PRESENTATION

Designing and Operationalizing Parametric Insurance for Coral Reefs

SUMMARY FOR PILOT SITES

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Example of Parametric Insurance if Insured Event Occurs

Insurance Policy

Indicative Term Sheet	Typhoon Parametric Insurance Policy Option: "Cat in a Stepped Circle"
Structure	Parametric "cat in a circle/box" insurance with stepped trigger covering reef area with center of reef defined as center of concentric circles expanding polygon or other shapes. Insurance payout depends on two factors: 1) the maximum sustained windspeed of the Typhoon when its path falls within the shapes, and 2) proximity to the center of the reef.
Original Insured	Policyholder such as trust fund, commercial entity, local or national government entity.
Insurer	Primary insurance company to issue the policy to the Original Insured. This primary company needs to be appropriately domiciled and regulated and have the required authorization to issue parametric insurance.
Reinsurer/ Reinsurers	Local or international reinsurance company that will provide the risk transfer protection for the Insurer. May be one or multiple reinsurers assuming risk on some basis.
Policy Term	One year or multi-year policy period such as 3 years or 5 years from Effective Date, with individual Cover Years defined. Policy inception date to be defined before the start of the typhoon season, e.g., 1 June. From 00:00am Local Standard Time on (1 June 2026) (the "Effective Date") to 00:00am Local Standard Time on (31 May 2027) (the "Expiration Date"). "Policy Term" shall mean the period from the Effective Date to the earlier of (i) the Expiration Date, or (ii) the effective date of termination of this Policy, triggers for such termination to be set out in the Policy. Alternative: Policy Term may also be for multi-year policy period such as 3 years or 5 years from Effective Date, with individual Cover Years defined.
Insured Peril	This Policy covers the occurrence of an Eligible Event arising from the peril of Typhoon only in the covered Territory. A condition for coverage is that the Insured has a genuine economic interest in the non-occurrence of the Eligible Event. Coverage is for response costs for reef repair and restoration after an Eligible Event, as coral reef itself is the covered asset. The Insured (or Beneficiary for claim payout) must have the necessary authorizations to undertake the reef repair and restoration at the covered sites.

Policyholder enters into insurance policy agreement and pays premium for cover

TC/Typhoon Event

Severe Tropical Cyclone hits within 100kms and wave and flooding damages coral

High SST Event

High SST event leads to coral damage and bleaching of % of reef

Claim Payout

Claim Payout calculated dependent on Event measurements and location. When Event is finished, claim paid within 20 days to Policyholder. Policyholder decides how to allocate funds according to governance.

TC Rescue

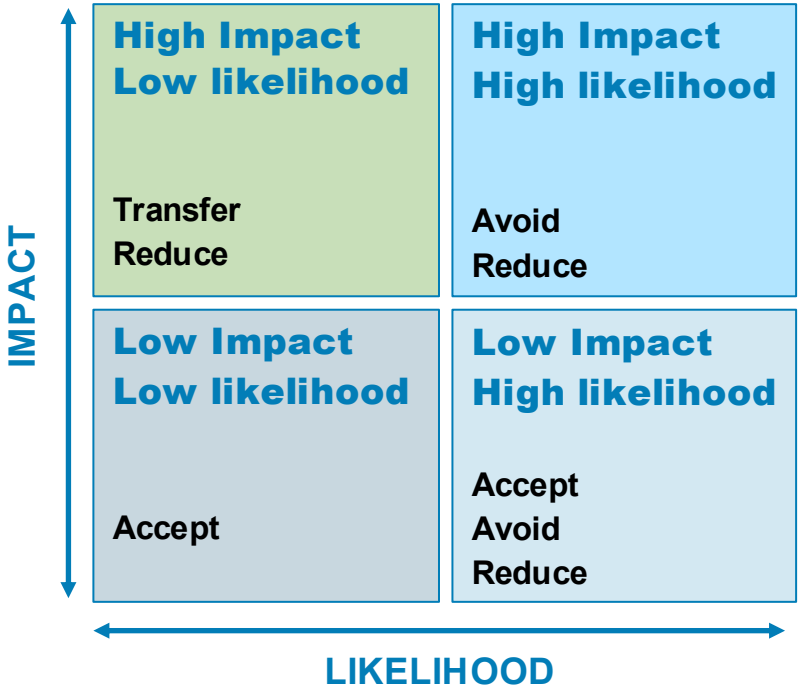
After TC/Typhoon, immediately assess, clear debris and begin rescue work

