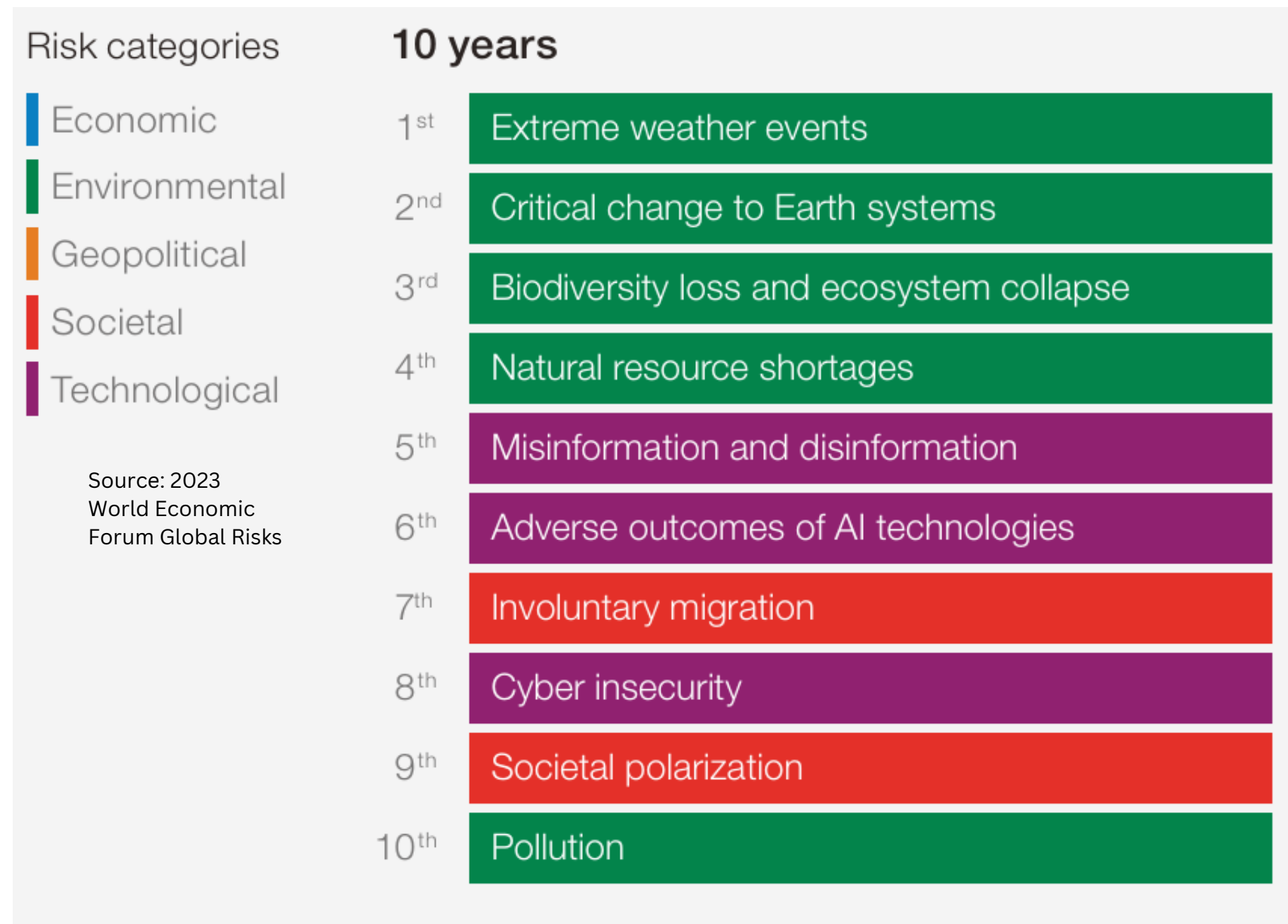


Parametric Insurance India Perspective

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Global Climate Risk



Agro-climatic risks are consistently perceived as the most critical risks requiring mitigation through insurance but are significantly underserved in India.

NATCAT Protection GAP

12% of India's total land area
perennially **flood-prone**

10% of Global **Tropical Cyclones**
affect India

68% of India's total land area
drought-prone

15% of India's total land area
perennially **landslides/GLOFs**

\$12 B
ANNUAL LOSS

According to a report by Swiss Re, India experienced economic losses totaling \$12 billion (approximately ₹1 lakh crore) due to natural catastrophes in 2023. This figure surpasses the previous 10-year (2013–2022) average of \$8 billion.



\$ 8 B Market
GAP as of date
expected to
grow at 15% p.a

Parametric Insurance

Parametric insurance is a type of insurance that is designed to protect against specific risks associated with an index or a predefined set of parameters rather than an individual policyholder's experience of losses. It provides coverage against the deviation(s) of a particular index or combination of indices from the predefined threshold or trigger value(s) indicating the likely losses incurred by the policyholder. The main building blocks of index insurance are:

1 Data

The threshold/trigger value and the losses are determined using independent and verifiable data from recognised sources

Example

- Rainfall data related to flooding
- High temperature related to heat-wave
- Solar Irradiation data related to solar energy

2 Trigger

Based on the nature of the underlying, a trigger is set. Actual index during risk period crossing the trigger results in loss.

Example

- 1-day Rainfall over 25mm
- 3-day average maximum temperature over 45°C
- Peak Sunshine Hours less than 3 hrs

3 Payout

Extent of loss is ascertained based on deviation from the trigger. Generally, higher the deviation, higher the loss

