilizing income, encouraging investment in sustainable practices and protecting livelihoods.
This can contribute to reducing poverty and food insecurity, foster climate adaptation and ensure efficient resource use, significantly strengthening community resilience against the impacts of climate change.

Viet Nam

Wind farm – Lack of wind

Wind farm

Lack of wind

Viet Nam

Key SDGs

Country profile

Viet Nam has some of the best wind resources in South-east Asia. Wind power projects are key to Viet Nam's ambitious renewable energy goals, and the country aims to increase its wind power to 27 percent of its total capacity by 2050, a rise of over 1400 percent from current installed capacity (PwC, 2023). However, low wind periods can affect the performance of wind farms. Insurance coverage can provide financial protection during these times, encouraging further investment in the sector and assisting in Viet Nam's renewable energy transition.

Description

The policy aims to cover a wind farm against low production due to lack of wind.

Policy structure and trigger

In a parametric insurance model for wind farm production, historical hourly wind speed data at the designated location is collected. Using these data, the historical average production per year can be calculated, based on the wind speed each hour and the corresponding average production at each speed. To align this with the policyholder's expected production, the average production per year is multiplied by a scalar factor. This calculation is repeated at the end of each year covered by the policy to determine the calculated production.

The policy includes a trigger amount of production. If the calculated production falls below this trigger, a payout is made. The size of the payout is decided by determining the difference between the trigger and calculated production and multiplying this by a predefined price per MWh. For example, a predefined production trigger for the year might be set at 1,000 MWh. If the calculated production falls short of this target, reaching only 900 MWh, a payout is triggered. The total payout is based on the difference between the target and the calculated production.

Results

Offering this kind of coverage protects renewable energy investors and project developers, encouraging critical investments in renewable energies, which are essential to meeting the targets of the Paris Agreement. Supporting wind power development can help Viet Nam reduce its reliance on coal production, which can help to safeguard the health of vulnerable communities: in 2019, an estimated 550 people in Viet Nam died as a result of pollution (Myllyvirta and Suarez, 2021).

French Polynesia

Tourism – Storm surge

Tourism

Storm surge

French Polynesia

Key SDGs

Country profile

French Polynesia's tourism industry is a significant part of its economy. The total value of spending by tourists is estimated to be around €645 million a year, which equates to 8 percent of GDP, and is about five times the total export value of local products (Islands Business, 2023; Fortin, 2020). This makes the tourism industry one of French Polynesia's main revenue-generating sectors. As such, it is a major employer, providing 18.2 percent of employment (Tahiti Tourisme, 2023).

Description

The policy protects a hotel against potential damage caused by a significant wave. This can help to ensure that tourism and hotel operations can continue, as well as preserve staff employment.

Policy structure and trigger

A structure for the policy is determined in which payouts are triggered when a wave of a predefined minimum height hits, with the sum of the payout increasing as the wave height increases. Data on wave heights are collected from a wave sensor buoy near the hotel. Wave data are continuously tracked throughout the policy's term, and the payout is determined based on the highest wave recorded during the period. Table 3 shows a year-long policy for a hotel with a policy limit value of 1,000 of a specified currency. In this policy, coverage begins when the wave height reaches 2.0m. If over the course of the year, the site experiences a wave height of greater than or equal to 3.0m but less than 3.5m, the hotel receives a payout of 60 percent of the predetermined limit. In this example, the policy pays out only on the maximum wave height for the period, but depending on the policyholder's needs, the policy could be customized to trigger a payout each time a wave goes above the minimum height.

Table 3

Payout structure of a parametric storm surge policy with a policy limit value of 1,000 of a specified currency

Height of the index (m)	Payout Option (%)	Payout of a specified currency
2.0	20	200
2.5	40	400
3	60	600
3.5	80	800
4	100	1000

Results

Insurance coverage on hotels in French Polynesia provides financial protection that enables resilience and stability in the aftermath of triggering events, ensuring that tourism infrastructure can be quickly rebuilt.

This reduces the impact of natural hazards on the tourism industry and the communities who rely on it.

India

Informal Workers – Extreme heat

Informal workers

Extreme heat

India

Key SDGs

Country profile

Eighty percent of India's population is highly vulnerable to climate disasters, and most regions have little capacity to adapt to adverse climate conditions (Mohanty and Wadhawan, 2021). As climate change makes heatwaves more severe and extensive, more people are put at risk, increasing health-related issues and economic vulnerability: an increase in heat stress is likely to cause productivity losses in India equivalent to 34 million full-time jobs by 2030 (Swiss Re Institute, 2022). At particular risk are the 90 percent of India's female workforce who are in informal work. Many of these women work outdoors in dangerously hot temperatures. If they cannot go out to work during periods of extreme weather, they lose their daily wages, putting these already vulnerable workers at risk of even greater economic hardship.

Description

The policy provides financial relief to women engaged in informal work in India, enabling them to reduce their health and economic risks during extreme heatwave events.

Policy structure and trigger

Parametric insurance policies for extreme heat have used a variety of temperature-based triggers to decide when to pay out. One type of trigger uses the highest daily temperature: a payout is made if a particular temperature is exceeded for two consecutive days. This type of policy can have multiple triggers set at different temperatures, meaning the payout increases for higher temperatures (CelsiusPro, 2024).

