

The background of the slide is a satellite map of the Arctic region, showing landmasses in brown and oceans in blue. A small yellow dot is positioned in the center of the letter 'C' in the word 'DESCARTES'.

DESCARTES

Parametric Insurance

Understanding Global Weather Perils
and Wildfire Risk – Lynn Roehrig

October 2025

Natural catastrophes & extreme weather impacting Australia

\$4.5bn annual insurance losses by natural perils over the past few years

Tropical Cyclone

- Wide exposure from the Pacific Islands to Western Australia.
- Festive season storms in 2023 caused AUD 1bn insured losses.

41%
of TC Jasper's
commercial claims
arose from corporate
property

Earthquake

- Major RI pool in place for NZL due to high risk.
- 2016 Kaikōura EQ alone with an insured loss of NZ\$2.27bn.

1,600
commercial
buildings marked to
be demolished after
Christchurch EQ

Flood

- Almost doubling of insured flood losses over past 5 years.
- Around 1.2 million properties face some level of flood risk.

AUD 6.37
billion in industry
loss caused by the
Eastern Australian
floods

Fire risk

- Major relevancy to forestry & agriculture in Australia
- Severe capacity constraints surging parametric demand

445,000
Australian homes
predicted to be
uninsurable within
thirty years.

Global Growing Threat of Wildfires



Wildfires are rampant and devastating, impacting regions worldwide.



Concerns over climate change and extreme temperatures

- Heightened threat to the forestry and Agriculture industry
- High fire-prone regions now more difficult to insure.



Fire triangle out of oxygen, heat, and fuel.

- **Fires need at least a 16% oxygen concentration** to sustain combustion, with air around us usually at 21%.
- **Heat is essential for both ignition and sustaining a fire**, e.g. lighting strikes, T&D lines, or just sun.
- **Fuel includes any combustible material**, such as dry brush, trees, grass, debris, buildings and other infrastructure.



Human-Induced vs. Natural Causes

- Human negligence or activity causes the most fires.
- Natural causes are influenced by local climate, vegetation, and geography, with lightning strikes as most common trigger.

**6bn
USD**
economic
losses in
2024

**36bn
USD**
insured
losses in
Q1/2025

Factors influencing wild- & bushfires in Australia



Wildfires
all-year
across
regions

**Climatic
drivers**
like El Niño
& Indian
Ocean
Dipole



Seasonality has a large influence on the ignition & spread of bushfires

- **Temperature:** Warmer months lead to dry vegetation, creating ideal ignition conditions, especially during heatwaves.
- **Humidity:** Low humidity levels (common in summer/droughts) dry out plants and soils, making them highly flammable and contributing to extreme fire behavior.
- **Precipitation:** Lack of rain, especially after wet growing seasons, turns lush vegetation into wildfire hazards as it dries out.
- The interplay of high temperatures, low humidity, and limited rainfall creates conditions for **rapid wildfire escalation**.



Wind drastically increases wildfire spread and intensity.

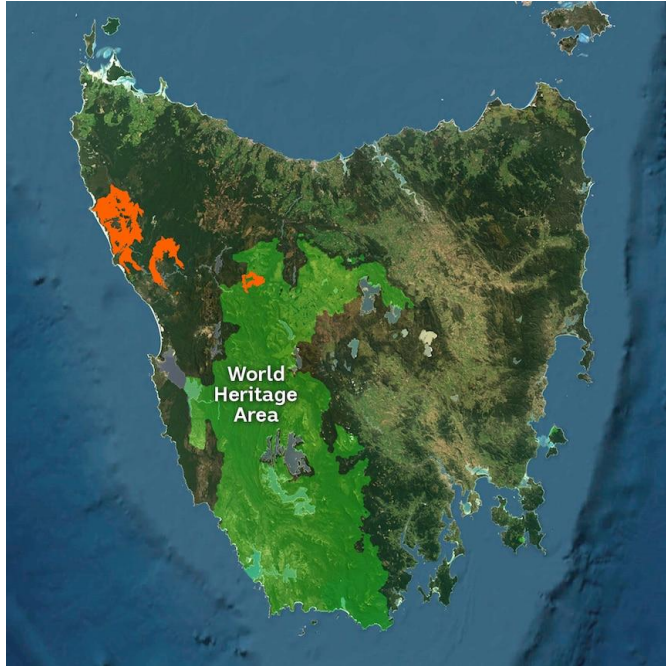
- **Carries embers over long distances**, igniting new spot fires.
- **Supplies fresh oxygen to the fire**, accelerating combustion.
- Often determines if a small flare-up **becomes a massive inferno**, particularly in human-caused fires.



