The MAR Insurance Programme

An innovative tool for coastal resilience and risk preparedness

The Mesoamerican Reef Region (MAR) enables over USD 4.5 billion in reef-related income annually

The MAR supports 430,000 ha of seagrass, **135,000 ha of coral**, over 65 species and over **500 fish species**, including the endangered whale shark, manatees, and turtles.

The MAR protects the safety and property of more than **2 million people who live in areas lower than 10 meters above sea level**.

The MAR protects coastal built capital from more than **USD 25.7 million in average annual flood damages.**
Costal protection **USD 430 million**.

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 the 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

Managing hurricane risks to coral reefs

Asset

Hazard

- 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

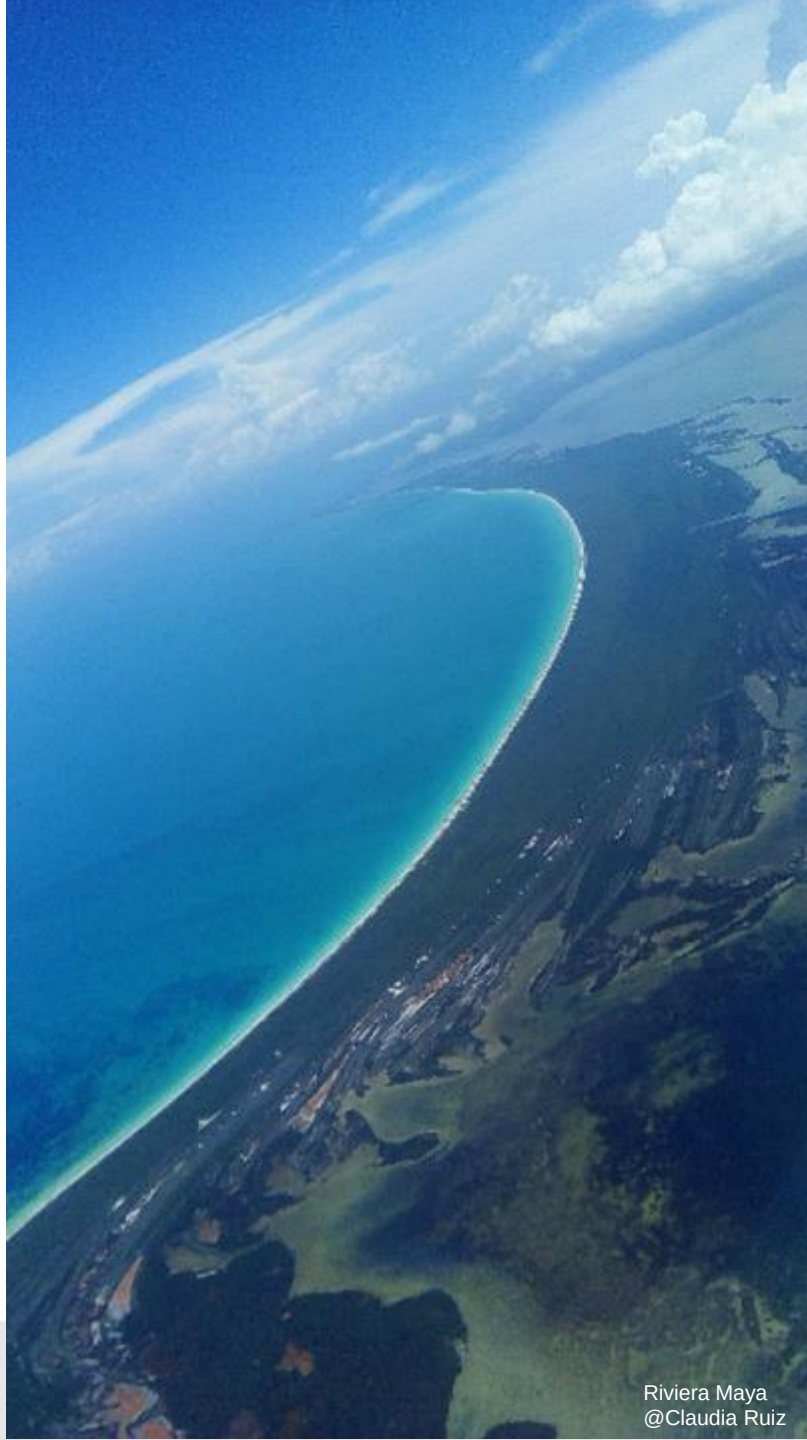
- Reef response
- Ongoing monitoring

The MAR Insurance Programme

Objective

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.

Partners of the MAR Insurance Programme



Riviera Maya
@Claudia Ruiz

The MAR Insurance Programme

Insurance-related activities

Insurance structure is designed collaboratively

Policyholder (MAR Fund) purchases the insurance *(with donor funding)*

The hurricane **meets** a pre-agreed intensity threshold and event notice is raised

A pre-defined insurance pay-out is made based on hurricane intensity and track/location

A report is generated by policyholder to demonstrate how funds were used

Reef response-related activities

Reef governance formalized; response established; and brigades trained

A hurricane passes near a covered site

The hurricane is **below** a pre-agreed intensity threshold

Possible alternative funding sources, such as an emergency fund, may be accessed

Policyholder receives pay-out to finance immediate reef response

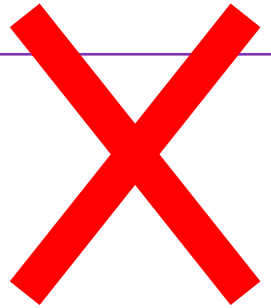
Reef guardians implement immediate reef response

Programme preparation and launch → **Triggering event** → **Reef response implementation and reporting**

Lessons learnt from insurance placement and reef restoration activities are taken forward to continuously improve the Programme