Restoration

Later Restoration longer term work to re-plant corals from nurseries and/or reproductive restoration. For both TC/Typhoon and high SST

Feasibility and Requirements for Insurance

1 Is the risk appropriate for insurance?



2 Are the necessary requirements in place?

Requirement	Description
Risk Owner/ Policy Holder	Legal entity that takes out policy and pays premium.
Defined Hazard	A clear threat, peril or event (not ambiguous, latent or difficult to identify)
Probability of Occurrence	The frequency and severity of hazard risk, with data to facilitate underwriting.
Financial Loss	Certainty that hazard can cause quantifiable loss to insured asset or service
Risk Management	Insurer and insured should share the goal of loss prevention Actions in place to manage vulnerability and reduce the likelihood or impact of losses.

Design Principles for Insurance

Following onsite research, stakeholder consultation, market testing and expert review, the insurance design focused on the most important needs of the impacted stakeholder groups:

	✓ **Affordability** Premiums should be affordable over the long term for the policyholder
	✓ **Simplicity and Transparency** Clear and easy for stakeholders to understand the coverage provided, when it pays out and who receives the funds
	✓ **Minimised Basis risk** Aim to reduce situations where the claim payout is much less than or greater than actual damages and repair costs
	✓ **Commercial Sustainability** Cover is availability in the open insurance market and market pricing is adequate for insurers to provide cover

Lessons learned: reef ecologists advise efficiency of scale = larger restoration areas more cost-effective, but practical upper bound on resources = maximum restoration area may be 2-3 hectares

Parametric (index-based) insurance is recommended as the most appropriate cover against identified risks for coral reef, as part of the holistic risk management program

Recommended insurance covers for Pilot Sites after the risk management program is in place

Parametric Tropical Cyclone (TC) / Typhoon

Risk: Severe TC / Typhoon with high likelihood of waves & storm surge to damage reef

1. General Luna, Philippines
1. Denarau / Nadi, Fiji

Parametric High SST

Risk: Sustained high SST with high likelihood to lead to significant coral bleaching

1. Nusa Penida, Indonesia
3. General Luna, Philippines
3. Denarau / Nadi, Fiji

Parametric Excess Rainfall

Risk: Extreme rainfall with high likelihood of flooding / run-off to cause pollution and damage to reef

2. General Luna, Philippines
2. Denarau / Nadi, Fiji
2. ~~Nusa Penida, Indonesia~~

Lessons learned: calibration to historical events and local knowledge is essential. External data sources may be inadequate

Other hazards identified by stakeholders:

- Marine vessel groundings and pollution = Commercial Marine Insurance
- Seasonal high waves and sea surge, Crown of Thorns outbreaks = Self-fund restoration with emergency reserves
- Earthquake & Tsunami = Include coral reef as community infrastructure in government or community insurance covers