Global warming leading to higher temperatures and longer droughts.

- **Hot air** removes moisture from soil & vegetation, reducing ignition barrier.
- **Seasonal rain patterns** affected, longer dry seasons for plants and soil.
- **Hydroclimatic volatility** to intensify significantly (very dry to very wet)

Forestries & other sectors affected by fires



Nearly 95,000 hectares of wilderness in Tasmania's west lost to bushfires in 2025

- **Wildfires have caused huge losses** in some regions in recent years, such as North America, Latin America, Oceania, Southern Europe
- **Wildfire losses have impacted various trade sectors**, including forestry in direct and an indirect manner, but have also caused indirect losses to environment and public health



Record global fire loss year for forests in 2024



Black Summer bushfire season cost farmers up to \$5 billion



Sibanye halted operations of Century zinc mine In November '24



Costs for power suppliers (required cost passes e.g. Endeavour)



2019-20 Black Summer bushfires cost Australia \$2.8 BN in tourism.

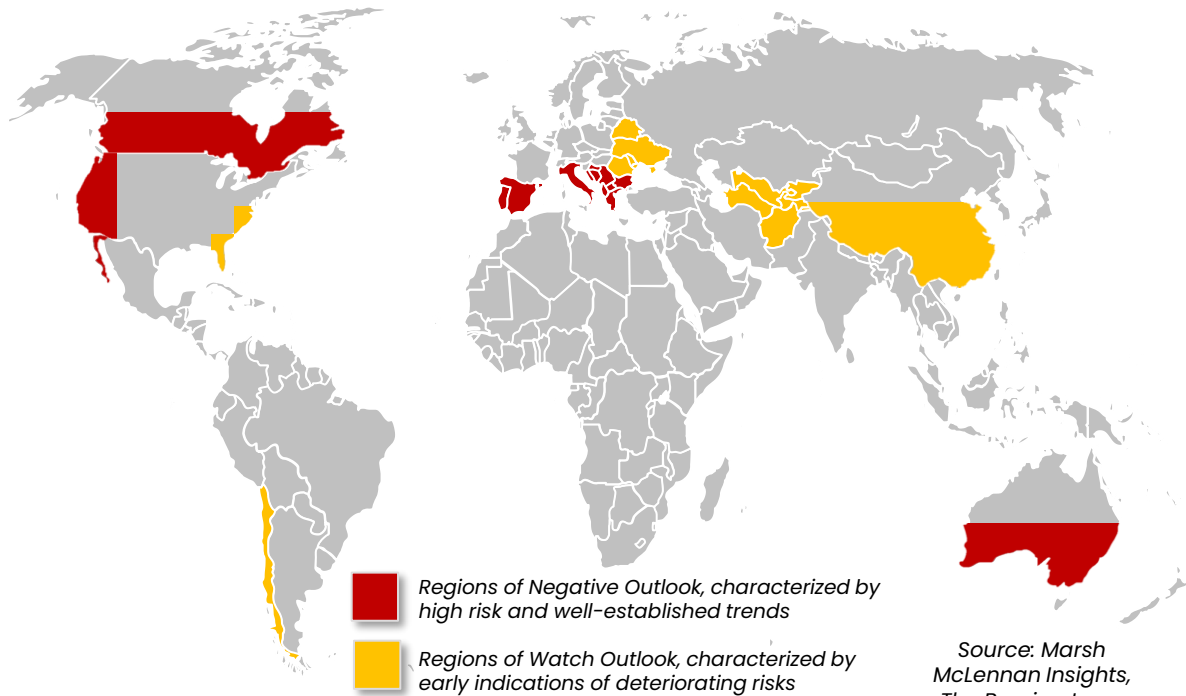


Extra expenses on firefighting & massive building losses



RESULTING CHALLENGES TO OBTAIN INSURANCE

- **Huge losses in specific regions** render **wildfire risks** tougher to insure
- **Climate change** intensifying perils and losses for the foreseeable future
- Deep, long-lasting **capacity constraints** in the insurance market, mostly in highly exposed wildfire regions
- Every year, **continuous pricing pressure** on brokers and clients for the renewals
- **Limited functionality** of traditional products to insure wildfires (e.g. financial uncertainty, lowered transparency, risk appetite does not match needs)



Source: Marsh
McLennan Insights,
The Burning Issue
(2019)

High need for alternatives to provide high insurance capacity, alleviate pricing pressure & introduce data-driven sustainable innovative financial instruments.

