# Innovative risk financing approaches to enhance ecosystem resilience along the Caribbean's coastlines

March 2025

MAR FUND

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2. Microphones and cameras will be disabled during the seminar.
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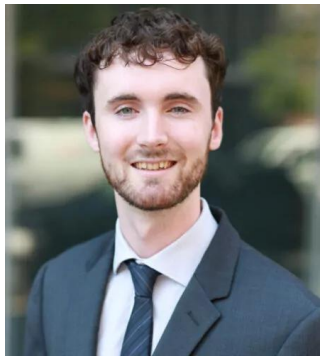
6. The speaker will answer the questions at the end of the presentation.

# Welcome and introduction



Moderator, Jack Stuart, ORRAA
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Sarah Conway, WTW

Claudia Ruiz, MAR Fund

Pablo Devis, Fondo Acción

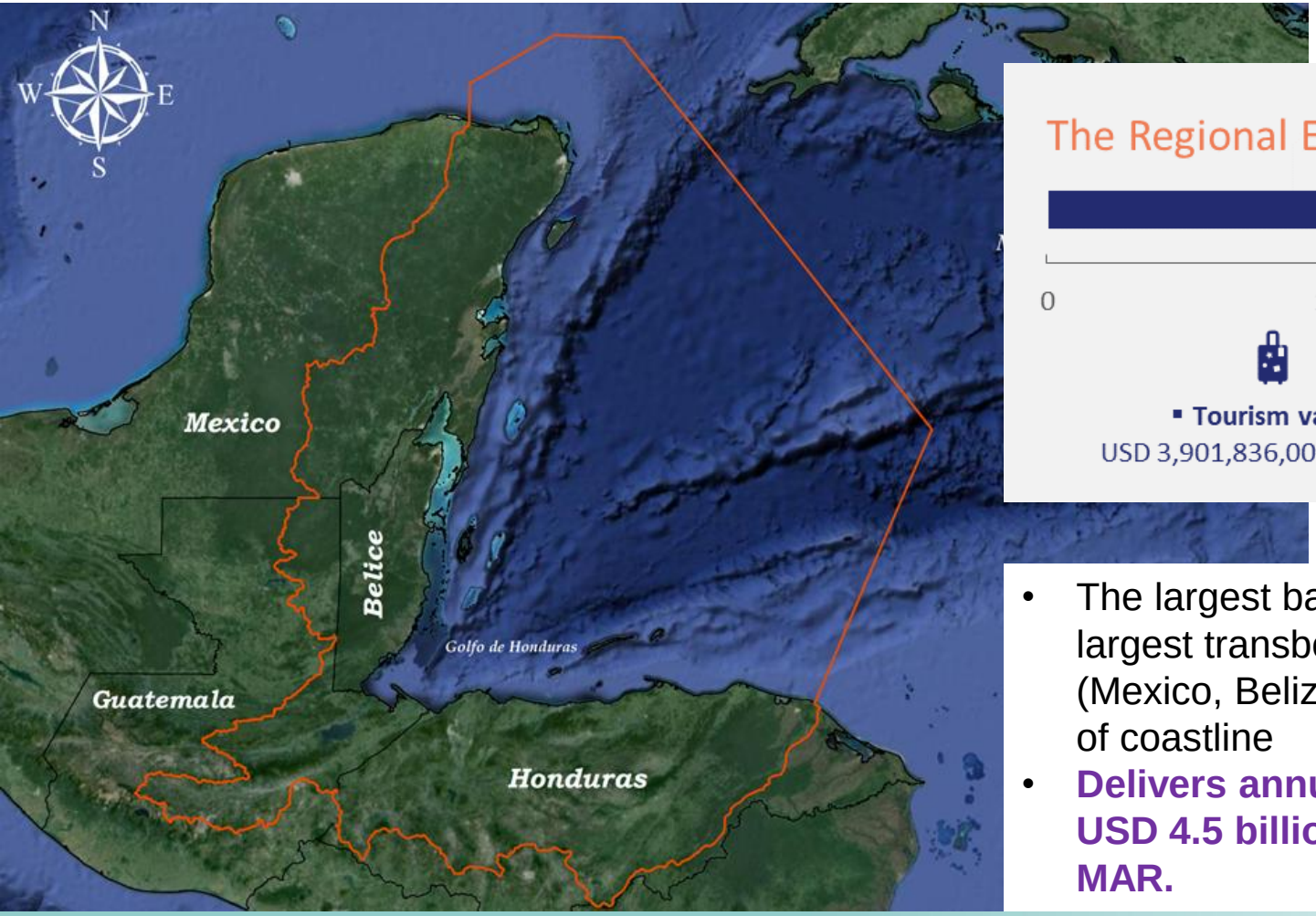
Cristina Sanchez, Forever Costa Rica

Israel Muñiz
Healthy Reefs For Healthy People

# Insurance innovations in the Mesoamerican Reef Region
# The MAR insurance programme


## Claudia Ruiz- MAR Fund-

# The Mesoamerican Reef (MAR) region





- The largest barrier reef in the Western Hemisphere and largest transboundary reef in the world - 4 countries (Mexico, Belize, Guatemala, Honduras) with 1000+ km of coastline
- **Delivers annual economic benefits of more than USD 4.5 billion to more than 2 million people in the MAR.**

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# The environmental problem: Hurricane-driven reef degradation

## Hurricanes are now a leading cause of live coral cover loss in the MAR

- Storms are now amplified by climate change, while global and local stressors have reduced the resilience of reef ecosystems.
- Reefs increasingly persist in a degraded state of early recovery and continual decline after storm-related damage.
- Reduced live coral cover and structural complexity leads to declines in fish biomass, fisheries productivity, and biodiversity.