Another type of trigger is percentile-based, and considers historic temperature data for each insured area. This percentile trigger is set at a different temperature for each area, because it is based on the normal temperatures for that city. A location that is usually hot will have a higher absolute temperature trigger than a location that is usually cooler (Swiss Re, 2024).

Results

Policyholders are automatically compensated with a predetermined payout when the temperature rises higher a set threshold. This amount, often a few dollars daily, typically compensates for their lost wage. The payment is directly deposited into their bank accounts whenever the temperature crosses the specified threshold. This swift payout mechanism enhances the financial resilience of the people insured by compensating for lost wages or spoiled goods.

As a result, informal workers and women in particular are empowered to prioritize their health and avoid working under extreme heat conditions.

Aligning parametric insurance with Sustainable Development Goals amplifies its positive impact.

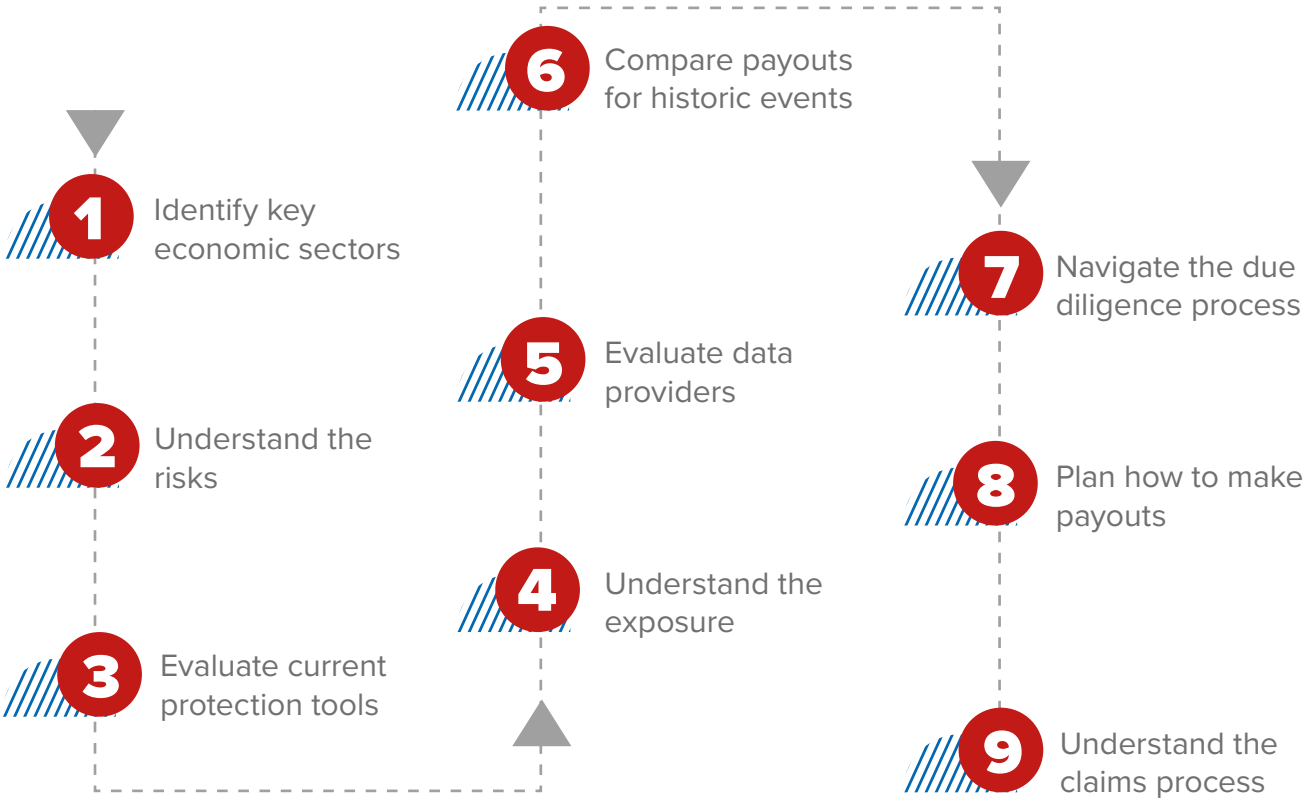
Photo credits: UNDP Tajikistan

6 CONSIDERING PARAMETRIC INSURANCE TO INCREASE RESILIENCE

The unique structure and complete customizability of parametric insurance represent significant advantages but they can also make implementing parametric insurance seem daunting for governments, businesses and communities looking for solutions to improve their financial resilience. Fine-tuning parameters so that the product offers appropriate coverage for the premium is essential, because incorrect or inadequate coverage could increase financial risk. Before a government, business or community decides whether a parametric solution is appropriate to meet their needs, they should consider the following key steps, as visualized in figure 6.

Figure 6

Key steps in deciding on a parametric insurance solution



Step 1

Identify key economic sectors

The first step in integrating parametric insurance into a risk management strategy is to pinpoint the industries or sectors that are vital to the business or economy, and thus most in need of the enhanced protection and swift recovery that parametric insurance can offer.