Market uptake in exposed wildfire regions

The market uptake for parametric insurance has been favored by **clients facing issues with their traditional insurance or having no insurance at all**

Retreat of market players caused
shortfall in capacity



Intransparency and claim process issues



Lack of budget and non-insurance
practices



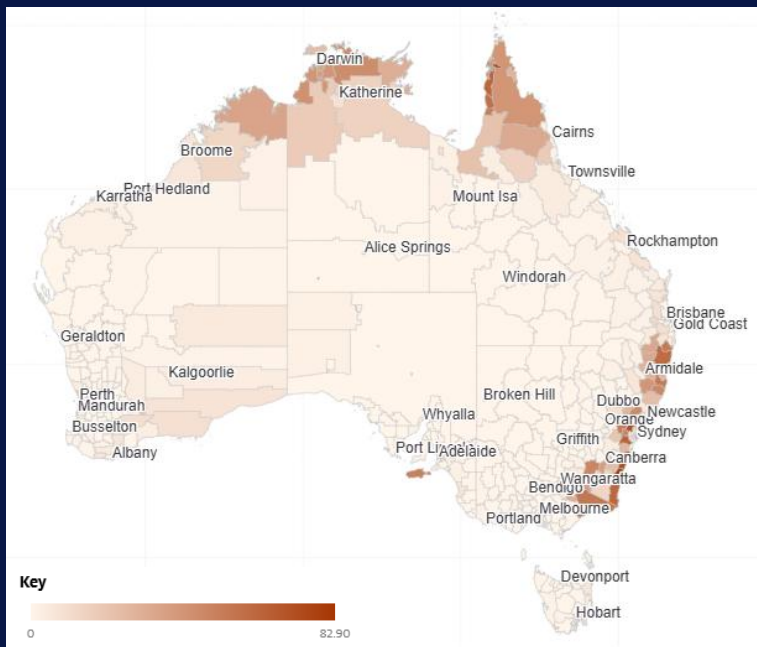
Parametric insurance continues to **solve issues in key geographies** by providing **high insurance capacity**, pushing **objective claim settlement** processes and **tailoring the cover to each client's budget**

...with further motivation to insure assets in Europe, Asia, and Africa

Parametric to relieve fire risks in Australia for client's efficiently

Bushfires 2019–2020 in Australia

Around A\$1.8billion claims from households & businesses affected by 2019–2020 fire season



Source: Guardian Australia analysis of data from the ABS, federal government, state health departments, Insurance Council of Australia

Source: Loss estimate by Perils

Underinsurance across the fire risk in Australia

Black Saturday Victorian Fires as an extreme example

- 80% of insured people affected by it were underinsured
- Class action lawsuits filed against an electricity distribution companies & other parties

445,000 Australian homes predicted to be uninsurable within thirty years.

Forestry insurability issues indicating the trend of P&C

- Wildfire exclusions and higher deductibles
- No insurance pool for forestry's wildfire risk
- 400% increase following fire events, incl. tighter T&C

International reinsurance market highly interconnected

- US\$20–30bn in insured losses in California Wildfires
- Reinsurance knock-on effects for AUS fire capacity

Space technologies & machine learning to model & track wildfires

New technologies help to model wildfire risks

Historical approaches fail to predict future wildfire risks

- Historical models fail to factor in climate change
- Traditional approaches doesn't account for the evolution of physical factors of land-use change

New generation machine learning models consider far more than 50 parameters to assess wildfire risks