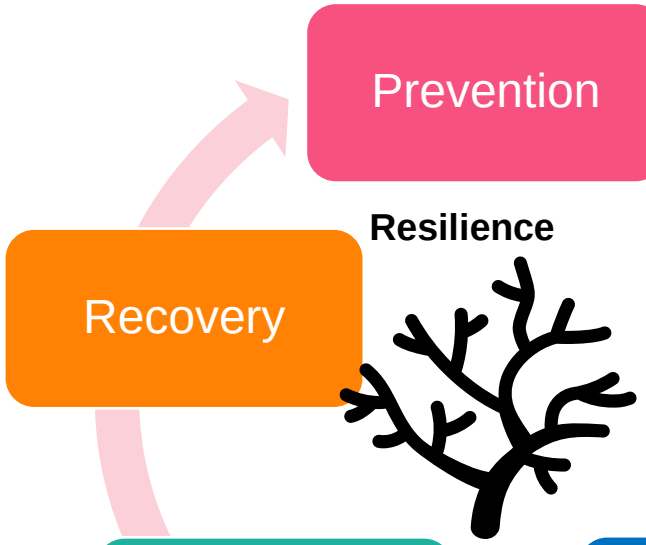
Hurricane Mitch, 2008


Hurricane Wilma, 2005


Hurricane Wilma, 2005

# The Mesoamerican Reef Insurance Programme

**Implement cost-effective insurance to cover hurricane risk to the MAR Region to enhance the resilience of the local beneficiaries who depend on the reef for their livelihoods, food security, and protection from coastal hazards**




- Risk analysis

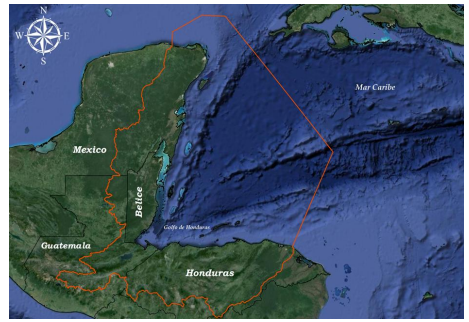
- Ongoing conservation/resilience building
- Disaster risk financing (e.g., parametric insurance)

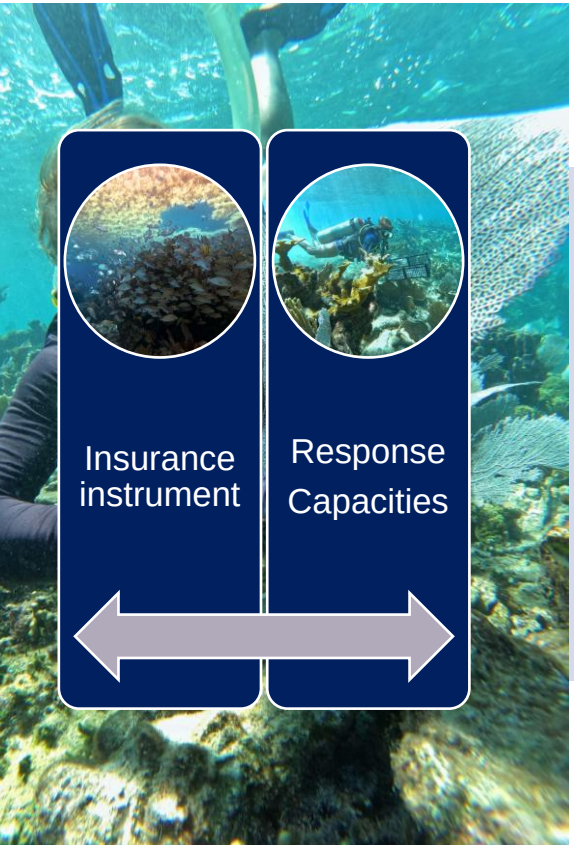
- Response Governance formalized
- Response plan development
- Reef guardian training

- Insurance pay-out
- Reef response

- Reef response
- Ongoing monitoring

# The MAR Insurance Programme - Structure




| Who pays and who is the policyholder? | What is covered? | How much is needed? | How is the pay-out managed and distributed? | How is the pay-out implemented? |
|---|---|---|---|---|

Premium paid and policy purchased by MAR Fund → Qualifying cyclone event occurs (parameter) → Insurance pay-out made → MAR Fund receives and distributes the pay-out through the Emergency Fund → Emergency Response Group implements response