How can you insure coral reefs?

Traditional Indemnity Insurance	Parametric Insurance
An item has an agreed value and suffers a loss The loss is **assessed after the event** and payment or repair is made to **compensate for the loss**	Parametric insurance features a parametric trigger A predetermined **trigger based on a physical feature of an event** defines when the contract is to pay-out **without any adjustment for the actual loss suffered**



Parametric insurance explained

- A type of insurance that **covers the probability of a pre-defined event happening** (e.g., a hurricane occurring within a certain geographic area within a certain period of time). It **pays out a pre-agreed amount** to a policyholder according to **pre-defined event characteristics** (e.g., wind speed).
- Key ingredients:

Data	Trigger Definition and Pay-out Amount(s)

▪ **Underpins the product (e.g., rainfall, temperature, wind).**
▪ Must be:
  ▪ Independent
  ▪ Reliable
  ▪ Consistent
  ▪ Sufficiently long historically for pricing
  ▪ Continuously recorded (i.e., real-time) for settlement
	▪ Trigger be **clear** and **robust.** For example:
	  ▪ Cumulative annual rainfall at agreed weather station
	  ▪ Intensity and location of a hurricane
	▪ **Pay-out amounts pre-agreed**. For example:
	  ▪ Fixed binary payment of entire limit once triggered
	  ▪ Scaling payment according to the severity of the event

Benefits

- Transparency
- Fast claims payments
- Simplicity
- Broad coverage
- Unconstrained use of funds

Other Considerations

- Basis risk
- Data needs
- Insurable interest

Risk transfer for coral Reefs: Reality check

Common (Mis)understanding

- Parametric insurance is a financing lever for ongoing conservation.

- Parametric insurance protects the total economic value of the coral reef ecosystem.

- Investments in resilience/conservation reduce the cost of the parametric insurance premium.

Reality

- Insurance has a cost. Over time, on average, you should expect to pay more than you receive. However, it is valuable if having money after an event quickly, and at scale, is important.