Example

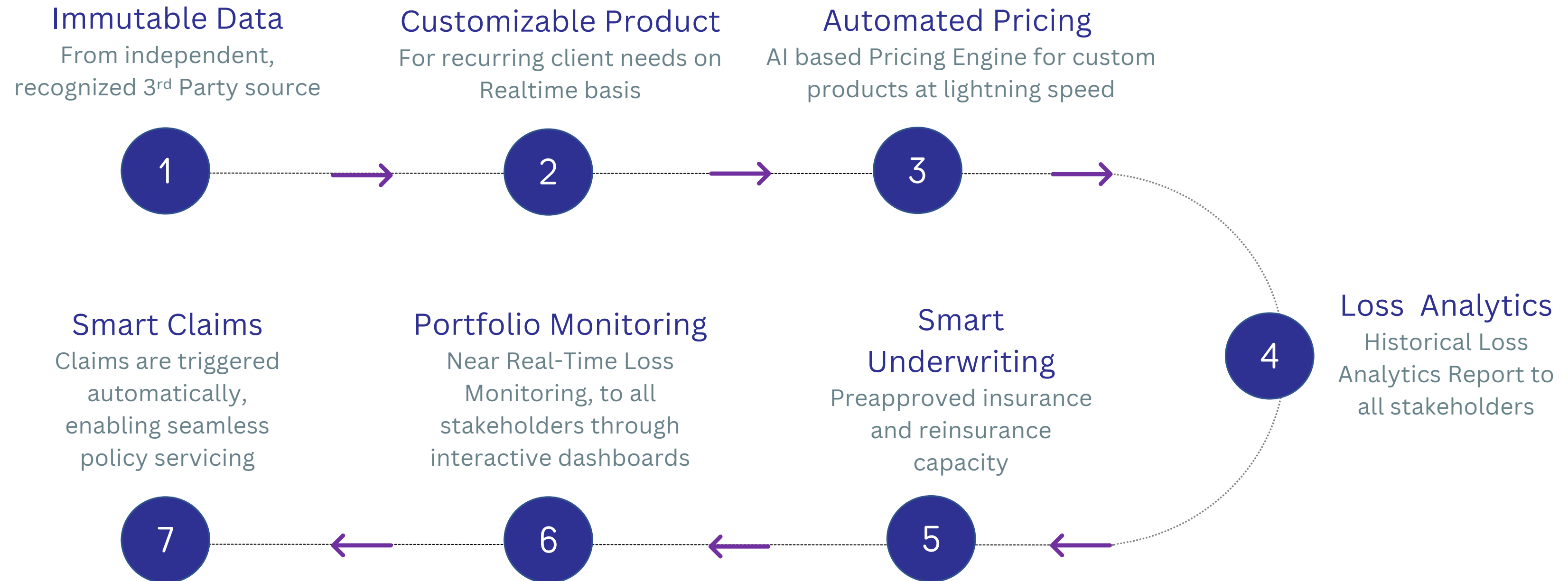
- > 25mm: ₹500; > 40mm: ₹1,000; >50mm : ₹2,000
- >45°C: ₹250; >46°C: ₹500; >47°C: ₹1,000
- PSH<3; ₹1,000 per day

Why Parametric Insurance

The parametric insurance market has been experiencing significant growth. Globally, parametric insurance is expected to **grow 3x faster** than traditional insurance lines till at least 2034.

- 1 Easy to understand**
No-frills attached product structure
- 2 Quick and transparent claim settlement**
Quick cash is key to recovery
- 3 Highly customizable solution**
Pay only for what you need
- 4 Peek into the past**
Backtest shows exactly how the product would have operated historically
- 5 Insuring invisible losses**
Non-damage business interruption, non-financial economic losses, exclusions/sub-limits

Process Flow

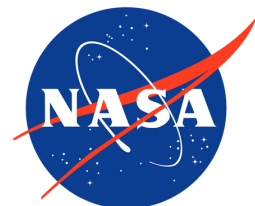


Immutable Data

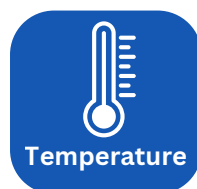


Over 100 years of historical data are available through various recognised global sources

Data from these sources need to be further stored in a decentralized system accessible to all parties, ensuring transparency and access.