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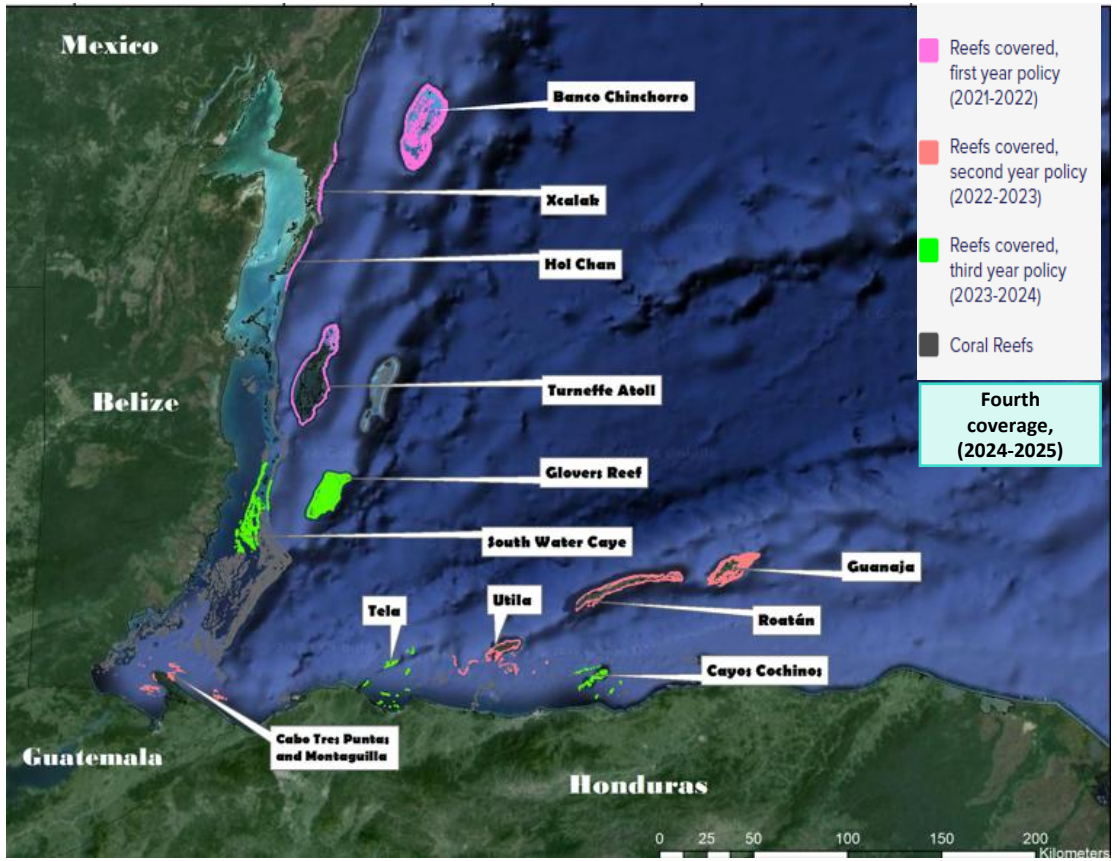
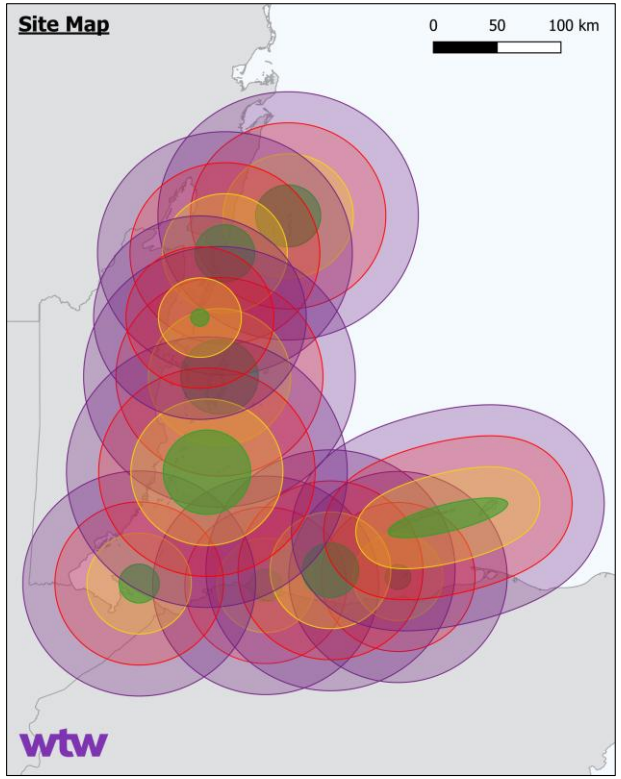
UN environment United Nations Environment Programme



