

How Ocean Accounts can strengthen Parametric Insurance for coastal resilience

Executive Summary

1. Parametric insurance (pre-specified payouts based on trigger events) faces key market challenges including basis risk—the mismatch between insurance payouts and actual damages experienced by policyholders—as well as data standardisation challenges and verification limitations.
2. Ocean accounts bridge the critical measurement-finance gap by providing an UN-endorsed framework, implemented across 30+ countries, for structuring data on ocean ecosystem assets and their economic, environmental and social contributions across time and regions, establishing consistent measurement protocols, quality thresholds, and historical baselines.
3. Measurements of ecosystem services within this standardised framework support both effective trigger design and improved premium calculations by quantifying ecosystem functions and their values. This helps insurers assess risk profiles with greater confidence, potentially reducing risk premiums that currently make parametric insurance prohibitively expensive for many coastal communities.
4. The standardised data enables development of multi-tier trigger structures with graduated payment mechanisms that align with the actual progression of environmental degradation, rather than simplified binary triggers that often miss the mark, making products more responsive and accessible to coastal communities.

The Challenge

Parametric insurance has emerged as a vital risk transfer mechanism for ocean-related perils, offering immediate payouts based on predetermined triggers rather than assessed losses. These triggers—specific measurable events like wind speeds exceeding certain thresholds or water temperatures reaching critical levels—automatically activate payouts without requiring damage assessment. However, despite growing applications in coastal protection, sustainable fisheries, and coral reef insurance, parametric products face substantial challenges to scale. A fundamental challenge is that payouts based solely on triggers rather than actual losses create a "basis risk" where compensation may not align with real damages experienced—a particular concern in developing countries where these solutions are most needed but trust in financial products is often limited. Core limitations include:

- **Risk pricing challenges:** Limited data on marine ecosystems results in excessive risk loadings, making premiums unaffordable for those needing coverage most.

- **Basis risk:** Conventional triggers often fail to match actual losses experienced, creating a mismatch between payouts and real-world damage.
- **Verification limitations:** Current trigger verification mechanisms are frequently slow or disputed, undermining the rapid payout advantage.
- **Limited preventative capability:** Binary triggers are typically positioned too late to enable early intervention when warning signs first appear.
- **Market development constraints:** High transaction costs and low standardisation restrict product innovation and market entry.

Ocean accounts can address these challenges through:

- Standardised methods for designing more accurate triggers using internationally comparable metrics
- Improved risk pricing through consistent ecosystem service valuation frameworks

- Internationally recognised standards for establishing graduated response systems based on ecosystem health thresholds
- Verification mechanisms using globally consistent data collection protocols

Ocean accounts bridge the measurement-finance gap, unlocking parametric insurance markets precisely where traditional insurance fails—in vulnerable developing economies.

Ocean Accounts: An Enabling Framework

Ocean accounts are a comprehensive framework that can help transform complex environmental, economic and social data into decision-useful financial intelligence. The ocean accounting framework aligns with international standards for environmental-economic accounting and has been tested in over 30 countries worldwide, ensuring global compatibility and methodological rigor. The system integrates satellite imagery, field measurements, economic models, local knowledge, social data, and consistent monitoring to develop natural capital assessments that could be linked to parametric insurance applications.

Ocean accounts could deliver five interconnected capabilities that could enhance parametric insurance design:

1. Insurance Product Design

- **Ecosystem service mapping:** Systematic mapping of key marine ecosystems and their contributions to the economy
- **Risk parameter selection:** Provide the evidence base needed to determine which environmental variables most closely correlate with economic losses
- **Coverage structuring:** Facilitate the development of layered protection aligned with ecosystem service values and vulnerabilities
- **Regional calibration:** Enables fine-tuning of insurance parameters to reflect local ecosystem characteristics and

dependencies, improving product relevance

2. Trigger Mechanism Improvement

- **Direct condition assessment:** Replaces indirect proxies with direct measurements of ecosystem health, reducing the mismatch between triggers and actual impacts
- **Focused indices using standardised data:** Combines essential environmental variables into simplified metrics that accurately reflect risk while maintaining transparency for users building the basis for creating focused indices
- **Regional vulnerability adaptation:** Customises triggers to account for different ecosystem sensitivities across regions
- **Continuous monitoring capability:** Enables shift from point-in-time to ongoing assessment, supporting timely intervention. This precision significantly reduces basis risk—the misalignment between index triggers and actual on-the-ground impacts experienced by policyholders—which is consistently cited as a primary barrier to parametric insurance adoption, particularly among first-time insurance buyers and vulnerable communities.

While parametric insurance by design pays based on triggers rather than loss assessment, the correlation between these triggers and real-world outcomes directly affects product credibility, regulatory acceptance, and, ultimately, market growth.

3. Evidence-Based Risk Pricing

Accurately pricing risk without extensive historical data is difficult. Ocean accounts solve this challenge by systematically capturing ecosystem service flows in monetary terms:

- **Quantifying economic dependency:** Precise measurement of how specific industries and communities depend on marine ecosystem services

- **Service Flow Valuation:** Monetary values assigned to protection services, provisioning services, and tourism amenities
- **Loss Exceedance Probability Modelling:** Data-driven catastrophe modelling based on ecosystem condition rather than proxy indicators
- **Value-at-Risk Calculation:** Transparent methodology for determining maximum probable losses under different scenarios

This allows for more accurate premium determination, potentially reducing premiums while maintaining profitability through superior risk selection.