Step 2

Understand the risks

Parametric insurance policies are specifically designed to provide coverage against predetermined events. As such, potential policyholders need to have a clear understanding of the risks that need to be protected against. If the risk profile is extensive and diverse, a traditional indemnity policy may be a more appropriate choice. Historical data need to be available on events that cause losses and trigger payouts, so that an appropriate insurance policy can be designed. Data on loss-causing events are also important in helping to understand the thresholds that trigger the start and end of payouts. These thresholds need to be calibrated carefully, because a policy with thresholds set too high or too low could fail to provide coverage when it is most needed. By accurately identifying and understanding the risks, the insurance product can be tailored to meet the policyholder's specific needs.

Step 3

Evaluate current protection tools

Identifying gaps that need to be filled in existing coverage is essential when considering parametric insurance options. Since one of the key advantages of parametric insurance is its adaptability, figuring out where gaps exist means a parametric policy can be customized either to function independently or to integrate into a hybrid model and enhance current insurance protections.

Step 4

Understand the exposure

Parametric policies can cover individual sites, entire portfolios or whole jurisdictions, so it is important to understand the extent of the exposure before entering into a policy. When insuring multiple locations, it is crucial to remember that risk can differ geographically. Not all locations may be equally affected by a specific event, and some might need more coverage than others. Having accurate data on locations is important because it can help insurers refine the modelling process and can enable more precise pricing. Recognizing these geographical risk variations and ensuring the accuracy of data can help create a parametric policy that effectively mitigates the unique risks of each area.

Step 5

Evaluate data providers

Under a parametric insurance policy, triggering events are determined based on data captured by various providers, so when taking out a parametric insurance policy, it is very important to thoroughly evaluate the data provider or data source that the policy will use. The data provider, or source of the data, is responsible for delivering objective, transparent and consistent data. These data must be reliable and accurate, since they directly influence the effectiveness and fairness of the policy, so the track record and trustworthiness of the data provider or source should be properly considered before the policy is set.

Step 6

Compare payouts for historic events

Parametric insurance products are highly customizable, given their diverse structures, event measurement methods and data sources. This can make understanding and comparing potential policies complex. To navigate this complexity, it can be useful to examine how these products would have paid out for specific historical events or scenarios that are a high priority. In this way, potential policyholders can fine-tune their policies to ensure that the events of most concern are covered and to establish the most suitable product for their budget.

Step 7

Navigate the due diligence process

Prospective policyholders should be aware that insurers are obliged to carry out a due diligence process to ensure that receiving bank accounts are not linked to illicit activities. Due diligence is an important protection, but it can cause delays in policy inception and payouts. Understanding potential obstacles like this and developing strategies to navigate them are important to ensure coverage and payouts happen smoothly.

Step 8

Plan how to make payouts

In contrast to traditional insurance policies, where a claims adjuster would be on-site to complete a damage report, this process does not occur with parametric insurance. This aspect becomes particularly important to consider post-event when distributing the payout to impacted sites. A thorough understanding of the loss is required to ensure an equitable method of dividing the payments. Therefore, it is crucial to have plans in place pre-event to ensure efficient and accurate distribution of funds.

Step 9

Understand the claims process

Upon experiencing a loss, the policyholder will notify their broker or insurer. Then, the final post-event data will be collected, ensuring accurate information to assess whether the event's intensity has triggered the policy and the corresponding payout threshold. Using these data, a report is generated outlining the maximum recoverable amount based on the policy's structure. Following confirmation of a policy-triggering event, the policyholder must issue a declaration of loss statement. After receipt of this statement, the payout is made per the policy terms, facilitating a swift return to business operations and balance sheet protection.

7 MEASURING THE IMPACT OF PARAMETRIC POLICIES

Parametric insurance represents an innovative approach to risk management, but it is also relatively new. Understanding, tracking and measuring its performance is important to ensure that it has the impact it promises, particularly in its contribution to the achievement of the SDGs. Sustainability initiatives in the insurance sector, especially in Europe, have accelerated the need for insurers to measure this impact. Governments, businesses and communities interested in adopting parametric insurance policies should also understand how to evaluate these products in order to determine whether they have achieved their intended results.

Measuring the impact of parametric insurance is challenging. As this report has illustrated, it is diverse in its applications and may be implemented through a broad range of models. Furthermore, its impact is most evident following severe, infrequent events, which complicates data collection and analysis that requires prior planning and organization. The distance between insurers and end beneficiaries is sometimes an additional challenge. Identifying the needs of vulnerable groups and measuring the outcomes of insurance typically requires a certain degree of on-the-ground presence and the ability to collect information directly from policyholders and beneficiaries. But vulnerable populations are often geographically spread out and thus can be costly to find and interview.

Theory of change: how parametric insurance can build financial resilience

Despite these challenges, a robust theory of change underpinned by empirical data can demonstrate the impact of parametric insurance and contribute to an approach towards sustainability for insurers. A theory of change is a method that explains how a policy, programme or intervention is expected to contribute to specific development change, using available evidence to analyse the causal linkages between the intended action and its desired outcomes. By designing impact measurement to include policyholders and beneficiaries throughout the impact assessment process, insurers can better understand climate risk and insurance needs and measure whether products are meeting these needs, bolstering sustainability outcomes and ensuring compliance.

A comprehensive theory of change helps stakeholders identify impact pathways, ensuring that products and outreach align with desired social and environmental outcomes. A theory of change can also provide clarity on the specific key performance indicators (KPIs) that need to be tracked to demonstrate impact. By defining a theory of change and monitoring KPIs, the value of parametric insurance can be shown, offering a feedback mechanism for continuous product and process improvements.