Climatic parameters



Topographic parameters



Human parameters



Natural parameters



Original



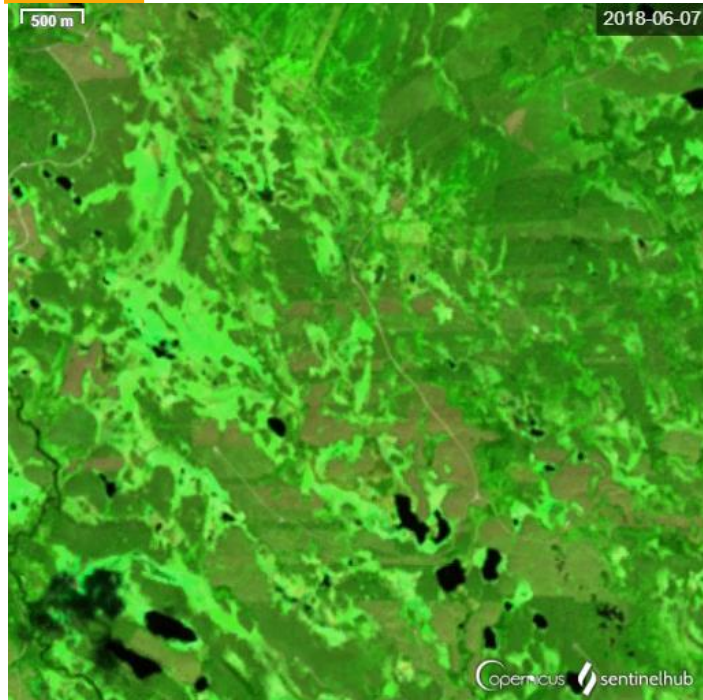
Carved-out area



Area at risk

Example of the land-classification algorithm on detection of grasslands to exclude from plantation

Detection of burnt areas with high accuracy



Satellite images obtained using different spectral bands before and after a wildfire in Sweden from June to July

Descartes & its partners utilize high-resolution daily satellite imagery to monitor vast landscapes

- **Continuous monitoring** of client's plantations throughout the risk period
- **Loss detection** powered by satellite imagery with various satellites, such as Sentinel, MODIS, Landsat, etc.
- **Identification of burnt area** and fire severity on client's plantations and surrounding area
- **Accumulation of burnt area and rapid indemnification** for losses incurred

What is Parametric Insurance?

- **Parametric Insurance (index-based insurance)** refers to contracts that pay out a pre-agreed indemnity when a pre-defined event occurs at or beyond pre-defined parameters.
- The 'parameters' here work as the **objective indicators of the extent of natural disasters** and criteria for the coverage clients can demand. For example, measurable pre-agreed events based on Peak Ground Acceleration (PGA) for earthquakes, water level for floods, and wind speed for typhoons / cyclones can be parameters.
- Generally, these perils are also exposed to a **higher level of variability** brought on by effects and of climate change, economic inflation and higher urbanization.
- Globally, parametric risk transfer products are increasingly being used by businesses as **complementary coverage, or replacements for the catastrophe and weather** exposed components of Property and other Insurance programs.

Descartes was born out of the conviction that climate change calls for a revolutionary approach to insurance.

Introducing our Wildfire Burnt Area Solution

Exposed assets of forest investors & carbon credit issuers protected by satellite-based wildfire insurance

Product Features



Burnt Area

Losses caused by wildfire, detected via burnt area by satellite imagery, no matter the number of fires/events over the risk period



Index

Burnt area detected at the insured location(s)



Loss Calculation

Based on wildfire occurrence, each location assessed for burnt area, subject to aggregate

Product Advantages

- ✓ Fully customized solution to forest assets
- ✓ Scalable without on-site visit required
- ✓ Flexible structuring to meet budget
- ✓ Valuable & highly in-demand capacity



Coverage Example

Client seeks to cover their forest areas based upon the shapefiles shared, this may be one or hundreds of forests.

- **Insured area:** 10,000 ha
- **Value per ha:** 1,000 NZD

Payout in case of a wildfire :

- **Burnt area:** 2,000 ha
- **Indemnity:** 2,000 ha x 1,000 NZD per ha = 2m NZD

Index & payout tailored to client and depend on purpose of the cover

Parametric Insurance in Action

Case Study | Burnt area solution for a forestry investor

POLICY OVERVIEW

Aggregate Limit & Location Limits
\$50M

Risk Period
1 year

Location
Shapefiles at insured location(s) depicting the forest plantations

Index
Wildfire occurrence detected via burnt area, with incurred losses based upon valuation and portion of affected area, subject to the limit of liability.

Payout Structure
Burnt area detected within the insured location(s)

- **Insured area:** 10,000 ha
- **Value per ha:** 1,000 AUD

Payout in case of a wildfire :

- **Burnt area:** 2,000 ha
- **Indemnity:** 2,000 ha x 1,000 AUD per ha = 2m AUD

Index & payout tailored to client and depend on purpose of the cover

RESULT

A timber investor has several large plantations exposed to wildfire in Australia, facing severe issues in obtaining insurance capacity and threatening its investments.

A **parametric wildfire product** would secure their forest plantations and carbon credit inventory against all forms of physical & financial loss resulting from a triggering wildfire.