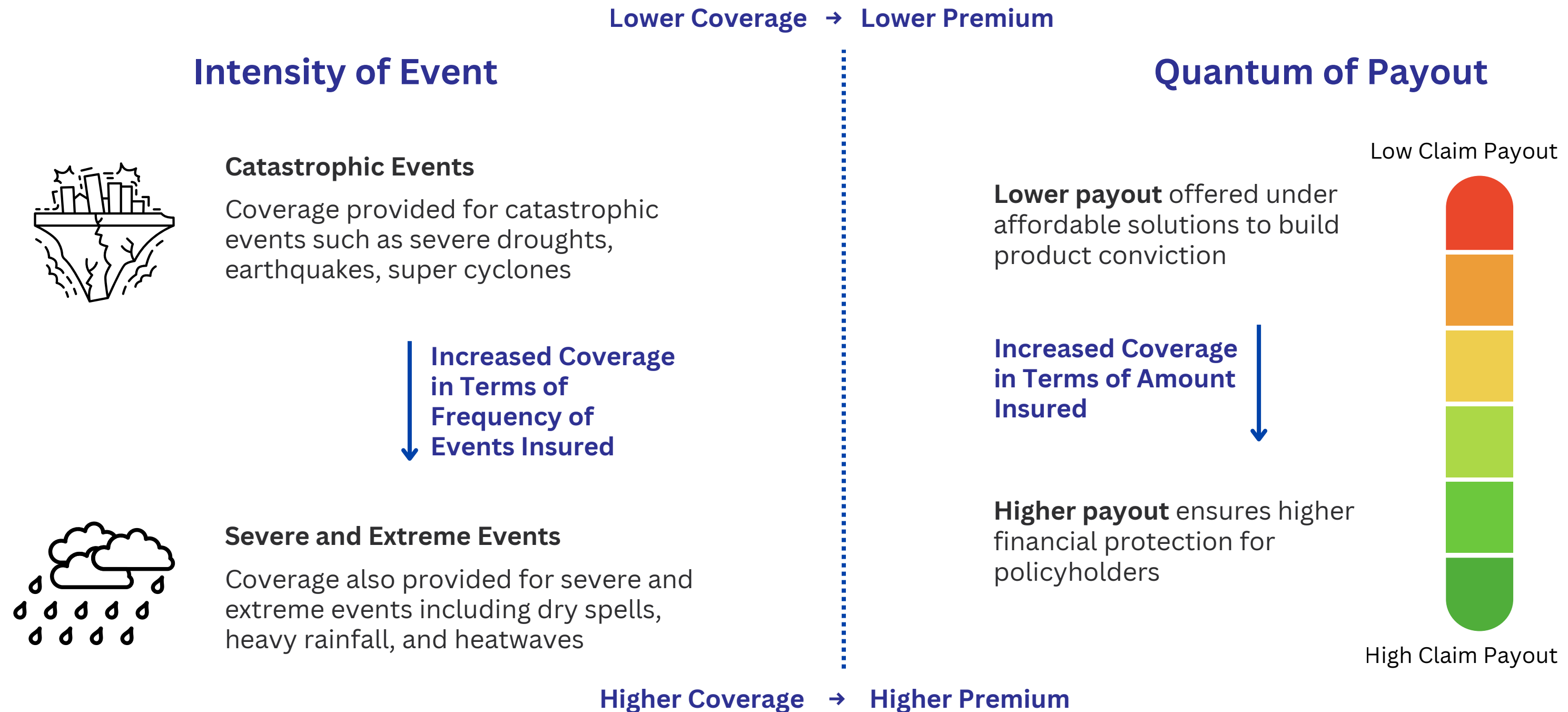


Climate
Hazards
Center
UC SANTA BARBARA



Customized Product - India Perspective

Flexible Product Options for Bespoke Risk Coverage



Parametric Insurance
India Perspective

Pricing Models

Data Modelling



- Data Download
- Spatial / Temporal Normalisation
- Outlier Adjustment
- Data Aggregation

Parametric Insurance
India Perspective



Immutable ?

Data Models

1. Hybrid Cloud
2. Preprocessing Data

Spatial Data Processing

1. GIS Exercise
2. Temporal and Spatial Resolutions
3. Bands of Data
4. Data in Petabytes

Pricing Models

Product Design



○ Cover Definitions

○ Temporal/Peril
Risk Allocation

○ Payout and
Trigger Definitions

○ Sub-limits &
Deductibles

Q

AI ?

Risk Allocation

1. Between Perils
2. Across Policy Periods

Cover Definitions

1. Subject Matter Expertise
2. Basis Risk
3. Data Accuracy (Historical vs Current)
4. **Composite Model**

Pricing Models

Distribution Fitting

Quantile Fitting

- Time Weighted Sampling
- Piecewise Distribution
- Monte-carlo Simulation
- Empirical Cumulative Distribution

Parametric Insurance
India Perspective

Q

Clustering ML ?

Piecewise Distribution

- 1.Traditional Distribution vs
- 2.Emperical Cumulative Distribution Function

Time Weighted Sampling

- 1.Data Trends
- 2.Detrending
- 3.Stratified Sampling
- 4.Raw Data or Modelled Data ?

Pricing Models

CLIMATIC Adjustments



Agro Climate Zone Classification

ENSO Loading

IOD Loading

Black Swan Premium



Clustering ML ?

ENSO + IOD

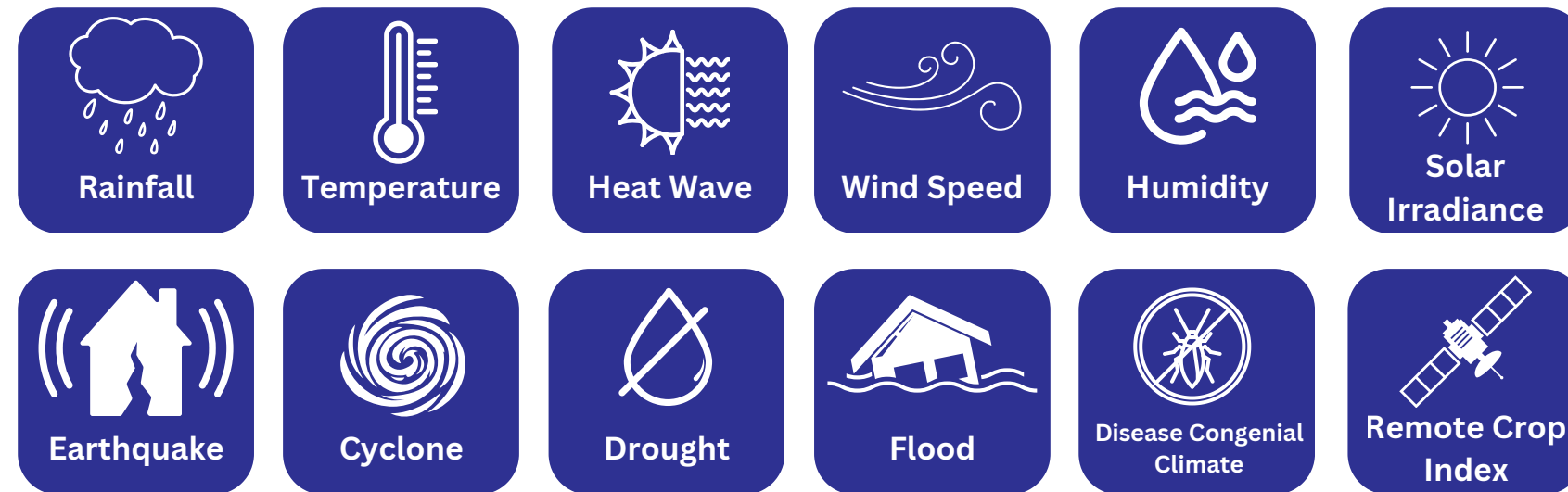
- 1.What perils does it affect?
- 2.What locations & Covers does it affect ?

Zone based Classification

- 1.Agroclimatic Zone (15)
- 2.Different Perils, Different Zones
- 3.Impact on Basis Risk

Examples

Smart Index Insurance Solutions





Crop - Agri & Horticulture

Protects against loss of productivity due to adverse weather events such as rainfall, temperature, high wind speeds, flood, drought, and cyclones

Who Can Benefit

- 1. Individual Farmers
- 2. Farmer Groups e.g. FPOs, FPCs, SHGs
- 3. Agri Companies
- 4. Agritech Companies
- 5. Banks and Microfinance Companies
- 6. Cooperative Banks & Societies

Market Snapshot

UNDERLYING MKT SIZE	INR 30 Lakh Crore
INSURANCE SAM AT 3%	INR 90,000 Crore
CURRENT INSURANCE MARKET	INR 28,000 Crore
PRODUCT STRATEGY	Focus on Horticulture and Plantation crops which are not offered insurance but having paying capacity
DISTRIBUTION STRATEGY	Tie ups with Agri Business, MicroFinance, Agri-Tech and Banks, through Broker Network