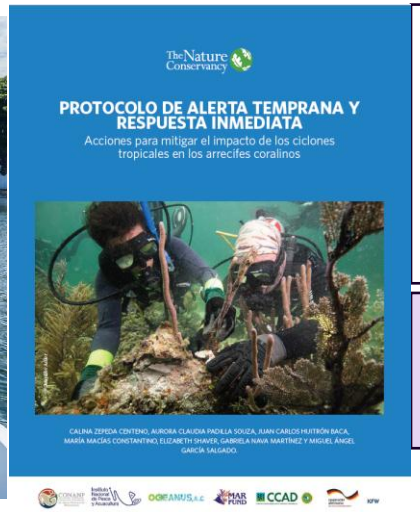




**Early Warning Protocol**
TNC, 2018

**Response Governance (Committees)**
7

**Response Plans (site specific)**
7

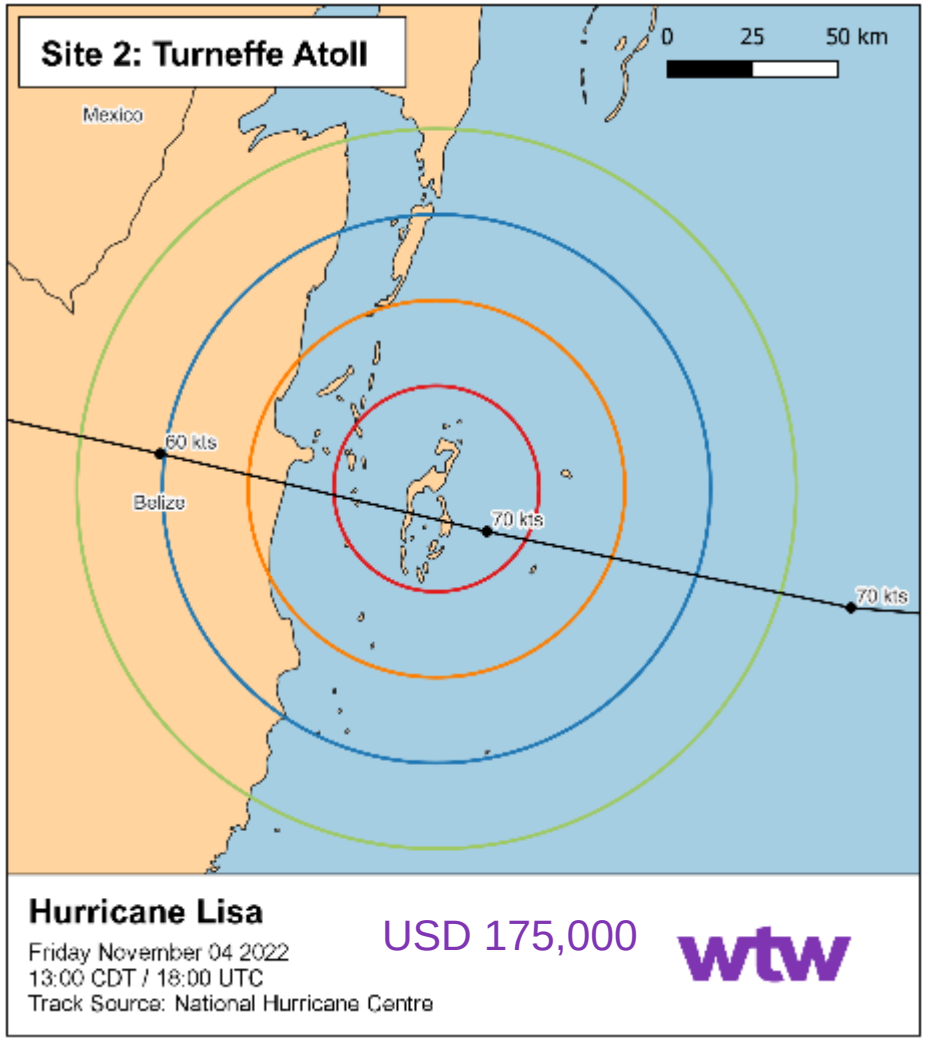
**Brigades (Reef Guardians)**
16


- **168 brigade members (reef guardians) >>16 brigades**
- **19 brigade trainers**

**Response Capacities built in collaboration with The Nature Conservancy**

# Pay-out and response for Hurricane Lisa, November 2022





**Above**: sites across Turneffe Atoll where reef assessment took place

**Top and bottom right:** Reef restoration activities taking place following Hurricane Lisa

# Benefits of a regional approach to financing reef response

## COST SAVINGS

**A single administration** and placement process **minimizes** frictional costs, reduces volatility in pay-outs and can translate into **lower** premiums

## PAY-OUT MANAGEMENT

A regional pay-out management process enables the **rapid distribution** of funds for immediate post-storm reef response

## TESTED MECHANISM

Initial frictional **costs and administrative burden were high but now reduced**, and rapid pay-out concept has been tested through Hurricane Lisa (2022)

## GOVERNMENT SUPPORT

**Governments support and endorse** the programme which is critical for its success

## STRATEGIC ALLIANCES

Coordinating with key stakeholders at the **site, national and regional levels** creates data and research, and builds capacities

## REPLICABILITY

The components and elements of the programme allow the **programme to be scalable to other sites**, risks and assets

# Managing Risks to Coral Reef Ecosystems with Parametric Solutions
Sarah Conway

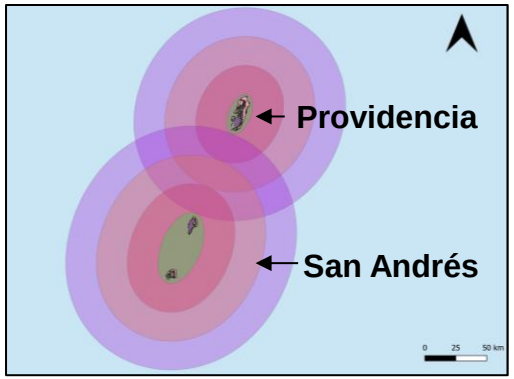
28 March 2025

# Scope: Assessing the Feasibility for Parametric Solutions

| Risk | Country | Rationale | Potentially relevant parametric solutions |
|---|---|---|---|
| **Hurricane** | **Colombia** | Reefs around SAP were severely impacted by Hurricanes Eta and Iota in the record-breaking 2020 hurricane season. | • Parametric insurance |
| **Coral bleaching due to marine heatwaves** | **Costa Rica** | Marine heatwaves threaten the survival of coral reefs, which are extremely sensitive to temperature changes. A parametric solution may be able to avert or minimize the impact. | • Parametric insurance<br>• Pre-arranged, trigger-based finance linked to grant funding |
| **Fertilizer run-off** | **Belize** | High Nitrogen levels have direct negative effects on coral health. A parametric solution may be able adjust farmer behavior/minimize fertilizer application when the risk of run-off is higher. | • Pre-arranged, forecast-based finance |

# Main Findings

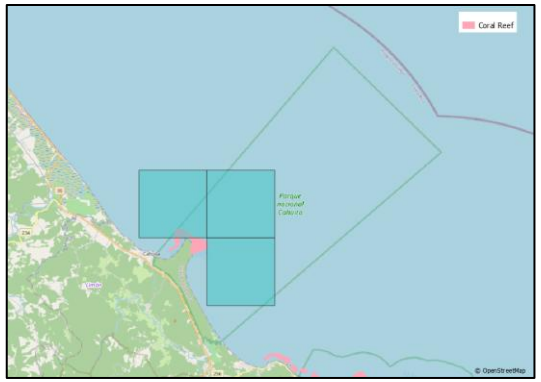
## Wind-driven hurricane risk for coral reef health