- The pay-out is structured to ensure there is sufficient liquidity in the aftermath of a triggering event to support time-sensitive pre-agreed response activities (and any other pre-agreed interventions).

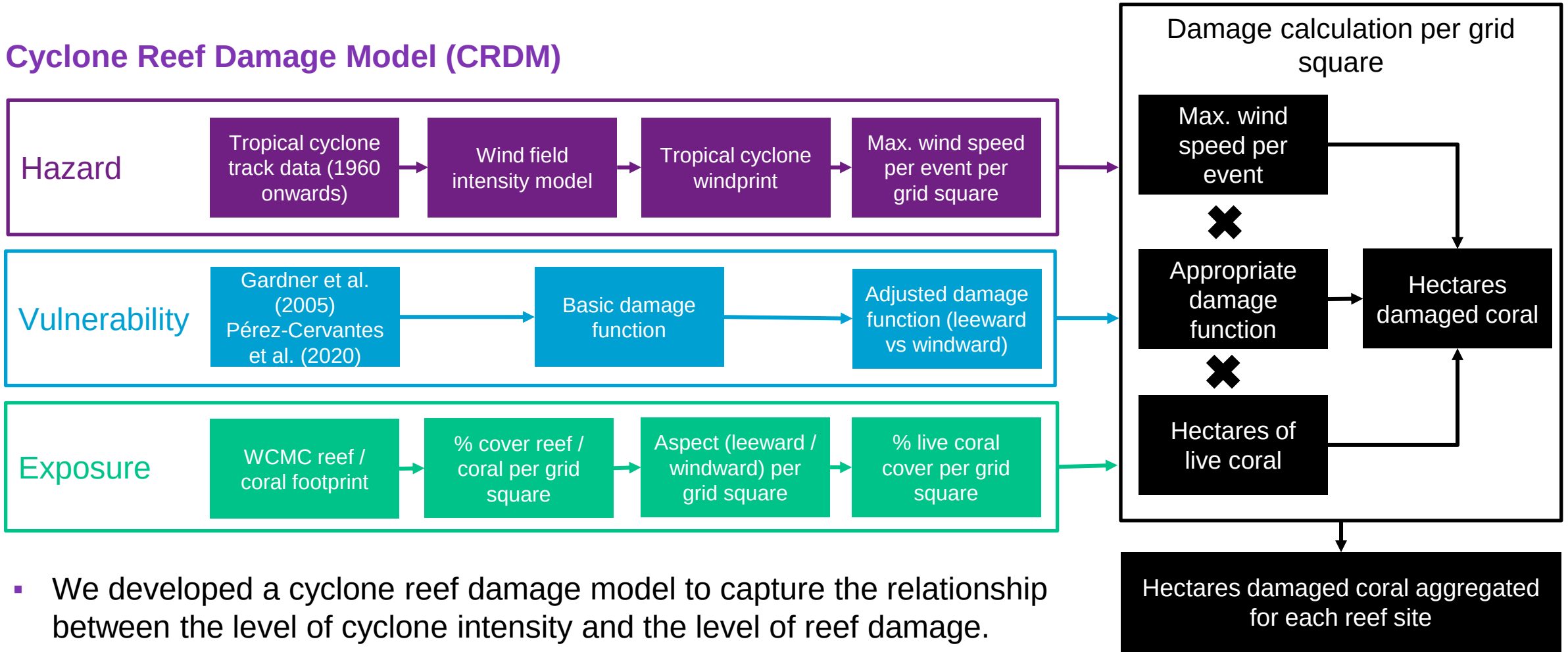
- Pricing is linked to the risk itself (e.g., of a hurricane occurring), which is not impacted by improved ecosystem health. However, the structure may be able to be adjusted (e.g., raising trigger thresholds, lowering the annual limit), thereby reducing the cost.