Box 2:

A theory of change for parametric insurance

By offering cost-effective, efficient risk transfer mechanisms and protection from climate events and natural hazards, **parametric insurance** offers an ex-ante solution that can reduce the financial burden of these events for a broad range of households and businesses, including the most vulnerable, at scale. This **leads to financial resilience** for governments, financial institutions, businesses and households and can unleash **productivity and investment**.

Defining KPIs to measure parametric policies' outputs and outcomes


Photo credits: UNDP Kyrgyz Republic

Effective programmes for parametric insurance require well-designed products, active stakeholders, transparent financial education, robust data and supportive regulatory environments. These components can be used in the definition of specific key performance indicators (KPIs), divided into measurable outputs and outcomes, to assess the impact on individuals and enterprises.

The KPIs for different programmes may vary based on the type of insurance, policyholders, contexts and objectives. Selecting indicators involves balancing precision with practicality and budget constraints. Data might be hard to collect and standardize across programmes. Intermediaries closest to the end policyholders may have heterogeneous systems and may not collect or warehouse data needed to track all the outputs and outcomes that can support the theory of change. For example, community-level financial institutions, including cooperatives and microfinance institutions, often manage data on loan disbursements to and payments from their policyholders, but may have limited or no systematized information about how loans are used to manage climate events. They are rarely able to access data that illustrate the extent to which climate events impact loan repayment.

Identifying standardized indicators that can help compare the real-life impact of financial investments across countries and programmes is a useful first step. For example, the IRIS+ system of Global Impact Investing Networks (GIIN) (see box 3), while not specific to parametric insurance, is widely used by investors and companies to measure the social, environmental and financial performance of programmes and investments.

Box 3:

Measuring impact with the IRIS+ system

The IRIS+ system developed by GIIN has made strides in standardizing a broad range of impact metrics, allowing for greater comparability across investments and countries. This comprehensive framework for measuring and managing impact includes suggested indicators that are widely recognized and used by ESG investors. The framework includes indicators that align with climate resilience, but has no specific indicators for parametric insurance, though some indicators could be adapted to parametric insurance and could be integrated into broader studies of insurance and climate resilience initiatives. IRIS+ also recognizes some challenges in capturing data, suggesting the use of a combination of administrative data and survey or customer research data.

See https://iris.thegiin.org/ for more details.

Table 4

Outputs and corresponding indicators

Output	Indicator type	Drought protection in Malawi (KPIs)	Earthquake protection in Mexico (KPIs)
Enhanced data systems	Development and maintenance of robust data systems to support accurate risk assessment	• Number of rainfall weather data collection points • Accuracy of rainfall data • Basis risk in year one, two and thereafter	Basis risk in year one, two and thereafter
Increased uptake of parametric insurance	Number of parametric insurance policies issued, indicating market penetration and accessibility	• Number of parametric insurance policies issued • Number of hectares covered with parametric insurance	• Number of parametric insurance policies issued • Insured amounts in the face of earthquake damages
Streamlined payout processes	Efficiency of payout processes, measured by the average time taken to disburse payouts after triggering events	Average number of days to disburse payouts after 30-day period of excessive drought	Average number of days to disburse payouts after earthquake trigger is hit
Enhanced preparedness	Increase in preparedness levels among policyholders due to proactive risk management practices	Number of farmers receiving training on climate adaptation techniques	• Number of emergency kits stocked in government buildings • Number of staff in government buildings receiving emergency training • Number of emergency drills • Number of participants in emergency drills

Table 5

Outcomes and corresponding indicators

Outcomes	Indicator type	Drought protection in Malawi (KPIs)	Earthquake protection in Mexico (KPIs)
Immediate risk management outcomes			
Reduced vulnerability	Reduction in financial shocks experienced by policyholders following adverse events	• Borrowing and savings balances of farmers as a percentage of monthly income before the drought • Borrowing and savings balances of farmers as a percentage of monthly income after the drought	Days of interruption by recipients of government services
Increased understanding of parametric Insurance	Improved understanding of parametric insurance mechanisms among stakeholders and policyholders	• Percentage of farmers who are aware they have insurance • Percentage of farmers who can name three main characteristics of the product (covered events, exclusions, where to claim)	• Percentage of policy renewals annually • Insured amounts by governments for earthquake protection
Enhanced preparedness	Increase in preparedness levels among policyholders due to proactive risk management practices	• Number of days before drought that farmers harvest crops to avoid losses • Number of farmers using climate adaptation methods (smart seeds, shade cropping, irrigation and others)	Government service workers' self-assessment of preparedness for earthquake
Social outcomes			
Reduced reliance on problematic financing mechanisms	Decrease in policyholders' use of high-interest loans or other challenging financing methods	• Number of farmers borrowing from high-interest loan providers (formal and informal) • Asset value before the drought • Asset value after the drought • Number of children in school before the drought • Number of children in school after the drought	• Government financing raised (in hard currency) to cover rebuilding public works damaged by the earthquake • Interest rate on government financing mechanisms
Increased resilience	Improvement in resilience for communities and businesses insured by parametric products	• Number of hectares planted by covered farmers before the drought • Number of hectares planted by covered farmers after drought	• Number of days required to reopen public buildings after the earthquake • Number of days of interruption of public service activity