Cat-in-Nested-Circle parametric structure for SAP, Colombia

- Technically feasible, validated with Coral Reef Damage Model
- Positive implementation enabling environment (policyholder, response plan, capacity)

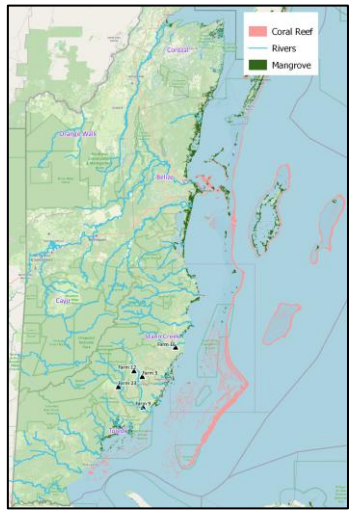
## Marine heatwave risk causing coral bleaching




Degree Heating Weeks Index in Cahuita, Costa Rica

- NOAA Degree Heating Weeks Index may be good to underpin structure as indicator of thermal stress, validated with Aqualink buoy data, but further technical analysis required
- Implementation questions regarding pay-out use cases and insurability

## Extreme precipitation causing excess agricultural nitrogen run-off




Standardized Precipitation Index anomalies capturing 1-month wet spell forecasts

- Climate Hazards Group InfraRed Precipitation with Station Data (CHIRPS) dataset and local rain gauges could underpin a product, but
- Given existing fertilizer management practices, parametric solution not cost-effective

# Lessons Learned

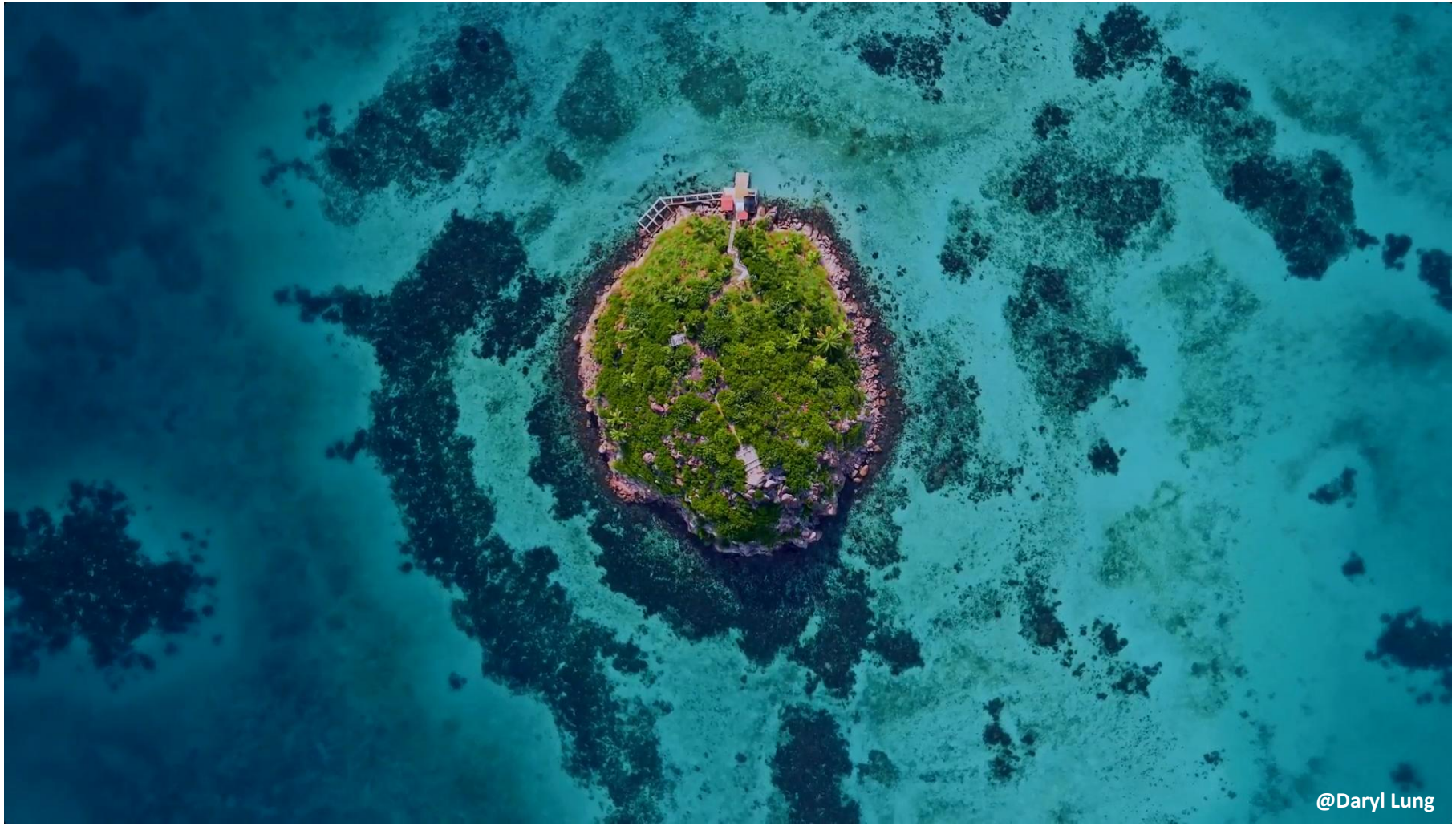
- **Parametric solutions:** one potential piece of a broader risk management and resilience-building framework.
- **Applicability to hazards impacting coral reefs:** most existing products in place address tropical cyclone risk, but may be useful to address other risks (e.g., marine heatwaves).
- **Feasibility assessment:** important to include technical and implementation considerations.
- **Local partners:** critical to have on-the-ground partners.