When to consider hurricane parametric insurance for coral reefs

- **Active, ongoing conservation efforts are underway.**
- **High hurricane risk** that could threaten the coral reef ecosystem and ongoing efforts to protect it.
- A compelling **pay-out use case** that is fit-for-purpose in the local context and that adds value if received quickly after an event (e.g., evidence of the value of and support for immediate reef response or other interventions).
- **Ability to receive and deploy a pay-out quickly**, should a hurricane occur. This requires:
  - A **capable policyholder** with the institutional infrastructure (e.g., dedicated account) to receive and transfer funding and an insurable interest in the coral reef ecosystem.
  - **Local partners** who are **sufficiently trained** and who have a **pre-agreed response plan** in hand.

Designing the MAR Insurance Programme structure (1)

Cyclone Reef Damage Model (CRDM)

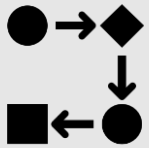


- We developed a cyclone reef damage model to capture the relationship between the level of cyclone intensity and the level of reef damage.
- The model is used to validate the structure and minimize basis risk.

Designing the MAR Insurance Programme structure (2)

Design

Design a product structure which captures the relationship between storm track, storm intensity and pay-outs, using the Coral Reef Damage Model (CRDM) to validate



Analyse

Run a historical storm track dataset through the proposed structure to understand when it would have been triggered if the product was in place, and validate with local partners

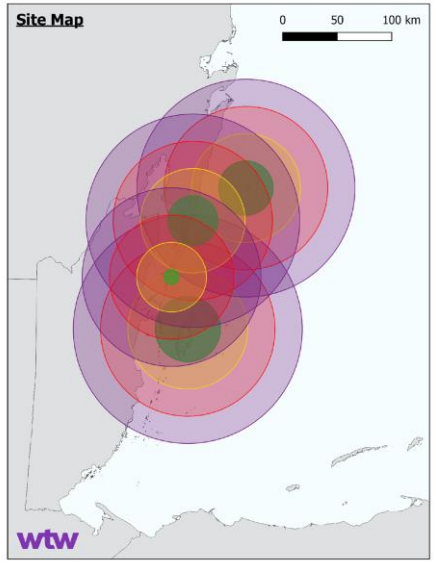
Optimise

Refine the structure using a large stochastic dataset to produce a comprehensive view of risk, and combine with programme limit and pay-out matrix

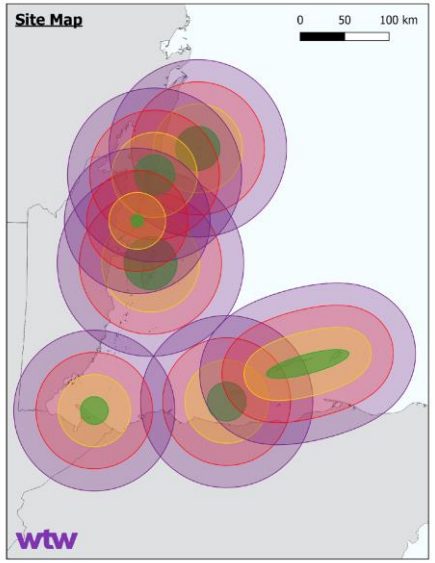
Regular communication with MAR Fund

Designing the MAR Insurance Programme structure (3)

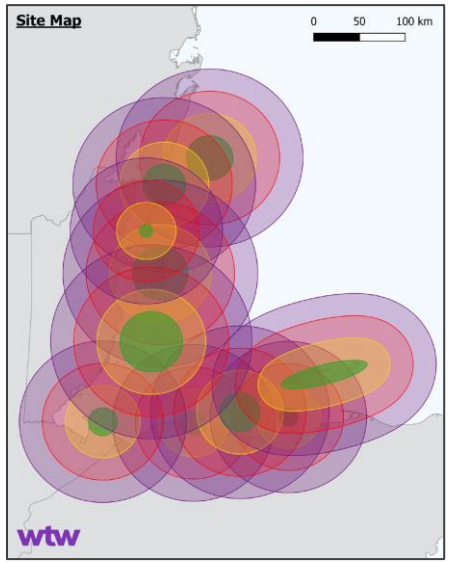
- We have structured a parametric ‘Cat-in-Nested-Circles’ product.
- Each site has four concentric Zones: D in the centre, then C, B, and A (the outermost zone).
- Each Zone includes the smaller Zone(s) within its boundary.