Sample Policy

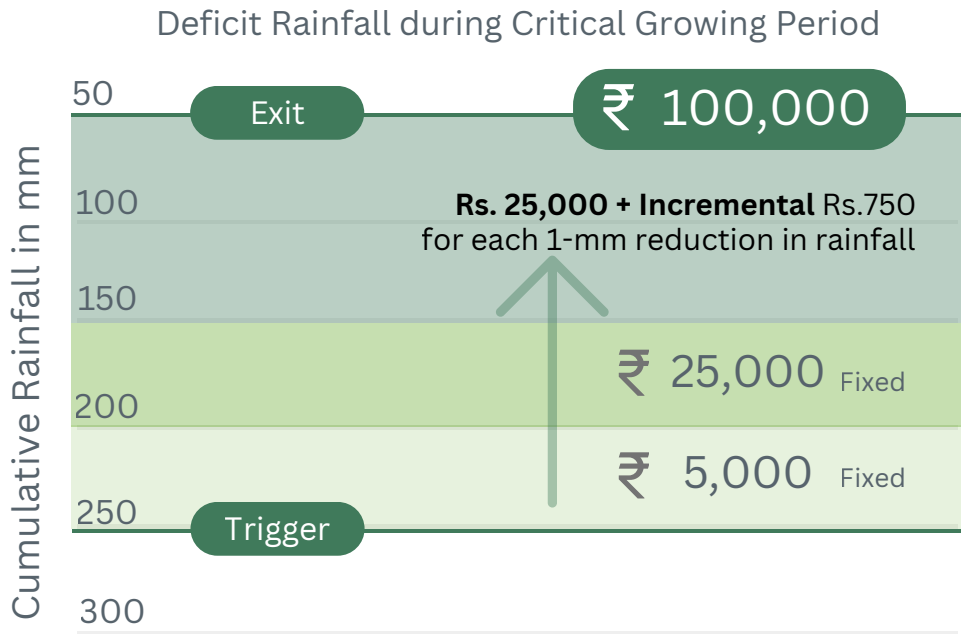
For illustration proposes, a sample of one cover is presented below. Generally, covers using multiple indices are offered for comprehensive coverage

A Farmer Producer Organisation in Telangana availed rainfall index insurance cover for their member farmers sowing paddy to protect their financial losses due to drought. Coverage is provided for the aggregate rainfall over the critical growing period of the crop.

Coverage Terms

POLICYHOLDER	Farmer Producer Organisation
LOCATION	Kollapur, Nagarkurnool, Telangana
DATA SOURCE	IMD Gridded Rainfall Data Geo Reference: 16°N 78.5°E
PAYOUT BASED ON	Aggregate Rainfall
COVERAGE PERIOD	1st July to 31st August
PAYOUT LEVEL 1	Below 250 mm pays fixed ₹5,000
PAYOUT LEVEL 2	Below 200 mm pays fixed ₹25,000
PAYOUT LEVEL 3	Each mm below 150 mm pays additional ₹750 per mm
MAX PAYOUT LEVEL	50 mm
MAXIMUM PAYOUT	₹ 1,00,000

Payout Sheet





Rural Loan Protect

Protects the rural loan book of financial institutions such as MFIs, NBFCs, Banks, RRBs, DCCBs, PACs increased delinquency due to climate adversities

Who Can Benefit

- 1. Commercial Banks
- 2. Non-Banking Financial Companies
- 3. Micro Finance Institutions
- 4. Regional Rural Banks
- 5. State & District Cooperative Banks
- 6. Primary Agricultural Credit Societies

Market Snapshot

UNDERLYING MKT SIZE	INR 10 Lakh Crore
INSURANCE SAM AT 1%	INR 10,000 Crore
CURRENT INSURANCE MARKET	INR 750 Crore
PRODUCT STRATEGY	Focus on providing a Meso-Level cover to protect against cascading Climate-related Agri Loss
DISTRIBUTION STRATEGY	Tie-ups with brokers and Agri-Lending Companies to market these products



Sample Policy

For illustration proposes, a sample of one cover is presented below. Generally, covers using multiple indices are offered for comprehensive coverage

Grameen micro finance institution protected their increased cost of loan recovery and repayment moratorium in case of adverse weather impacting the crop growth of their farmer customers

Coverage Terms

POLICYHOLDER	Grameen Micro Finance Companies
LOCATION	Hariharganj, Palamu, Jharkhand
DATA SOURCE: 1	IMD Gridded Rainfall Data Geo reference: 24.5°N 84.25°E
DATA SOURCE: 2	IMD Gridded Temperature Data Geo reference: 24.5°N 84.5°E
PAYOUT BASED ON	Cumulative Rainfall or Avg Max Temp during Critical Sowing Period
COVERAGE PERIOD	1st June to 30th November
PAYOUT CONDITION	Cumulative Rainfall < 300 mm, OR Average maximum temperature > 35 degree Celsius
PAYOUT	1 month's EMI per outstanding loan

Payout Sheet

Cumulative Rainfall and Max Temperature

	Cumulative RF	OR	Max Temp	
100 mm	1 month's EMI per outstanding loan		1 month's EMI per outstanding loan	45C
200 mm				40C
300 mm				35C
400 mm	No Payout		No Payout	30C



Loss of Wages

Protects daily wagers against loss of wages due to adverse weather such as excess rainfall, heat/cold waves, and weather adversities.

Who Can Benefit

1. Agricultural or other Seasonal Labourers
2. Labour Departments of Government
3. Companies employing labour workforce
4. Fishermen Unions
5. Construction Workers

Market Snapshot

UNDERLYING MKT SIZE	INR 50,000 Crore
INSURANCE SAM AT 2%	INR 1,000 Crore
CURRENT INSURANCE MARKET	INR 200 Crore
PRODUCT STRATEGY	Focus on providing a Climate based income protection cover for SHGs and organised/un-organised labour force
DISTRIBUTION STRATEGY	Tie-ups with brokers and SHGs



Sample Policy

For illustration proposes, a sample of one cover is presented below. Generally, covers using multiple indices are offered for comprehensive coverage

A State Labour Department wanted to protect the income of agricultural labour in the State due to loss of work during drought. They purchased a drought index insurance cover that pays out lost wages on notification of drought.