# Coral reef insurance and response in the Colombian Caribbean

*Innovative risk financing approaches to enhance ecosystem resilience along the Caribbean's coastlines*

March, 2025

# Context: Why it matters?

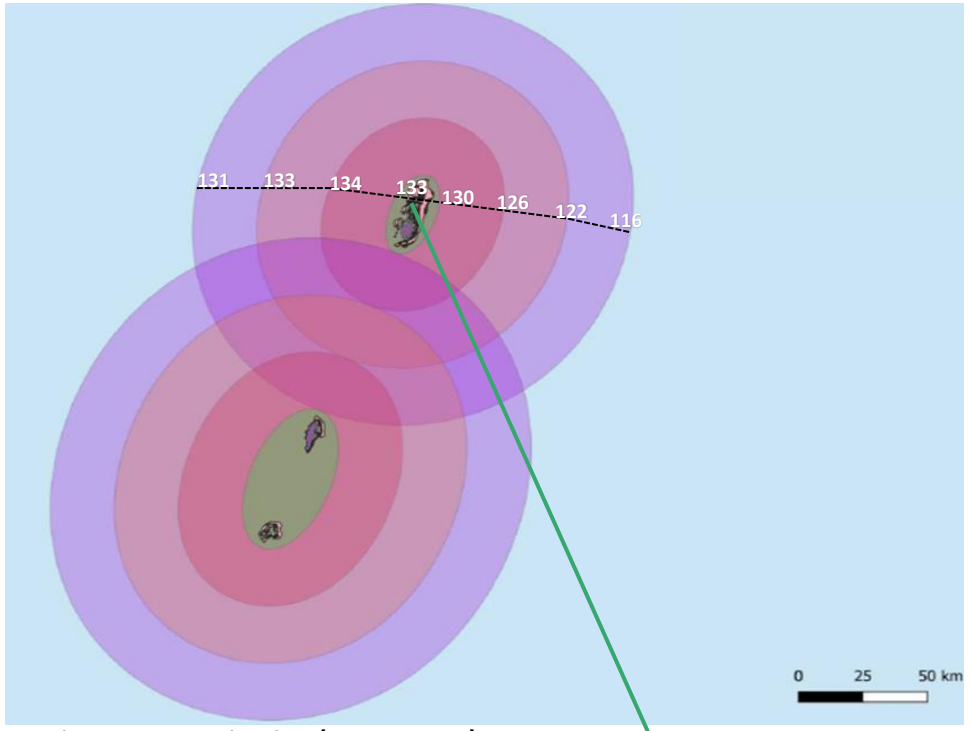
# Context: Vulnerability

# Solution: Innovative parametric insurance for coral reefs

**Insurance design**

**Pay-out management**

**A reliable financial instrument to cover emergency response costs on reefs that have been affected by hurricanes.**




**Hurricane Iota projection (WTW, 2024)**

| *Trigger Min (kn)* | *Hurricane Category* | *Zone A* | *Zone B* | *Zone C* | *Zone D* |
|---|---|---|---|---|---|
| **0** | **0** | 0% | 0% | 0% | 0% |
| **64** | **1** | 0% | 0% | 5% | 10% |
| **83** | **2** | 0% | 5% | 10% | 20% |
| **96** | **3** | 5% | 10% | 20% | 40% |
| **113** | **4** | 10% | 20% | 40% | 80% |
| **137** | **5** | 20% | 40% | 80% | 100% |

# Local engagement and governance

Stakeholder engagement

Governance framework and response plan

Local brigades training


**40**
Stakeholder groups engaged

**1**
Response Plan & Governance Framework

**45**
Local brigade members

**4**
Local instructors

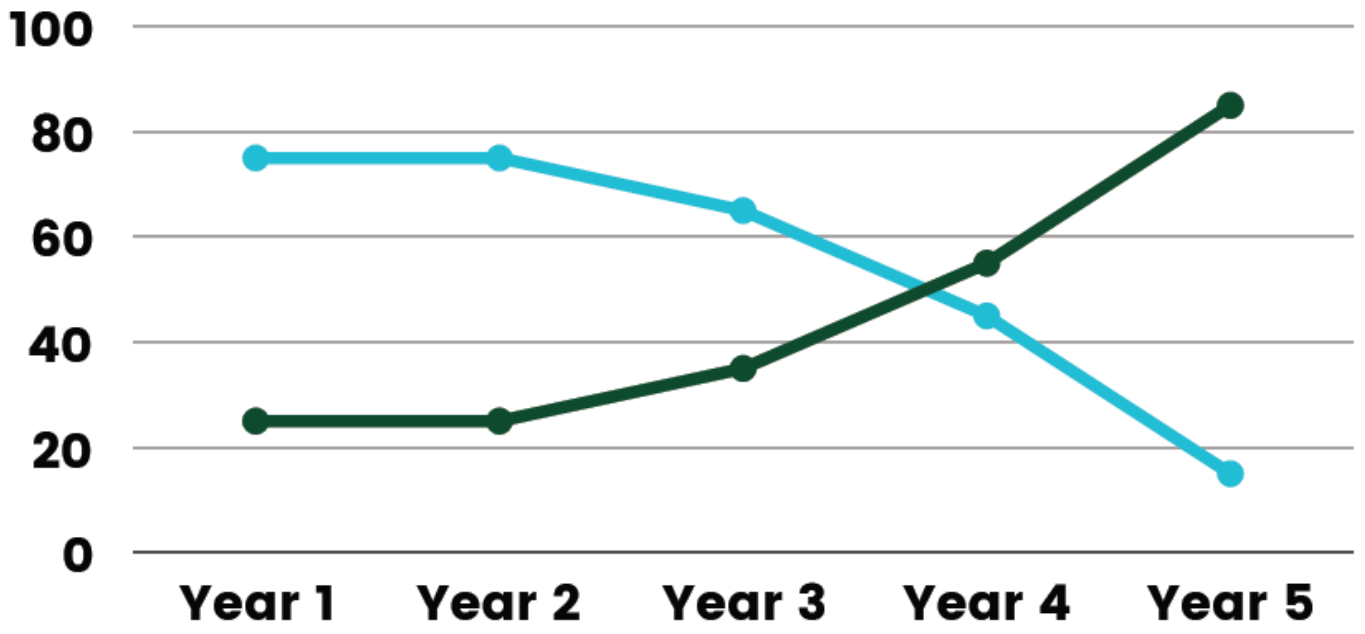
**Well-trained, local brigades are essential for immediate coral reef response after hurricanes. Their actions minimize coral mortality, maintain coastal protection, and preserve ecosystem services critical for local and Raizal communities.**