Outcomes	Indicator type	Drought protection in Malawi (KPIs)	Earthquake protection in Mexico (KPIs)
Long-term economic outcomes			
Greater productivity	Increase in productivity metrics (e.g., yield, revenue) for businesses and farms covered by parametric insurance	• Yield on planted crops before and after drought • Revenues from crops before and after the drought • Investment in productive activities before and after the drought	Government budget allocation to rebuild public service buildings (in hard currency)
Improved investment climate	Enhancement in the investment climate, reflected by the amount of new investments attracted due to improved financial stability and risk management	• Amount of investment in agricultural enterprises (in hard currency) before and after the drought • Agricultural exports (in hard currency) in covered crops and related processed products before and after the drought	Mexico's sovereign rating
Supportive policy environment	Number of new or amended regulations supporting parametric insurance	• Government subsidies for smallholder farmers implemented • Regulation specific to parametric insurance implemented	Number of new or amended regulations supporting parametric insurance

Photo credits: UNDP Peru

Photo credits: UNDP South Sudan

8 ENCOURAGING A HOLISTIC APPROACH THROUGH PARAMETRIC POLICIES

For parametric insurance to reduce the protection gap and protect vulnerable communities, an appropriate ecosystem is needed. To build this ecosystem, all stakeholders, including governments, development partners, organizations, individuals and insurers, need to actively encourage education and establish suitable systems that can allow parametric insurance to thrive.

Governments

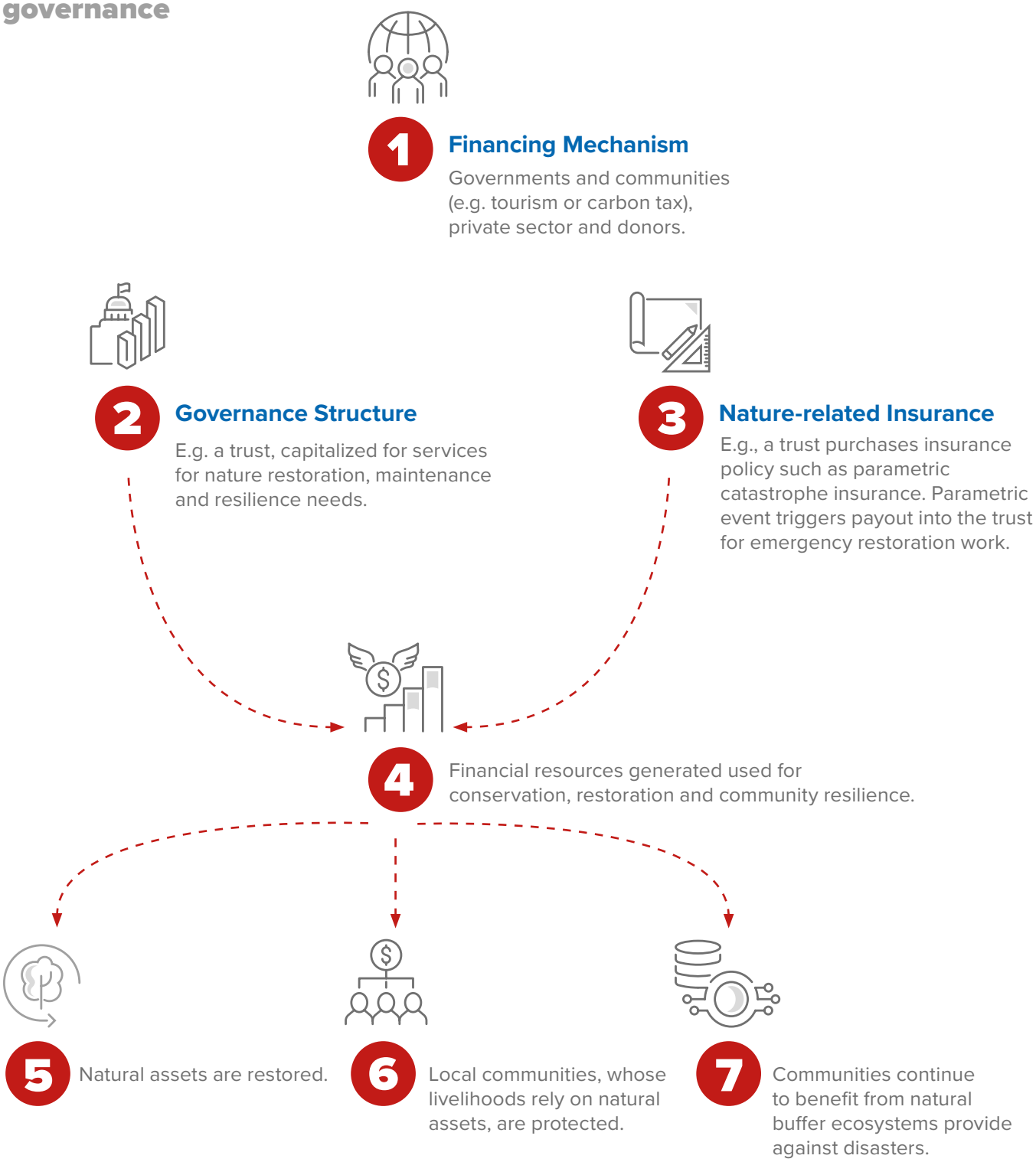
As of 2023, only 40 percent of natural catastrophe losses are covered by insurance, which means the remaining 60 percent must be shouldered by individuals, organizations and governments (Swiss Re Institute, 2024). Governments often bear the largest amount of these costs, including relief and recovery efforts as well as the reconstruction of public and even private infrastructure, where the private sector is underinsured (Swiss Re, 2023). Financial preparedness through insurance can reduce this burden and decrease volatility in state budgets, improving planning capacity and avoiding fiscal instability.