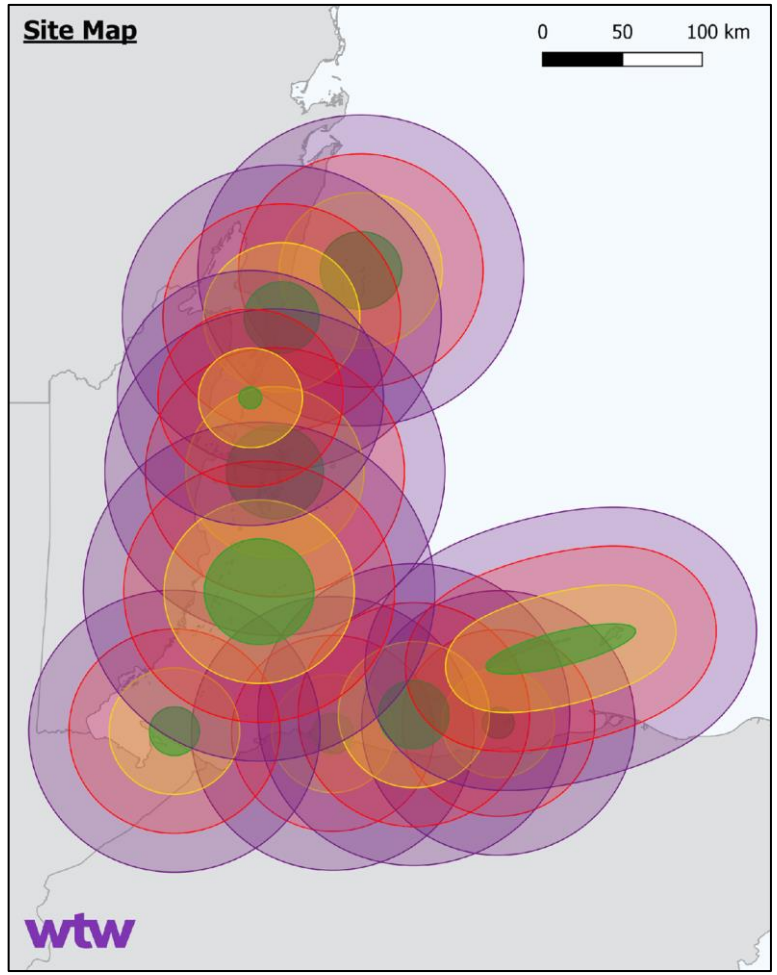
Inaugural year of placement with 4 sites for the 2021/22 season



Second year of placement with 7 sites for the 2022/23 season



Third year of placement with 10 sites for the 2023/24 season

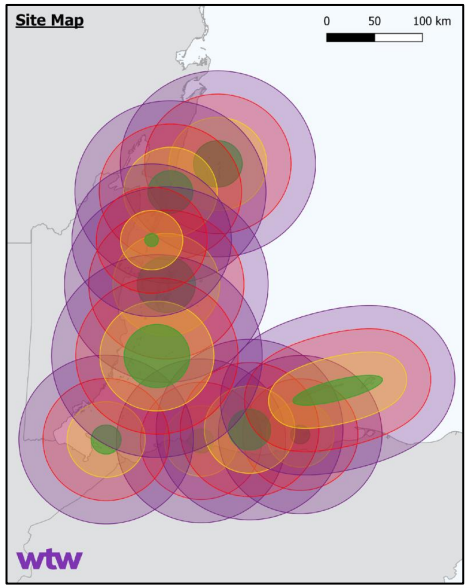


Fourth and current year of placement with 10 sites for the 2024/25 season

Designing the MAR Insurance Programme structure (4)