# Long-term vision: Financing

Financing strategy

**€140K**

Secured funding premium




Secure long-term, sustainable financing for annual parametric insurance premiums that support rapid post-hurricane response for coral reefs.

# Lessons learned


- Local empowerment
- Local governance
- More than just reef protection: Livelihoods
- Partnerships
- Potential for scale-up and replication
- Mobilize finance!
- Connect with broader conservation agendas
- Finance + community action = climate resilience

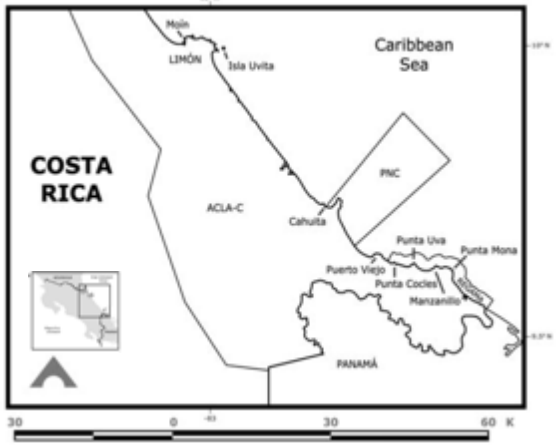
“*Reefs are life. We depend on them, and therefore, the responsibility to care for and sustain them belongs to all of us.*”

—— Zadatt Newball: Local brigade member

**Pablo Devis Posada**
**Climate change coordinator**
**pdevis@fondoaccion.org**
**https://fondoaccion.org**

@Daryl Lung


# PARAMETRIC ENSURANCE: Heat Waves impacting Coral Reefs

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Environment and Climate Change Canada

- Cahuita National Park
- Lack of local information
- Differing oceanographic conditions
- Frequency and intensity of events
- Insurance feasibility is low

# ACTIONS FOR THE CONSERVATION OF THE REEFS OF CAHUITA NATIONAL PARK

- Capacity-Building
- Local funds
- Research and monitoring
- Coral Reefs Restoration






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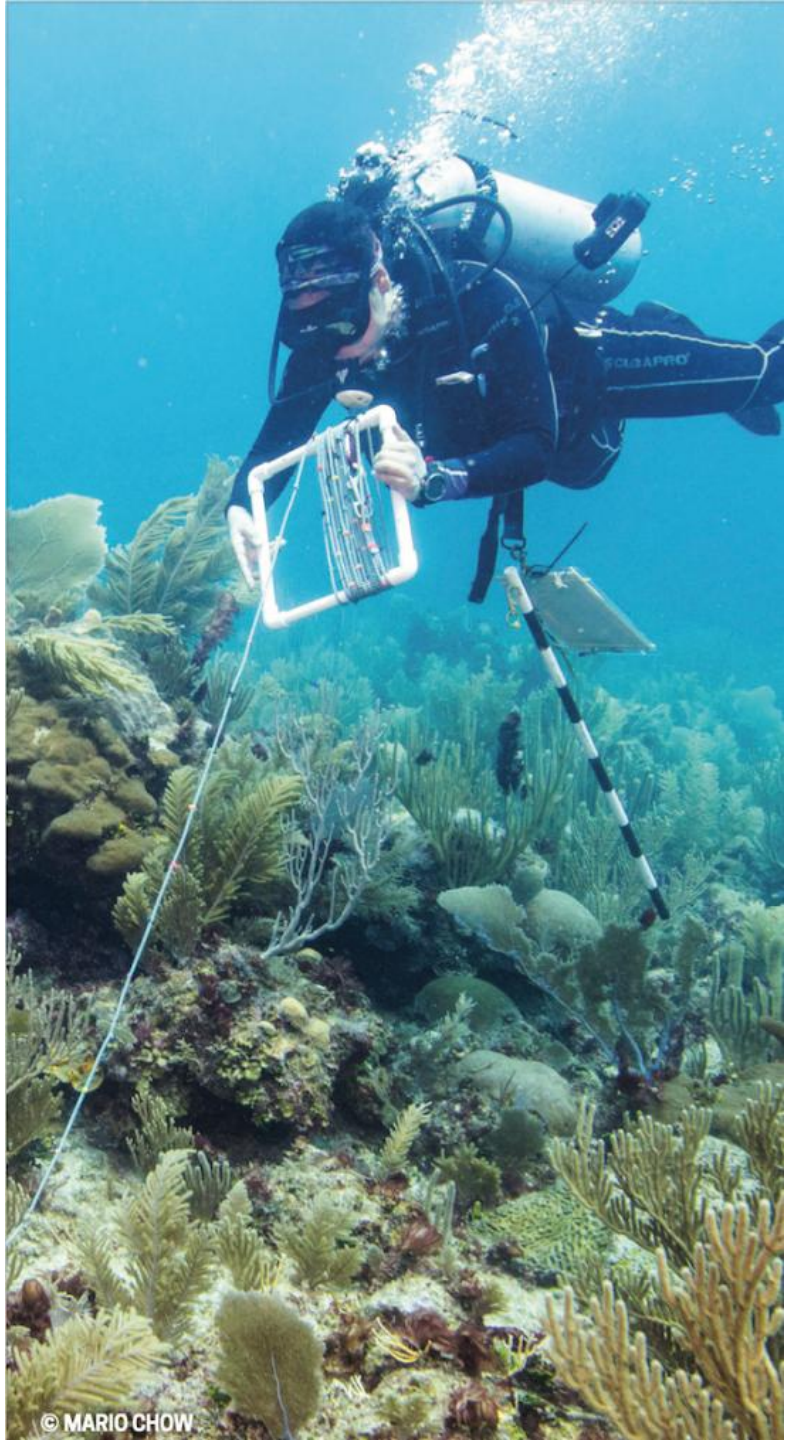
# Slide 1: Key Activities