Given that parametric insurance may not align with traditional insurance models, governments can help by creating a supportive regulatory environment (UNDP, 2023). Transparent guidelines need to be established and trust in parametric insurance offerings needs to be built. This can facilitate increased insurance penetration, reducing potential uninsured losses by individuals and organizations and bringing down the cost for government in covering the gaps.

To develop and promote parametric insurance products, governments can establish public-private insurance programmes with private insurers. As shown in figure 7, these strategic alliances leverage the strengths of both sectors, combining governments' extensive reach and resources with private insurers' innovation and risk management expertise. Governments can support these partnerships in various ways, including by funding products and providing subsidies to projects that would otherwise not be viable (World Bank, 2024a). This can enable the most vulnerable to gain access to previously inaccessible insurance, helping to reduce the protection gap. Well-designed partnerships can address affordability issues or gaps in coverage for policyholders that are highly exposed to natural hazard risks and can encourage a unified, cooperative approach to managing these risks (G7 Finance Ministers and Central Bank Governors, 2024).

Figure 7

Example of multistakeholder governance



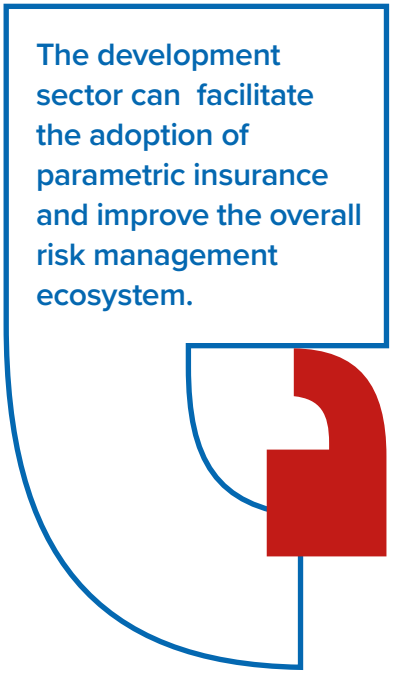
Another way in which governments can support parametric insurance is by investing in data infrastructure. This infrastructure may include weather stations, satellite systems and other cutting-edge technologies capable of delivering precise, real-time data on meteorological, geological and other natural events. This more localized and accurate data could allow effective hazard modelling in new, previously uninsurable regions, as well as making policies more affordable for policyholders by creating cheaper third-party data sources.

By taking these steps, governments can nurture the expansion of parametric insurance, allowing insurance to reach previously inaccessible communities and so strengthening resilience within their jurisdictions.

Development partners

Development partners, such as the United Nations and development finance institutions, can act as a bridge between governments and insurance sector by supporting the development of resilient systems. This includes supporting market functions and policies and regulations, enabling governments, businesses and communities to better understand and manage risks.

The development sector can facilitate the adoption of parametric insurance and improve the overall risk management ecosystem.