Coverage Terms

POLICYHOLDER	State Labour Department
LOCATION	Karnataka
DATA SOURCE	Notification of Drought by State Disaster Management Authority
PAYOUT BASED ON	Severity & Duration of Drought Period
COVERAGE PERIOD	1st July to 30th November
PAYOUT CONDITION 1	Early Drought Warning for at least 15 days during risk period
PAYOUT LEVEL 1	- Moderate Drought pays 10 Days' Wages - Severe Drought pays 20 Days' Wages
PAYOUT CONDITION 2	Drought Declared for more than 70% Duration of risk period
PAYOUT LEVEL 2	- Mild Drought pays 10% of wages during the risk period - Moderate Drought pays 25% of wages during the risk period - Severe Drought pays 100% of wages during the risk period
MAX PAYOUT	100% of seasonal wages

Payout Sheet

	Early Drought Warning		Drought Declaration
Severe	20 days of wages		100% of seasonal wages
Moderate	10 days of wages	+	25% of seasonal wages
Mild	No Payout		10% of seasonal wages
Normal	No Payout		No Payout



Crop - Price Volatility

Protects farmers and farmer groups against unexpected fall in market prices, lenders against price fluctuation and bulk buyers against unexpected increase in market prices

Who Can Benefit

- 1. Agriculture Producers
- 2. Food & Beverage companies
- 3. Energy distribution companies
- 4. Importers & Exporters
- 5. Commodity Traders

Market Snapshot

UNDERLYING MKT SIZE	INR 3 Lakh Crore
INSURANCE SAM AT 3%	INR 10,000 Crore
CURRENT INSURANCE MARKET	NIL
PRODUCT STRATEGY	Focus on 10 Major Crops like Soybean, Cotton, etc which are export-oriented and face global market risks
DISTRIBUTION STRATEGY	Tie-ups with FPOs and Agri Procurement Businesses for Providing a price risk guarantee



Sample Policy

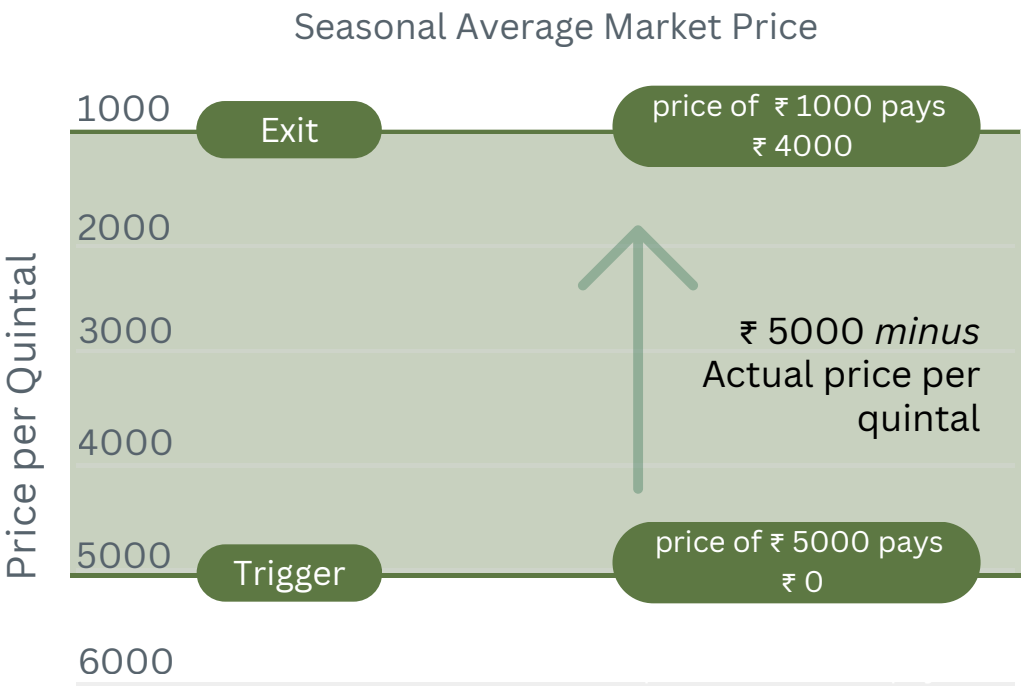
For illustration proposes, a sample of one cover is presented below. Generally, covers using multiple indices are offered for comprehensive coverage

A soybean farmers' cooperative in Madhya Pradesh wanted to protect their members against market volatility for their crops. They availed a price index insurance cover that pays out in case seasonal average market price falls below a trigger level.

Coverage Terms

POLICYHOLDER	Soybean Farmers' Cooperative
LOCATION	Madhya Pradesh
DATA SOURCE	Soybean Price for Indore Mandi from Agmarknet
PAYOUT BASED ON	Average of Daily Modal Price during Coverage Period
COVERAGE PERIOD	15th October to 15th November
PAYOUT LEVEL	₹ 5,000 - Average of daily modal price during coverage period) per quintal
MAX PAYOUT LEVEL	Seasonal Average Market Price of ₹ 1,000 per quintal
MAXIMUM PAYOUT	₹ 4,000 per quintal

Payout Sheet





Livestock Productivity and Endemic

Protects against loss in dairy productivity due to heat stress, unavailability of pasture for grazing, loss of livestock due to flood, drought, cyclones and death due to Wide Spread Endemic Covers notified by National Institute of High Security Animal Diseases (NIHSAD)

Who Can Benefit

- 1. Individual Farmers
- 2. Farmer Groups
- 3. Dairy Federations/Cooperatives
- 4. Diary Tech Companies
- 5. Banks and Microfinance companies
- 6. Cooperative Banks

Market Snapshot

UNDERLYING MKT SIZE	INR 16 Lakh Crore
INSURANCE SAM AT 3%	INR 50,000 Crore
CURRENT INSURANCE MARKET	INR 2500 Crore
PRODUCT STRATEGY	Focus on Product covering Livestock Productivity from climatic conditions like drought, heat/cold stress and endemic
DISTRIBUTION STRATEGY	Tie-ups with Livestock cooperatives and Milk Unions