**Objective: Assess the impact of post-hurricane reef interventions in Belize and Mexico.**

Case studies: Puerto Morelos (MX) & Turneffe Atoll (BZ) (2017–2023 HRI & partner data).

**Methods:**

1. Literature review & ecological data analysis.
2. Evaluate stressors (heat stress, bleaching).
3. Stakeholder surveys & expert insights.



# Slide 2: Results & Challenges

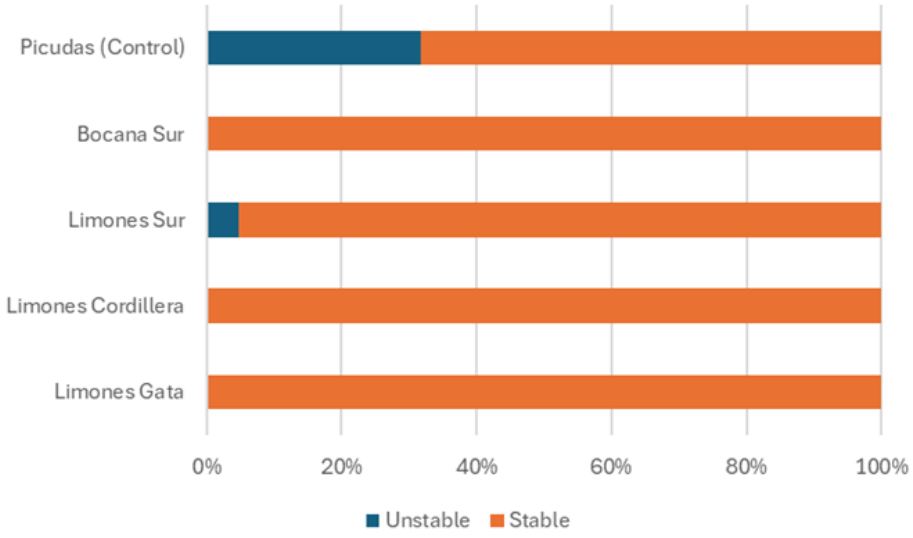
**Key findings:**

1. High Initial Survival – 100% survival of treated coral fragments; cementation most effective.
2. Strong Stabilization & Survival – 94.78% survival rate and highest stable colonies compared to control site.
3. Early Assessments Are Crucial – Immediate monitoring provides key stabilization insights.

**Challenges:**

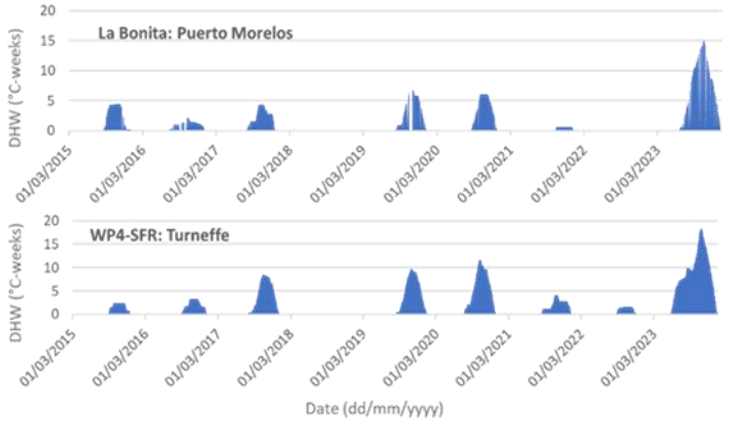
1. Limited Controls – Few control sites hinder comparative analysis.
2. Unclear Long-Term Impact – No significant coral cover differences detected.
3. 2023 extreme heat stress (DHW ~16°C-weeks) affecting recovery.

**Stable and unstable colonies in Puerto Morelos**




**Heat stress and coral bleaching as a main confounding factor**

@Valentina Cuchiarra, CORAL



# Slide 3: Next Steps & Recommendations

**Improving Monitoring & Research:**

- Standardize pre- and post-intervention assessments.
- Expand replication with control sites.

**Boosting Response Capacity:**

- Recruit & train more brigadistas.
- Establish incentive programs.

**Climate Resilience:**

- Integrate thermal stress resilience into interventions.

**Enhancing Stakeholder Engagement:**

- Develop open-access data-sharing platforms.
- Strengthen communication to build confidence in interventions.

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