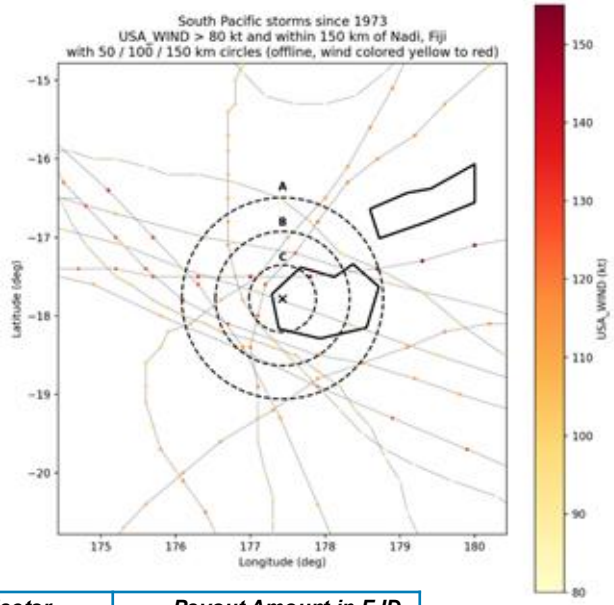
Insurance Illustrations: Summary across Pilot Sites

	Denarau / Nadi, Fiji	Nusa Penida, Indonesia	General Luna, Siargao, Philippines
			
Insured Peril	Tropical Cyclone (TC)	High Sea Surface Temperature (SST)	Typhoon
Event Limit (USD)	$180,000 (FJD 400,000) for one hectare of restoration	$60,000 (IDR 1,000,000,000) for one hectare of restoration	$170,000 (PHP 10,000,000) for 1-2 hectares of restoration
Payout Start Point	Category 3 Tropical Cyclone	SST / DHW > 8 weeks threshold exceeded for at lease 21 days	Category 3 Tropical Cyclone
Trigger Basis	Tropical cyclone Windspeed on RSMC, Nadi from FMS and TC track	DHW from NOAA	Tropical cyclone Windspeed on PAGASA and Typhoon track
Illustrative Premium (USD)	$22,000 to $33,000 (FJD 50,000 - 70,000)	$8,000 to $12,000 (IDR 130,000,000 – 200,000,000)	$24,000 to $33,000 (PHP 1,400,000 – 1,900,000)
Insurance Availability	Tested product, capacity available	Innovative product, likely capacity but fewer insurers	Tested product, capacity available

Illustration for Denarau, Fiji : Tropical Cyclone

Recommended Insurance (illustrative):
Typhoon Parametric Insurance Policy "Cat in a Stepped Circle"
Payouts aligned to staged intensity levels within Zones from 50km (C) to 150kms (A) of Denarau/Nadi

Maximum wind speed in Zone (in knots 10-minute average sustained)	Maximum wind speed in Zone (in km/hr 10-minute average sustained)	Payout Factor A	Payout Factor B	Payout Factor C
<64	< 118	0%	0%	0%
≥64 and < 85	≥118 and < 157	0%	0%	25%
≥85 and < 100	≥157 and < 185	0%	25%	50%
≥100	≥185	50%	70%	100%



Back testing to check relevance

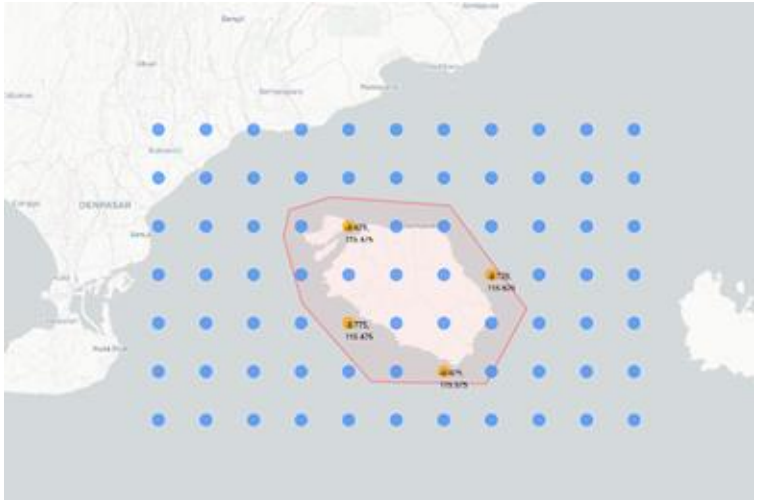
Historic Event Name	*Historic Track Year*	*Maximum wind Speed 1-minute avg knots (trigger)*	*Payout Factor*	*Payout Amount in FJD (assuming a 400,000 limit)*
BEBE	1973	85	25%	100,000
OSCAR	1983	110	25%	100,000
ERIC	1985	93	25%	100,000
HINA	1985	131	70%	280,000
SINA	1991	105	25%	100,000
JONI	1993	106	50%	200,000
GAVIN	1997	106	25%	100,000
WINSTON	2016	148	100%	400,000
HAROLD	2020	108	25%	100,000