Parametric Insurance in Action

Case Study | Fire-in-a-Circle cover for a hospitality client

POLICY OVERVIEW

Aggregate Limit & Location Limits

\$30M

Risk Period

1 year

Location

Defined circle around the long. & lat. coordinates of insured location

Index

Wildfire occurrence detected by burnt area entering the coverage location, with payouts becoming available up to 100% of the incurred damages, subject to the aggregate limit.

Payout Structure

Burnt area detected within the insured location(s)

Wildfire Event	< 100 m	> 100 m
Burnt area detected	Up to 100% of location limit	-

Example

In the insured location, there might be 25% of burnt area detected.

The client would be eligible to 100% of the limit, subject to its physical losses.

RESULT

High value properties exposed to bushfire face substantial issues in obtaining the required insurance capacity to indemnify potential damages but also continuously support their mortgage loan.

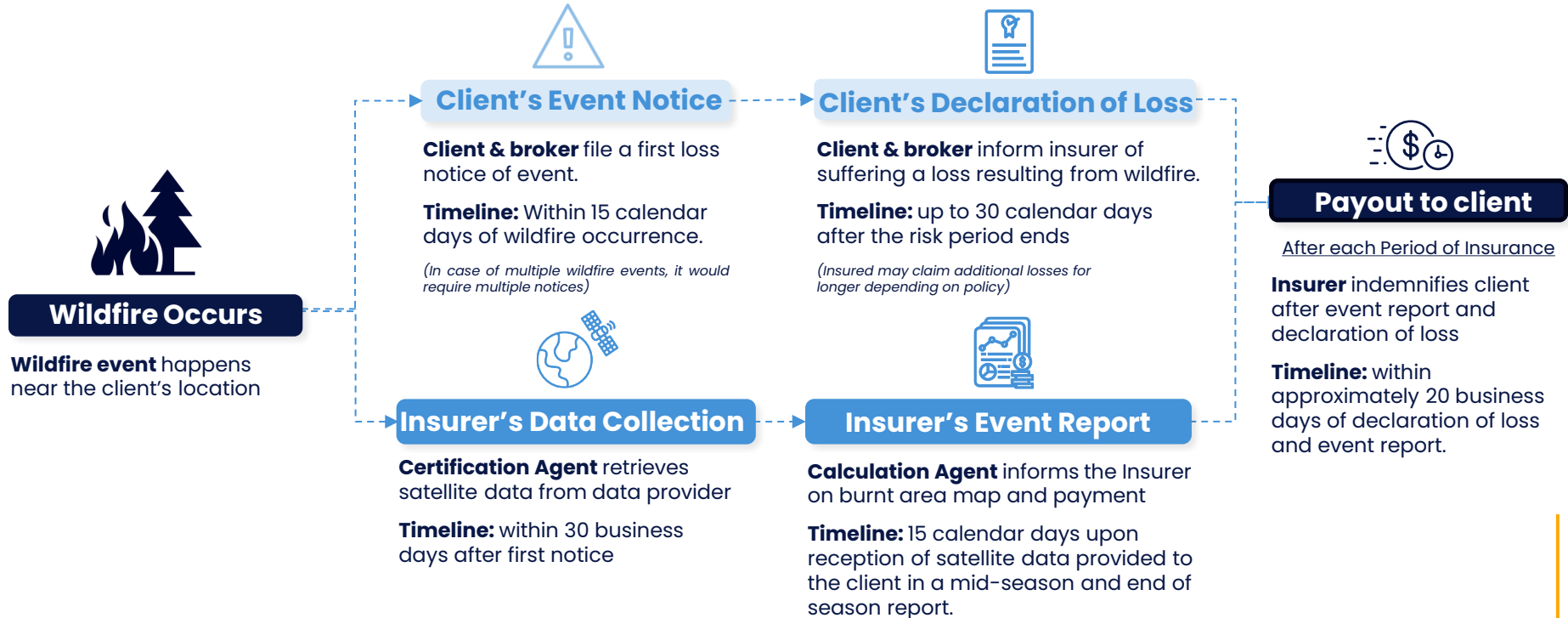
The policy covers two assets of the hospitality client. Each defined by a 100 m radius. In case of a bushfire, the client would receive a **payout up to 100% of the respective location limit**, i.e. 30MN AUD.



What happens in the event of a wildfire?