Sample Policy

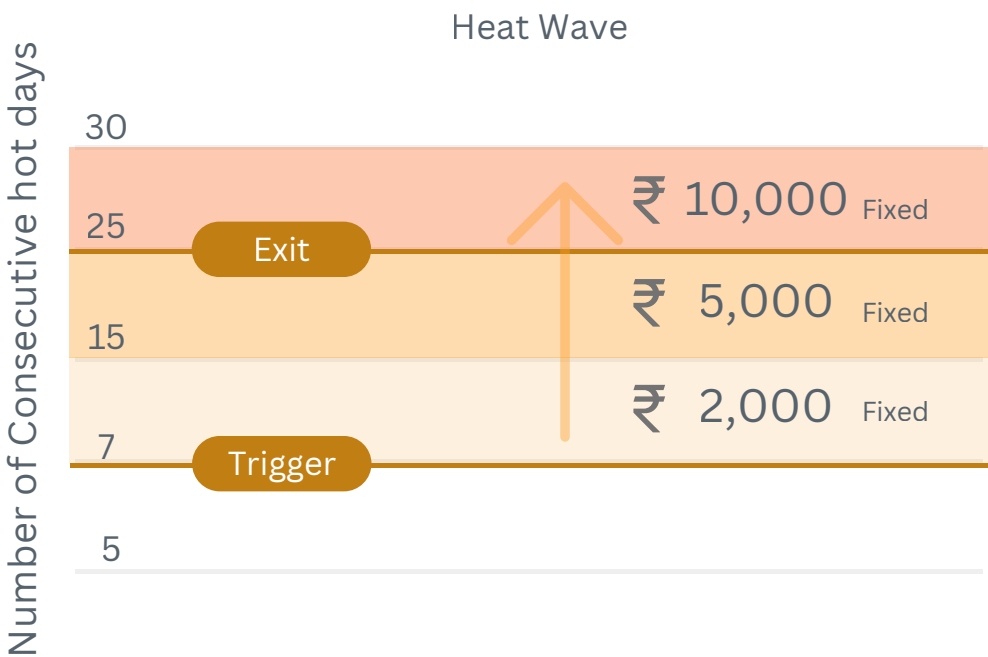
For illustration proposes, a sample of one cover is presented below. Generally, covers using multiple indices are offered for comprehensive coverage

A milk union in Gujarat protected its dairy farmers against loss of income due to reduction in milk yield during peak summers. They availed a heat-index insurance cover for their members that provides coverage against heat waves resulting into loss of milk yield.

Coverage Terms

POLICYHOLDER	Milk Union
LOCATION	Vadnagar, Mehsana, Gujarat
DATA SOURCE	IMD Gridded Temperature Data Geo Reference: 24°N 72.5°E
PAYOUT BASED ON	No. of Consecutive Days where Max Temp >45°C or remains 5°C above normal
COVERAGE PERIOD	1st April to 30th June
PAYOUT LEVEL 1	7 consecutive hot days pay ₹2,000
PAYOUT LEVEL 2	15 consecutive hot days pay ₹5,000
PAYOUT LEVEL 3	25 consecutive hot days pay ₹10,000
MAX PAYOUT LEVEL	25 consecutive hot days
MAXIMUM PAYOUT	₹ 10,000

Payout Sheet





Seed & Agri Inputs Insurance

Protects seed growers and Agri-Input providers against climate adversities causing germination failure, quality loss and revenue loss

Who Can Benefit

- 1. Seed Producers
- 2. Seed Cooperatives
- 3. Seed Distributors and Retailers
- 4. Nurseries and Greenhouses
- 5. Govt & Non-Govt Agri Support Programs

Market Snapshot

UNDERLYING MKT SIZE	INR 3 Lakh Crore
INSURANCE SAM AT 3%	INR 9,000 Crore
CURRENT INSURANCE MARKET	INR 100 Crore
PRODUCT STRATEGY	Focus on Seed and Agri Inout companies to protect against cascading Climate-related Agri Loss
DISTRIBUTION STRATEGY	Tie-ups with brokers and seed companies to market these products



Sample Policy

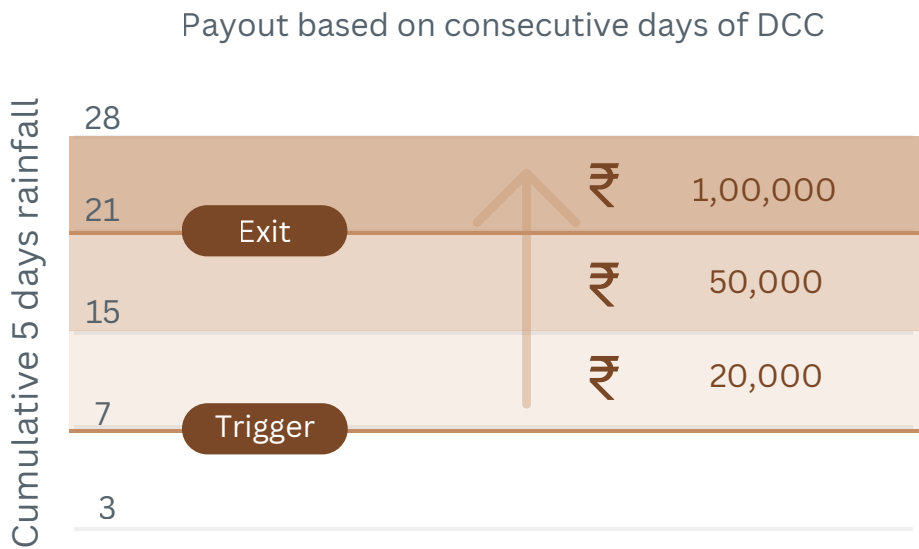
For illustration proposes, a sample of one cover is presented below. Generally, covers using multiple indices are offered for comprehensive coverage

A seed producer in Bihar wanted to protect loss of income in case of inferior quality of produced seeds. They purchased an index disease congenial climate insurance cover that pays out which when adverse weather may cause infection and alter composition of seeds.