Illustration for Nusa Penida, Indonesia: High SST

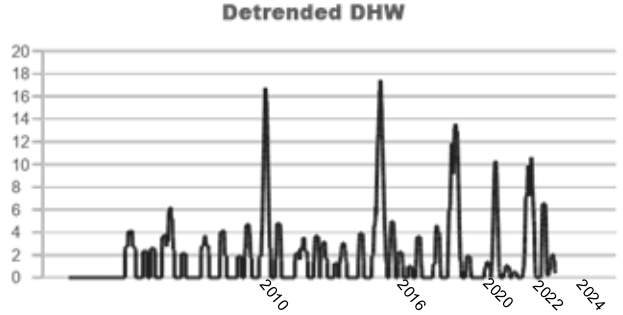
Recommended Insurance (illustrative):

Extreme Sea Surface Temperature Parametric Insurance Policy
Payouts aligned to anomalous SST events of extended and/or extremely high SST surrounding Nusa Penida

Degree Heating Weeks averaged across area (in DHW subject to minimum of 3-week duration)	Payout Factor in % of Event Limit
<8.0	0%
≥8.0 and < 11.0	10%
≥11.0 and < 14.0	50%
≥14.0	100%



Back testing to check relevance DHW (2000 – June 2025) – spatial average and detrended



Year	*Heating Degree Week (HDW) average*	*Payout Factor*	*Payout Amount in IDR*
2010	*> 14*	*100%*	*1,000m*
2016	*> 14*	*100%*	*1,000m*
2020	*> 11*	*50%*	*500m*
2022	*> 8*	*10%*	*100m*
2024	*> 8*	*10%*	*100m*

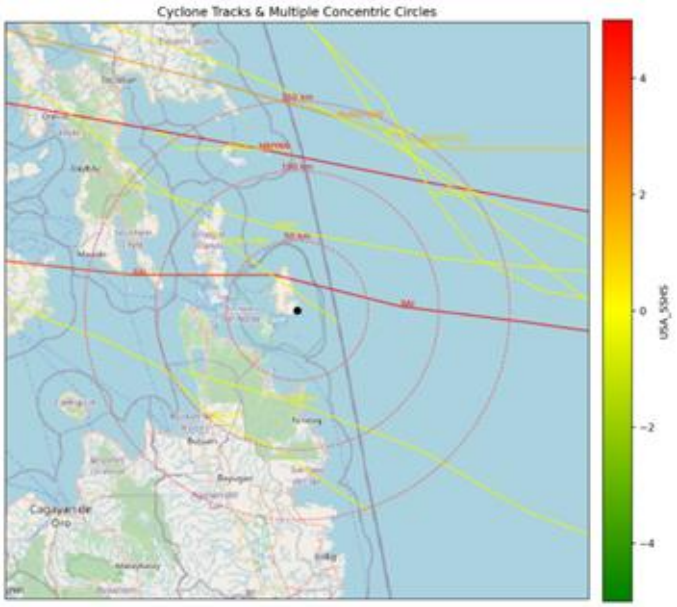
Illustration for General Luna, Philippines: Typhoon

Recommended Insurance (illustrative):

Typhoon Parametric Insurance Policy "Cat in a Stepped Circle"

Payouts aligned to staged intensity levels within Zones from 50km (Zone C) to 150kms (Zone A) of General Luna