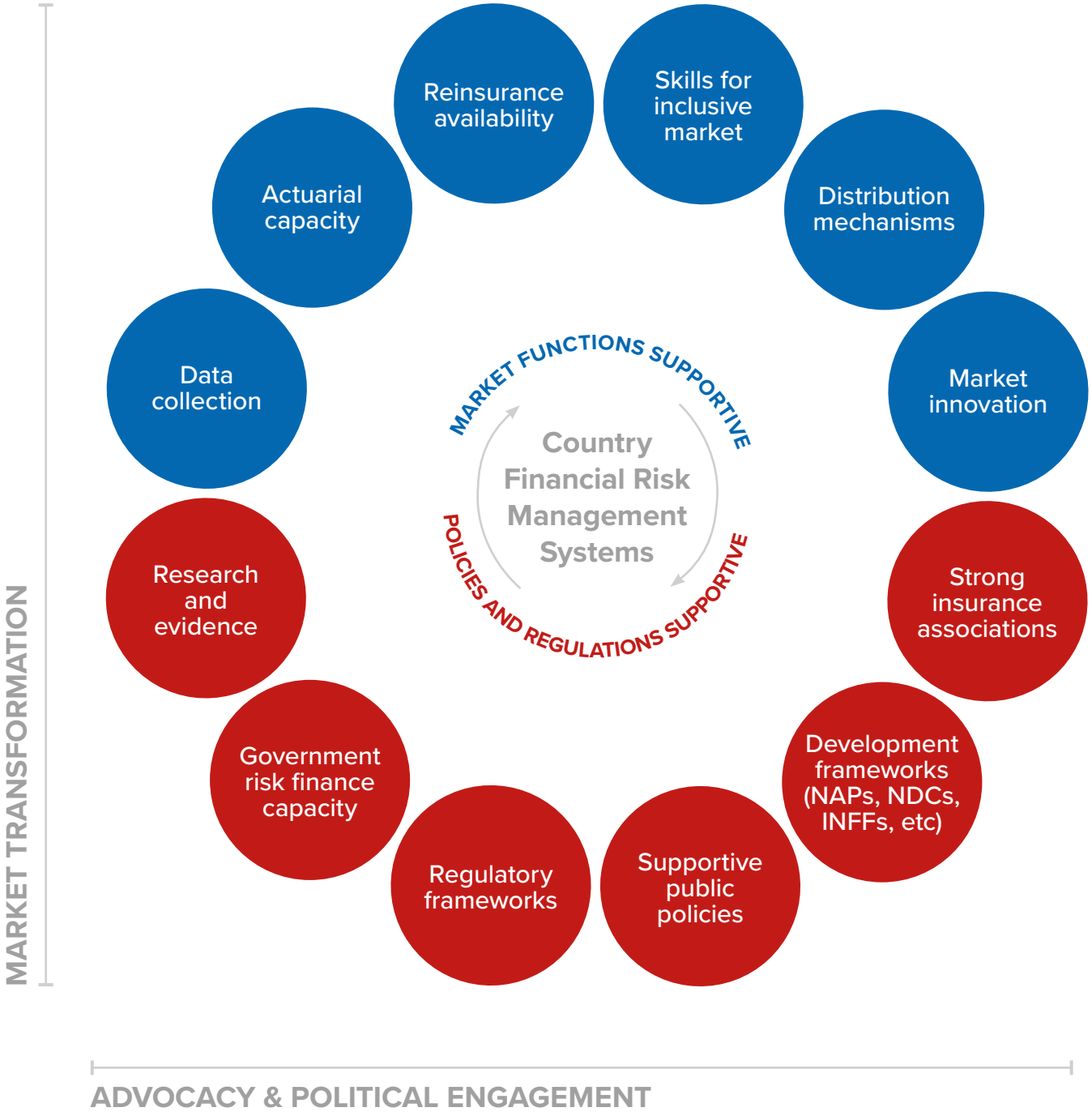


Parametric insurance can be an effective element of risk management solutions for governments, businesses and other stakeholders, but developing countries may lack the necessary capacity, regulation and policies to put these risk transfer mechanisms into place. By providing technical expertise to strengthen capacity, build a legal, regulatory and policy enabling environment, and integrate insurance and risk financing into development programming and policy, the development sector can be a key player in facilitating the adoption of parametric insurance and improving the overall insurance and risk management ecosystem.

One of the key advantages of parametric insurance is its ability to pay out a claim quickly once a trigger is hit. Development partners can support governments to develop effective payout management processes to ensure that when payouts are made, resources are effectively channelled where they need to go to ensure countries can build back better. Their contributions are essential in strengthening national frameworks, improving financial inclusion and ensuring long-term economic stability in developing countries.

Figure 8

The development sector's role in insurance market development



Policyholders

Policyholders, such as businesses and organizations, can play an important part in making parametric insurance successful, by helping to raise awareness, ensure products are tailored to specific needs and drive market growth.

Education is the first step in integrating parametric insurance within an organization. Stakeholders need to understand the unique benefits of parametric insurance, how it differs from traditional insurance, and its effectiveness in risk management. This foundational understanding can ensure the product is accepted and integrated within the organization.

Proactive risk management, which involves identifying potential risks and developing strategies to mitigate them beyond traditional methods, can also help companies make use of parametric insurance and promote its use elsewhere. By proactively preparing to manage risk, the organization highlights the benefits of parametric insurance and prepares for potential risk scenarios, demonstrating the value of parametric insurance in managing those risks.

Close collaboration with insurers is essential in deploying and promoting parametric insurance. Insurers' expertise in the use cases of parametric insurance can help design a product tailored to an organization's specific needs. This ensures that the insurance product is fit for purpose and responsive to the organization's risk profile.

Through their active engagement with parametric insurance products, businesses and organizations can ensure that parametric insurance effectively enhances resilience and supports sustainable development.

Insurers

As the parametric insurance industry continues to grow, carriers need to offer products that effectively enhance policyholder resilience while also supporting sustainable development and reducing the protection gap. To achieve this, insurers should fulfil four key criteria.

First, the insurance protection should cover a risk associated with one of the 17 SDGs. By doing so, insurers can ensure that the products they sell contribute to driving a sustainable future. Given that parametric policies often cover climate-related events, they naturally align with SDGs. However, parametric insurance has the potential to impact many different SDGs, so efforts should be made to align with multiple SDGs where possible.

Sustainable development through the parametric industry requires collaboration between insurers, governments, development partners and policyholders.

Secondly, the insurance solution must incorporate a tangible element of risk transfer, so that protection is effective when it is needed. Natural catastrophe events are volatile, and typically characterized by low frequency and high severity, so the effectiveness of risk transfer should not be assessed based solely on losses incurred during the period of cover. Instead, a modelled approach is necessary to represent the long-term expected behaviour of the losses and, therefore, the expected element of risk transfer. This approach should be continuously monitored to ensure that policyholders receive an effective solution commensurate with the premium paid. Insurers are responsible for defining the technical implementation details and rigorously evaluating the risk transfer to ensure its effectiveness.