4. Condition Monitoring Systems

- **Baseline documentation:** Establishes comprehensive records of normal ecosystem health variation, essential for detecting meaningful changes
- **Threshold identification:** Determines critical points where ecosystem function significantly deteriorates, creating clear trigger points
- **Early warning detection:** Identifies intervention periods between initial condition changes and potential catastrophic impacts
- **Preventative action windows:** Creates opportunities for risk reduction before significant losses occur, enhancing the value proposition

5. Automated Verification Mechanisms

Ocean accounts enable transparent, standardised measurement systems that allow rapid, indisputable claims verification:

- **Objective measurement protocols:** Standardised methodologies for assessing ecosystem condition
- **Third-party verification infrastructure:** Independent validation of trigger events

- **Automated data processing:** Algorithmic determination of whether triggers have been met
- **Blockchain-based settlement:** Potential for smart contracts that execute payouts automatically when conditions are met

Practical Applications for Parametric Insurance

Ocean accounts serve as a standardised data infrastructure that structures environmental, economic and social information in a consistent, internationally recognised format based on UN statistical methodologies and standards. This includes

- **Systematic data organisation:** Arranges Ocean ecosystem and economic data into coherent, comparable datasets
- **Standard classifications:** Provides standardised categories for ecosystem types, services, and economic dependencies
- **Consistent measurement protocols:** Establishes uniform methods for quantifying both physical and monetary values
- **Integration with National Statistics:** Ensures compatibility with existing economic and environmental reporting systems

This standardisation underpins financial market functionality in the same way accounting standards enable capital markets—creating transparency, comparability, and reliability that allows participants to price risk appropriately, transact with confidence across jurisdictions, and develop derivative products based on consistent underlying measurements. Environmental financial products like parametric insurance cannot scale beyond niche applications without standardisation due to prohibitive information asymmetries and validation costs.

Enabling Index Development

Using data structured within ocean accounts, insurers and stakeholders can develop indices tailored to specific risk transfer needs that directly address basis risk—both when payouts fall short of actual losses (negative basis risk) and when they exceed them (positive basis risk). Ocean accounts organise environmental data consistently, making it possible to create practical applications such as:

Multi-Trigger Reef Resilience Index (RRI)

An RRI could integrate multiple parameters and trigger levels

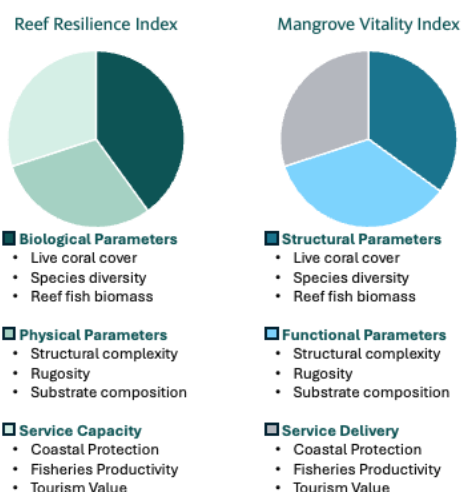
- Biological parameters: Live coral cover, reef fish abundance
- Physical parameters: Structural complexity, water quality metrics
- Service capacity: Wave energy reduction potential

Graduated Mangrove Protection Index (MPI)

An MPI could incorporate varied payout thresholds based on:

- Structural parameters: Canopy cover, forest width
- Functional parameters: Sediment trapping effectiveness
- Service delivery: Storm surge reduction capacity

The practical value of standardised indices becomes evident in real-world applications. For example, a coastal resort could purchase parametric insurance with a graduated payment structure triggered at different RRI levels, ensuring some compensation even when the primary trigger is narrowly missed. Similarly, communities dependent on mangrove-supported fisheries could secure coverage with multiple triggers reflecting progressive ecosystem degradation, providing earlier intervention funding.



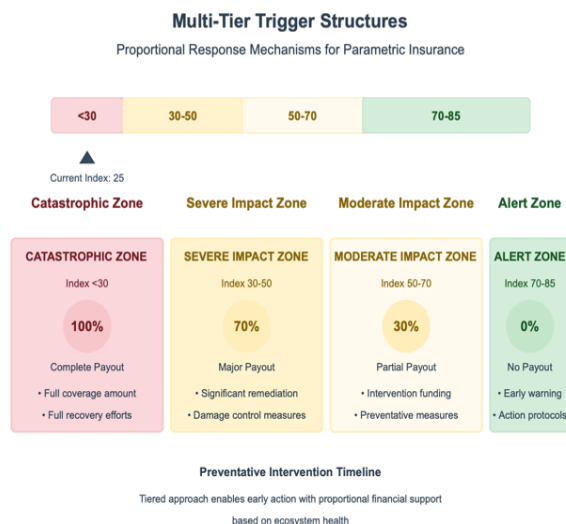
Such indices, built on standardised ocean accounts data, enable insurers to design products that more precisely match actual loss experiences—addressing the industry challenge where parametric insurance may fail to pay despite significant damage or, conversely, pay more than the actual loss incurred. Reducing this mismatch through improved data standardisation and multi-level trigger design can improve the attractiveness of insurance products to both policyholders and insurers, supporting market growth.