Parametric Claims Process for property sides

Example of parametric claims process: **a few transparent weeks for a parametric payout empowered by earth observation** vs. months of uncertainty in traditional insurance, complicated by wordings & deductibles



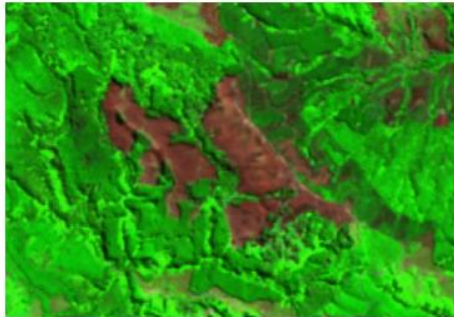
Disclaimer: each policy is bespoke, hence they may differ from this timeline. Please refer to insurance policy.

Better detection of burnt area leads to better payouts for clients

- Various **raw indices available from reanalysis dataset** that are derived from satellite imagery to detect burnt area
- These indices are nowhere near perfect, hence Descartes' proprietary **"second-order" index to minimize basis risk.**

Example comparison of two proxy indices

... at AUD 10,000 insured value per hectare, this client would miss 1MN AUD in claim.



Actual fire event in Feb 2020 seen on Sentinel-2 imagery (SWIR)



Burned Areas detected using raw % threshold on dNBR
113 Ha burned



Burned Areas detected using Descartes Index
219 Ha burned

CLIENTS' BENEFITS & MOTIVATIONS TO GO PARAMETRIC



Enhanced financial certainty and lower costs

- **No exclusion of smaller** wildfires or bushfires
- **Swift payment** of claims
- **Whole season is covered**
- **Limited claims** handling costs



Higher transparency & objective claim settlement

- Value of each hectare **pre-agreed**
- Optional recovery tables / salvage rates **pre-defined**
- **Independent third-party certification**
- **Modelled As-if payouts** shared with the client upfront



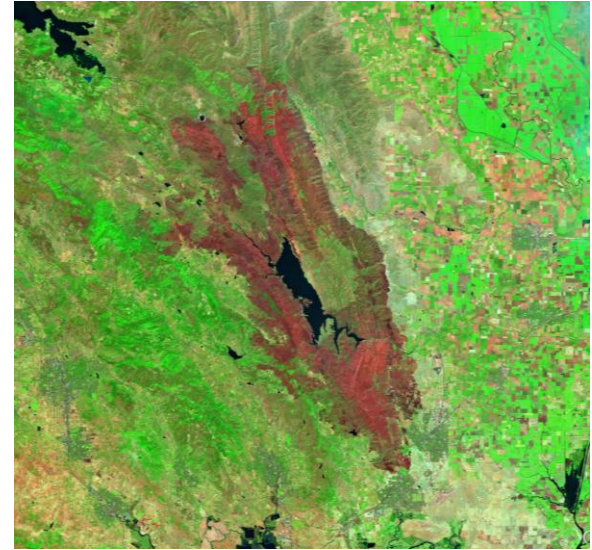
Tailor-made insurance covers

- Limit and deductible **flexible**
- Possibility to **cover entire portfolios** across different countries
- **Multiple options** to be quoted & discussed
- **Full flexibility on valuation of trees and assets**
- **Suitable to cover carbon credits**

GET A QUOTE & FOLLOW THE CLAIM PROCESS EASY

To provide you with a quote, we would require:

- **Shapefile** (.shp, .kmz, .kml file) / exact location of the assets
- **Historical events and losses**
- **Current or future values**
 - For Forestry: tree value per hectare, optional salvage values
 - For carbon assets: tree value and carbon offset
- **Required limit and approximate deductible** envisioned
- **Budget span** for the net premium
- **Fire management** tools and processes, information on how the risk is managed



Descartes: Data-Driven Managing General Agency

Global leader in parametric insurance, building resilience for corporates and public entities in a world at risk.

We provide tailored and cost-effective solutions for each client's unique risk profile and budget.



Up to \$110MN capacity written on A Paper with leading (re)insurers



Largest insurance team of 150+ FTEs for data science, risk models & software engineering



AI-enhanced risk modelling & data-driven structuring



Global footprint collaborating with 200+ broker partners

20+ perils covered

From climate to cyber risks for any asset

\$10 billion in capacity

Deployed since our foundation in 2019

19 global offices

Across 10 countries

Trusted by more than
500+ corporates & public entities

\$200M+ GWP

Successfully underwritten in 2024

230+ employees

Across the world

Get in touch with us!



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All parametric cover carries the risk that the trigger index may not be perfectly correlated with the underlying risk exposure, with the result that the insured may suffer a loss without the parametric insurance being triggered.

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