Coverage Terms

POLICYHOLDER	Seed Producing Company
LOCATION	Lalganj, Vaishali, Bihar
DATA SOURCE	ECMWF ERA-5 Land; 2m dewpoint temp Geo Reference: 25.9°N 85.2°E
PAYOUT BASED ON	Number of Consecutive Days with Disease Congenial Climate (Avg Daily RH > 80% & Maximum Daily Temp > 37C
COVERAGE PERIOD	1st November to 31st March
PAYOUT LEVEL 1	7 consecutive Disease Congenial Days pay ₹20,000
PAYOUT LEVEL 2	15 consecutive Disease Congenial Days pay ₹50,000
PAYOUT LEVEL 3	21 consecutive Disease Congenial Days pay ₹1,00,000
MAXIMUM LEVEL	21 consecutive Disease Congenial Days
MAXIMUM PAYOUT	₹ 1,00,000

Payout Sheet





Logistics

Protects logistics and delivery companies, against heavy rainfall, floods, and cyclones causing delay in shipments leading to revenue loss

Who Can Benefit

- 1. Logistics and Courier Services
- 2. Retailers and E-commerce Platforms
- 3. Manufacturing Companies
- 4. Importers & Exporters
- 5. Agri Businesses and Food Producers

Market Snapshot

UNDERLYING MKT SIZE	INR 1 Lakh Crore
INSURANCE SAM AT 3%	INR 3,000 Crore
CURRENT INSURANCE MARKET	INR 100 Crore
PRODUCT STRATEGY	Focus on providing a Climate based business interruption cover to Logistics providers related CAT Losses
DISTRIBUTION STRATEGY	Tie-ups with brokers and Transport Unions and commerce associations



Sample Policy

For illustration proposes, a sample of one cover is presented below. Generally, covers using multiple indices are offered for comprehensive coverage

All India Logistics, operating a fleet of trucks in India, procures parametric insurance to mitigate risks during the monsoon season. When heavy rainfall leads to flooding in key transportation routes, triggering the parametric insurance based on predefined parameters, All India Logistics swiftly receives a payout to cover financial losses incurred from delays

Coverage Terms

POLICYHOLDER	All India Logistics
LOCATION	India Wide
DATA SOURCE	Total Precipitation, ECMWF ERA-5 Land Geo Ref: Enroute Predefined Grid Points
PAYOUT BASED ON	Past 4 Hours excess Rainfall above a threshold, when near a grid point
COVERAGE PERIOD	1st January to 31st December
PAYOUT LEVEL 1	4 Hours Cumulative 30mm - 50mm rainfall pays Rs 1000 per grid point
PAYOUT LEVEL 2	4 Hours Cumulative 50mm - 70mm rainfall pays Rs 2000 per grid point
PAYOUT LEVEL 3	4 Hours Cumulative >70mm rainfall pays Rs 3000 per grid point
MAXIMUM PAYOUT	100,000 per truck per year

Payout Sheet

Payout is paid by mapping real-time routes to pre-defined grid points. If rainfall exceeds the threshold in the grid point closest to the truck real-time location, a payout is made. Payouts of all grid points is added to arrive at claim per route





Structural Damage

Provides aid to private, and commercial structures and engineering projects for relief measures in case of cyclones, floods and earthquakes

Who Can Benefit

- 1. Homeowners
- 2. Real Estate Developers
- 3. Consumer Good Distributors
- 4. Municipalities
- 5. Utilities and Energy Companies
- 6. Manufacturing Units

Market Snapshot

UNDERLYING MKT SIZE	INR 10 Lakh Crore
INSURANCE SAM AT 1%	INR 10,000 Crore
CURRENT INSURANCE MARKET	INR 500 Crore
PRODUCT STRATEGY	Focus on providing a Meso-Level cover to protect against Earthquake and Cyclone Losses
DISTRIBUTION STRATEGY	Tie-ups with brokers, large commercial plants, and government organizations.



Sample Policy

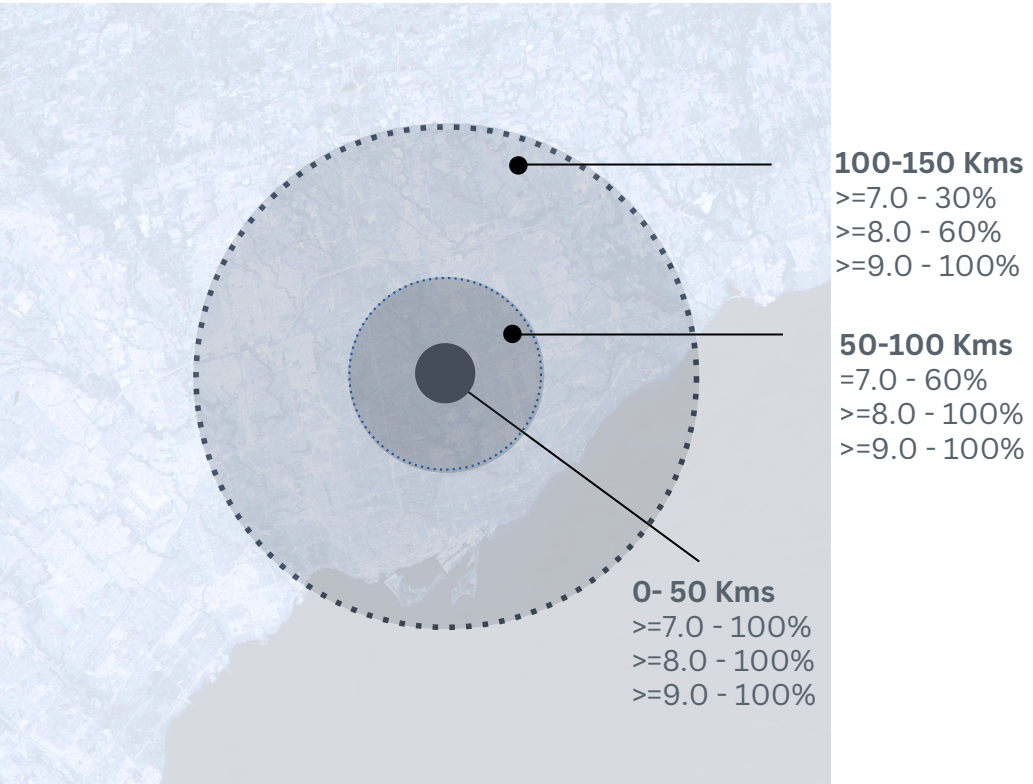
For illustration proposes, a sample of one cover is presented below. Generally, covers using multiple indices are offered for comprehensive coverage

A cooperative housing group society in Gujarat wants to protect their multistorey buildings against earthquake damage. They purchased an earthquake index insurance cover that pays out immediately after an earthquake happens that offer immediate payouts for relief and repair.