Thirdly, parametric policies should have the potential to scale up. This scalability is determined by the technology used to monitor the triggering of losses, which should ensure it does not rely on an insurance infrastructure that cannot be easily replicated. Scalable solutions can be expanded to cover larger populations or additional regions, enhancing the overall resilience of communities.

Finally, to maintain parametric insurance's positive effect on resilience, one component is especially important: the policies must offer a quick payment of funds following predefined events. Quick payouts are crucial for affected communities, enabling faster recovery and reducing the long-term socioeconomic impacts of natural hazards.

Insurers alone cannot promote sustainable development through the parametric industry without the support and collaboration of governments, development partners and policyholders. But by adhering to these four criteria, carriers can ensure that as the market grows and the right conditions are met, the products they offer contribute to building a more resilient and sustainable future. This approach not only benefits those insured but also supports broader societal and environmental goals, aligning with the principles of sustainable development.

Quick payouts are crucial for affected communities, enabling faster recovery and reducing the long-term socioeconomic impacts of natural hazards.

Conclusion

Parametric insurance offers a transformative approach to risk management, shifting the focus from reactive to proactive measures. This efficient risk transfer mechanism enables large-scale protection against natural hazards and climate events.

As parametric insurance has evolved and matured, its impact has expanded beyond just agriculture to other sectors, and it can now be deployed across a wide range of circumstances, either stand-alone or in a hybrid solution with traditional indemnity insurance, to provide an enhanced and tailored risk management solution for governments, communities and businesses around the world. This paper has demonstrated its effective use in case studies that span four continents.

To support the growth of parametric insurance and protect vulnerable communities, establishing the right ecosystem is essential. This will require active participation from governments, development partners, policyholders and insurers.
Supported by development partners, governments can create supportive regulations and incentives, while policyholders can engage in proactive risk management and collaborate with insurers to tailor products to specific needs. Insurers must design innovative parametric products that address unique risks. By working together, all these stakeholders can make parametric insurance more effective, mitigate disaster impacts, reduce the protection gap and contribute to community resilience and sustainability.

So far, there have been limited systematic efforts to measure the impacts of parametric insurance towards achieving greater sustainability. However, a well-articulated theory of change, supported by a comprehensive collection of KPIs on outputs and outcomes and stakeholder engagement, can demonstrate the benefits of parametric insurance, guiding policy and fostering widespread adoption. As the industry matures, efforts to further match parametric insurance impact measurement to sustainability compliance requirements will likely increase, and initiatives such as the framework in the paper can offer suggested indicators that mesh with other impact investment metrics.

The aim of this paper is to clarify parametric insurance and make it more accessible for governments, businesses and communities interested in better understanding how this tool can form part of a broader risk management strategy.

This comprehensive guide hopes to empower potential policyholders, such as governments and organizations, giving them the confidence to explore the benefits of parametric insurance to build resilience, while also fairly presenting the limitations and risks of parametric insurance. When aligned with the SDGs, parametric insurance can lead to a more secure and resilient future for all. Understanding its advantages and applications is the first step towards building that future.

Photo credits: UNDP Sri Lanka

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Glossary

Basis risk
The potential discrepancy between the compensation provided by parametric insurance and the actual loss suffered by the insured. This can occur in two situations: adverse basis risk and favourable basis risk.

Claims adjuster
A person who investigates insurance claims to determine the extent of the insuring company's liability.

Declaration of loss statement
A formal statement made by the policyholder to the insurance company regarding a loss. The statement is used to determine the value of the loss and the amount of the claim.

Deductibles
The amount a policyholder must pay out-of-pocket for expenses before the insurance company will cover the remaining costs.

Exposure
The financial amount of a risk covered by an insurer.

Heterogeneous systems
Diverse systems that vary in structure, function and data management practices, often using different technologies and standards.

Insurance penetration
The ratio of total insurance premiums to GDP in a given year. A useful indicator of the level of development of the insurance sector in a country.

Moral hazard
The risk that a party may act recklessly or dishonestly because they are protected from consequences, or with the aim of profiting from insurance.

Payout structure
The method by which an insurance policy will disburse funds to the insured party.

Peak Ground Acceleration (PGA)
A measure of earthquake acceleration on the ground and an important input parameter for earthquake engineering; also considered a good indicator of the potential for damage.

Protection gap
The difference between insured and uninsured losses. This gap impacts developed and developing nations in distinct ways.

Risk pool
A group of individuals or entities that come together to share a common risk, often through an insurance policy.

Risk profile
A description of the types of risks an individual or organization is willing to take. It can include both the types of risks as well the amount of risk with which they are comfortable.

Risk transfer
A risk management technique where risk is transferred to another party, often by contract.

Structure
The design or arrangement of an insurance policy, including its coverages, exclusions, limits and deductibles.

Theory of change
A comprehensive framework based on a set of assumptions that outlines how and why a desired change is expected to happen in a particular context, often used to design and evaluate social and environmental impact initiatives.

Trigger
In insurance, a trigger is the event or condition that must occur for a policy to pay a claim. In traditional insurance, this is usually physical damage to an asset or an actual loss. In parametric insurance, it is the occurrence of an event, based on information provided by a third-party data provider.

Uninsured losses
Losses that are not covered by an insurance policy. These can be catastrophic, particularly for vulnerable communities lacking economic stability.

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