Maximum wind speed in Zone (in knots 10-minute average sustained)	Maximum wind speed in Zone (in km/hr 10-minute average sustained)	Payout Factor Zone A	Payout Factor Zone B	Payout Factor Zone C
<64	< 118	0%	0%	0%
≥64 and < 85	≥118 and < 157	0%	10%	25%
≥85 and < 100	≥157 and < 185	25%	50%	70%
≥100	≥185	50%	70%	100%



Back testing to check relevance

Historic Event Name	*Historic Track Year*	*Maximum wind Speed 1-minute avg knots (trigger)*	*Maximum wind Speed 10-minute avg knots (trigger)*	*Payout Factor*	*Payout Amount in PHP*
LOUISE	*1964*	*126.077*	*110*	*50%*	*5,000,000*
SUSAN	*1969*	*98.308*	*85*	*25%*	*2,500,000*
NELSON	*1982*	*114.000*	*99*	*25%*	*2,500,000*
IKE	*1984*	*102.600*	*89*	*25%*	*2,500,000*
MIKE	*1990*	*105.869*	*92*	*50%*	*5,000,000*
HAIYAN (YOLANDA)	*2013*	*142.500*	*124*	*70%*	*7,000,000*
RAI (ODETTE)	*2021*	*140.000*	*122*	*100%*	*10,000,000*

Market Testing & Implementation Considerations

Common Themes

- Growing interest in parametric insurance for climate and reef-related risks.
- Regulatory environments are generally supportive, but regulators should be engaged early.
- Success depends on stakeholder buy-in, credible local policyholder and sustainable funding sources.
- International reinsurers willing to support local insurers for specialist parametric insurance.

Fiji

- Mature market for parametric cyclone insurance, good data availability.
- Regulatory environment (Reserve Bank of Fiji) supports flexible local or offshore placement. Offshore placement requires local broker.
- SST and rainfall insurance considered second-phase products

Indonesia

- Regulator (OJK) permits locally issued parametric products with pre-approval required.
- Current parametric use for agriculture and disaster risk.
- SST insurance pilot planned in Gili Islands.
- Rainfall data quality insufficient, emergency fund recommended
- SST parametric solution implementation may require a longer approval timeline.

Philippines

- One of the most advanced markets for parametric insurance in Asia (typhoon, earthquake widely used).
- Regulator approval process is relatively fast
- Low national insurance penetration, community awareness and uptake require more capacity-building.

Differences & Learnings

- Market readiness for parametric is relatively advanced in Fiji and the Philippines; Indonesia may need additional preparation.
- Data quality shapes feasibility: wind/cyclone data is strong, but rainfall data variable.
- SST insurance is promising but still innovative, requiring careful design and insurer capacity building.
- Climate change will impact availability & price.

Recommendations Parametric Insurance
Next Steps for Implementation

Requirement	Description	Recommendations
Risk Owner/ Policy Holder	Legal entity that takes out policy and pays premium. Ability to fund risk management and insurance premium	*Recommended entity may be Conservation Trust or PPP. Legal entity may be existing or to be set up. Must have legal right to fund conservation & restoration of coral reef.*
Sustainable Funding for Premium and Risk Management	Reliable income stream to support ongoing risk management activities and annual premium payment	*Recommendation for a blended finance approach, leverage tourist levies, donor financing & government funds to build sustainable finance income*
Risk Management	Insurance integrated with risk management and risk reduction program. Start planning and capability building	*Pending stakeholder validation of risk management and restoration recommendations*
Regulatory and Legal considerations	Prepare to address the local regulatory and legal environment for parametric insurance.	*Review and impement recommendations in Policy, Legal and Risk reports.*
Validation & refinement of Insurance	Review insurance recommendations and alternatives. Test against local stakeholder views. Consider engaging local insurance broker.	*Insurance should only represent 10% to 25% of total budget for conservation, restoration, operations and risk management*