Coverage Terms

POLICYHOLDER	Cooperative Housing Group Society		
LOCATION	Surat, Gujarat		
DATA SOURCE	US Geological Survey Data Geo-reference: 21.2°N 72.8°E		
PAYOUT BASED ON	Distance from epicenter of earthquake		
COVERAGE PERIOD	1st January to 31st December		
PAYOUT CONDITION	<50 Kms	50-100 km	100-150 km
>=7.0 Magnitude	100%	60%	30%
>=8.0 Magnitude	100%	100%	60%
>=9.0 Magnitude	100%	100%	100%
MAXIMUM PAYOUT	₹ 1,00,00,000		

Payout Sheet





Solar Energy Productivity

Protects policyholders against low solar power productivity due to fewer than expected solar irradiation

Who Can Benefit

- 1. Homeowners
- 2. Farmers
- 3. Solar Power Plants
- 4. Real Estate Developers
- 5. Solar Equipment Manufacturers
- 6. Education Institutes, Hospitals
- 7. Residential & Commercial Complexes

Market Snapshot

UNDERLYING MKT SIZE	INR 80,000 Crore
INSURANCE SAM AT 1%	INR 800 Crore
CURRENT INSURANCE MARKET	NIL
PRODUCT STRATEGY	Focus on Solar Energy Producers, Retail and Commercial to cover protection deficit, due to deficit solar irradiation
DISTRIBUTION STRATEGY	Tie-ups with brokers market these products



Sample Policy

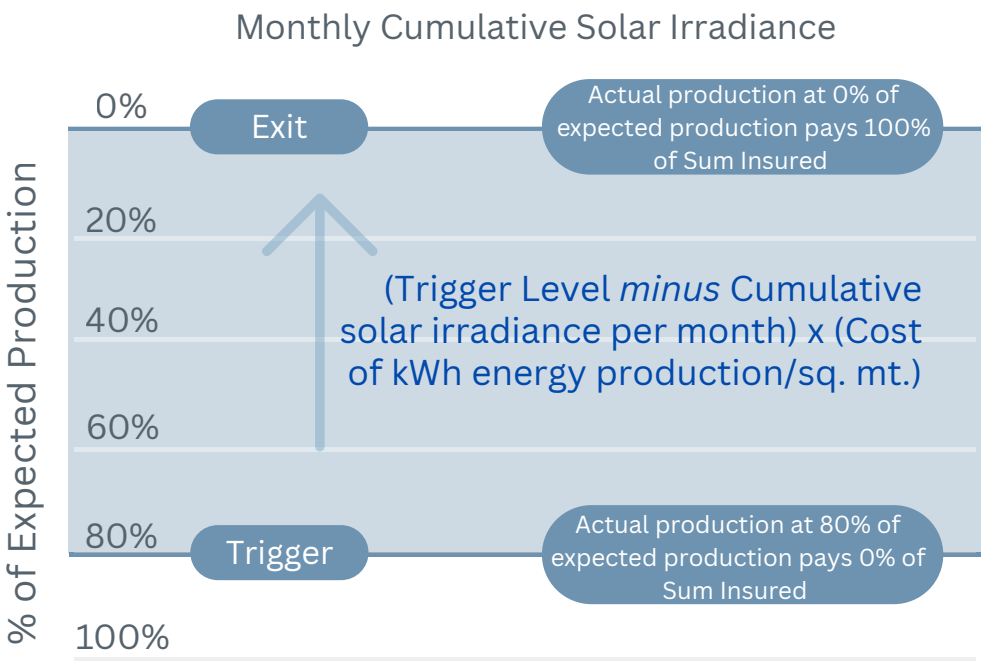
For illustration proposes, a sample of one cover is presented below. Generally, covers using multiple indices are offered for comprehensive coverage

A solar panel distributor in Rajasthan wanted to provide an energy production guarantee to its customers. They purchased a solar irradiance index insurance cover that pays out if total solar irradiance falls below a trigger level.

Coverage Terms

POLICYHOLDER	Solar Panel Distributor
LOCATION	Ramsar, Barmer, Rajasthan
DATA SOURCE	Surface net solar radiation, ERA-5 Land Geo Reference: 25.7°N 70.9°E"
PAYOUT BASED ON	Cumulative Solar Irradiance
COVERAGE PERIOD	1st April to 31st March, Monthly Payout
PAYOUT CALCULATION	(Trigger Level - Cumulative solar irradiance per month) x (Cost of kWh energy production/sq. mt.)
TRIGGER LEVEL	80% of Expected Production
MAXIMUM PAYOUT	80% of Expected Production

Payout Sheet





Energy Demand

Protects power companies and commercial users against sudden increase/decrease in energy demand

Who Can Benefit

- 1. Power Generation Companies
- 2. Energy Traders
- 3. Retail Power Distributors
- 4. Industrial / Commercial Energy Consumers
- 5. Government Energy Departments

Market Snapshot

UNDERLYING MKT SIZE	INR 1,20,000 Crore
INSURANCE SAM AT 1%	INR 1,200 Crore
CURRENT INSURANCE MARKET	NIL
PRODUCT STRATEGY	Protects power companies and commercial users against sudden increase/decrease in energy demand
DISTRIBUTION STRATEGY	Tie-ups with brokers market these products



Sample Policy

For illustration proposes, a sample of one cover is presented below. Generally, covers using multiple indices are offered for comprehensive coverage

A power distribution company wanted to protect its balance sheet against unexpected costs of buying energy during a demand surge during summers. They purchased a temperature index insurance cover against demand surge due to heat and cold waves.

Coverage Terms

POLICYHOLDER	Power Distribution Company
LOCATION	New Delhi, Delhi
DATA SOURCE	IMD Gridded Temperature Data Geo Reference: 28.5°N 77°E
PAYOUT BASED ON	Deviation in Monthly Average of Daily Mean Temperature
COVERAGE PERIOD	1st January to 31st December
TRIGGER LEVEL	Deviation of 3°C
PAYOUT CALCULATION	₹1,25,00,000 per 0.5°C deviation
MAXIMUM PAYOUT LEVEL	5°C Deviation
MAXIMUM PAYOUT	₹ 5,00,00,000

Payout Sheet