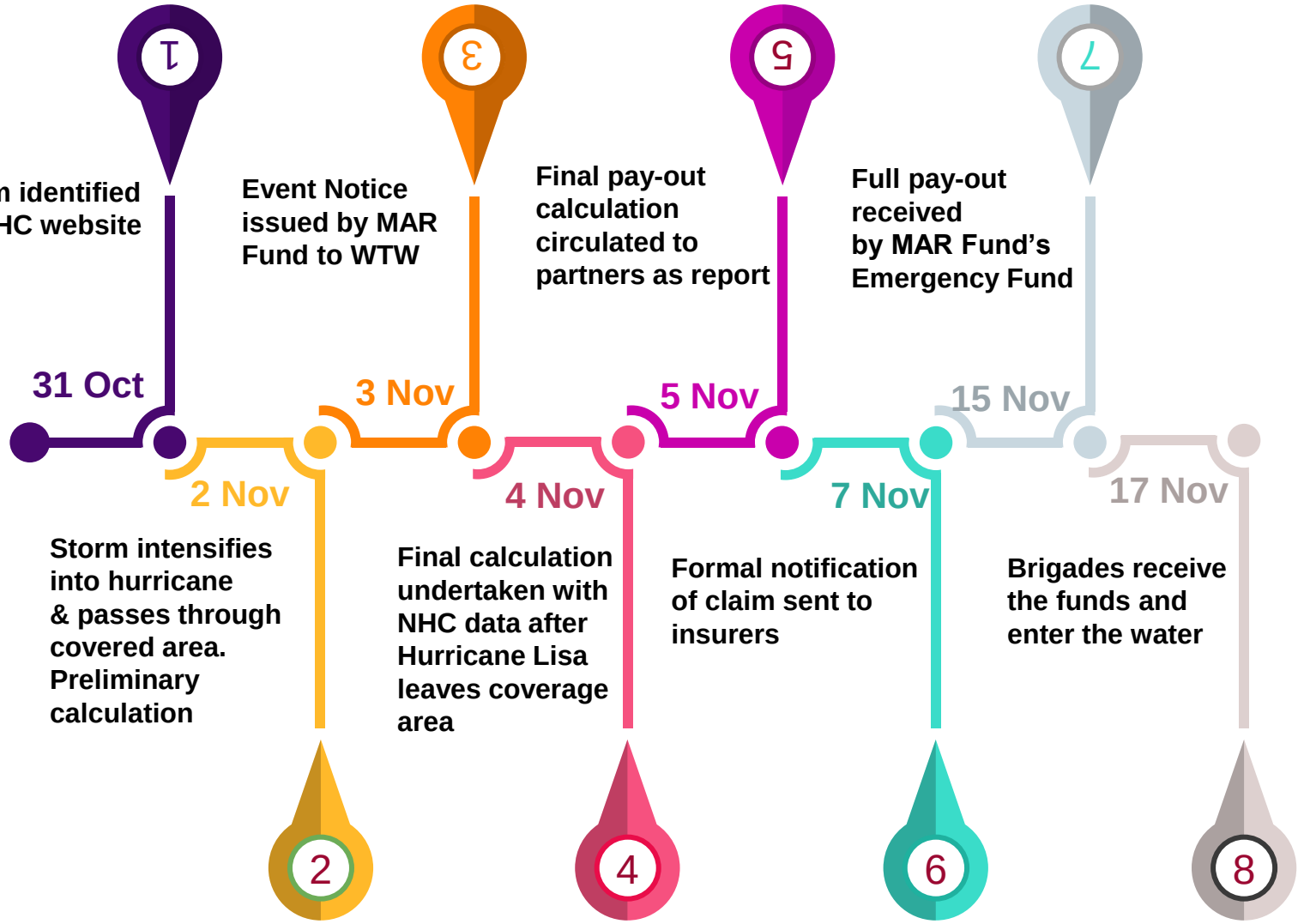
- The trigger mechanism utilises peak wind speed as the fundamental hazard parameter to proxy hurricane intensity, with response needs—and therefore pay-outs—captured as a function of peak wind speed.
- The pay-out matrix reflects the estimated costs of reef response at each site.
- The category of hurricane and the Zone within which the storm track passes at that status* has a corresponding Response Level according to the matrix at right.
  - The pay-out at each Response Level varies between the sites to reflect the maximum absorbable rapid reef response budget for each site.