Multi-Tier Trigger Structures

Ocean accounts data can be used to design triggers that balance simplicity with accuracy. Graduated structures provide proportional responses:

- **Early Warning Threshold:** Activates preventative action protocols when ecosystem indicators first deviate from normal ranges, without financial payout
- **Intervention Threshold:** Releases partial funding (30-40% of coverage) when conditions deteriorate further, enabling rapid response measures that may prevent catastrophic damage
- **Major Impact Threshold:** Triggers substantial payout (60-80% of coverage) when ecosystem function is significantly compromised

- **Catastrophic Threshold:** Provides full coverage when complete ecosystem collapse or service loss occurs



A tiered approach allows for preventative intervention before catastrophic losses occur, reducing the overall severity of a claim while providing resources at critical intervention points.

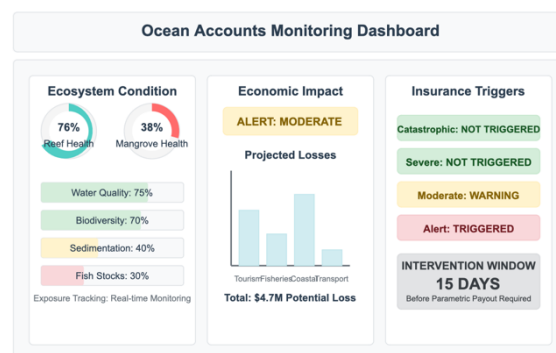
Integrated Monitoring Dashboards

The different indices and triggers can be combined to build a unified systems that transform ecological data into insurance intelligence:

- **Exposure tracking:** Continuous monitoring of insured assets and their ecosystem dependencies
- **Condition indicators:** Assessment of ecosystem health relevant to insured perils, using periodic monitoring with frequency balanced against cost and reliability constraints, supplemented by remote sensing where appropriate
- **Economic impact modelling:** Automated translation of ecosystem changes into potential financial losses
- **Early warning signals:** Advanced notification of developing risk conditions
- **Automated trigger verification:** Independent confirmation of whether payouts should be initiated

These dashboards provide a transparent mechanism for all stakeholders to monitor conditions, anticipate potential claims, and verify trigger events:

Example of Monitoring Dashboard



Benefits to Stakeholders

Ocean accounts deliver stakeholder-specific value across the parametric insurance ecosystem:

Stakeholder	Benefits
Policyholders (Governments, Coastal Communities, Blue Economy Businesses)	• Reduced basis risk with accurate triggers • Faster disaster response payouts • Lower, more accurately priced premiums • Preventative intervention capabilities • Enhanced resilience planning
Insurers and Reinsurers	• Improved risk selection and pricing • Reduced maximum probable losses • Portfolio diversification • Data-driven product innovation
Financial Intermediaries (Brokers, MDBs, DFIs)	• Expanded market opportunities • Ecosystem-linked product differentiation • Reduced transaction costs • Enhanced advisory capabilities

	• Alignment with sustainability mandates
Regulators and Supervisors	• Consistent product approval frameworks • Transparent trigger verification • Quantifiable risk reduction evidence
Conservation Organizations	• Ecosystem protection funding • Economic validation of conservation • Enhanced monitoring capabilities

Utilising standardised data creates reinforcing benefits. Improved measurement enables better insurance terms, increased conservation funding, enhanced ecosystem health, and ultimately greater economic resilience, transforming traditional disaster response into proactive risk management.

Implementation Pathway

Ocean accounts can be implemented across a scalable pathway that accommodates varying resource capacities, technical capabilities, national and business priorities, allowing market participants to build sophistication while progressively delivering immediate value.

Ocean accounts can be implemented across different investment scenarios, with modest investments yielding critical impacts on parametric insurance design. Countries and organisations

don't need maximum investment to see these benefits - basic systems can improve standardisation, reduce basis risk, and enhance payout speed.

A phased implementation approach could build capabilities systematically and allow capacity-constrained issuers to enter the market with basic ocean accounts while building toward more sophisticated implementations that deliver enhanced financial and conservation benefits. Structuring financial products using ocean accounts correlates with improved risk management capabilities, earlier warning periods, and more favourable financial terms—creating a clear business case for progressive implementation.

Recommended Readings:

1. [What are Ocean Accounts?](#)
2. [Ocean Accounts Technical Guidance](#) (to be updated in late 2025)
3. Expert insight into how ocean accounts can provide [Data-Driven Solutions for Ocean Finance](#)
4. Expert insight on how [Ocean Accounts Provide a Data-Driven Approach to Coastal Disaster Resilience](#)
5. Expert insight into [Unlocking finance for the Sustainable Blue Economy](#)

All expert insights are available at available at:
<https://www.oceanaccounts.org/tag/expert-insights/>

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