Minimum wind speed (kn)	Hurricane Category	Zone A	Zone B	Zone C	Zone D
0	0	0	0	0	0
64	1	0	0	Level 1	Level 2
83	2	0	Level 1	Level 2	Level 3
96	3	Level 1	Level 2	Level 3	Level 4
113	4	Level 2	Level 3	Level 4	Level 4
137	5	Level 3	Level 4	Level 4	Level 4



** Status means that a Tropical Cyclone has a peak 1-min sustained windspeed at or above the threshold for that Category somewhere along its track within the relevant Zone, using linear interpolation to join NHC reporting nodes*

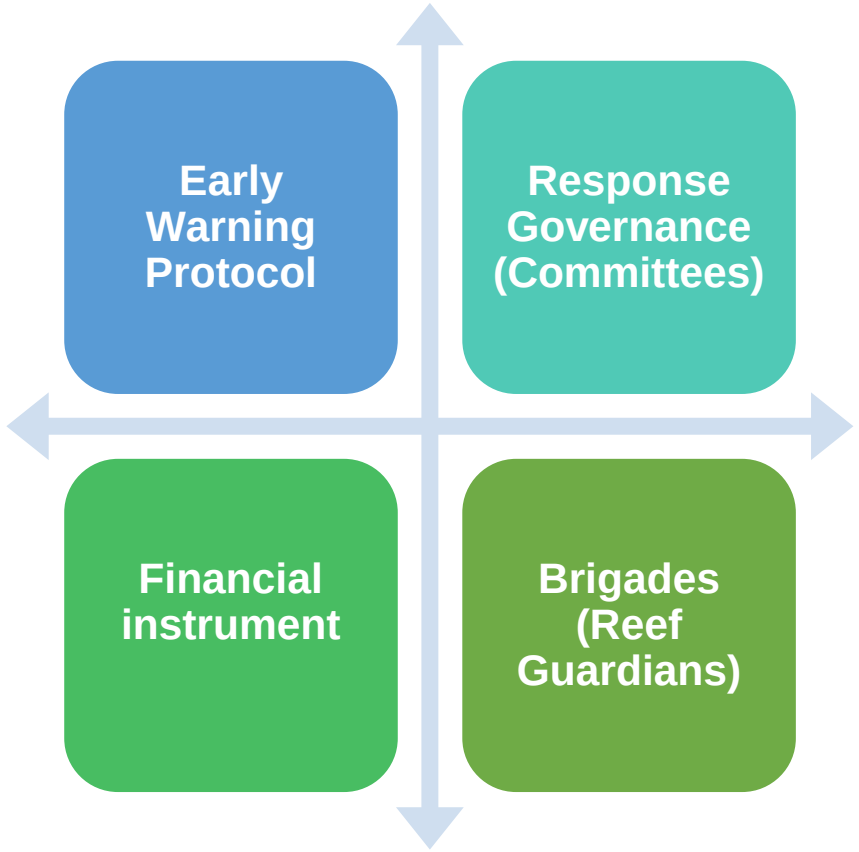
Hurricane Lisa Pay-out, November 2022

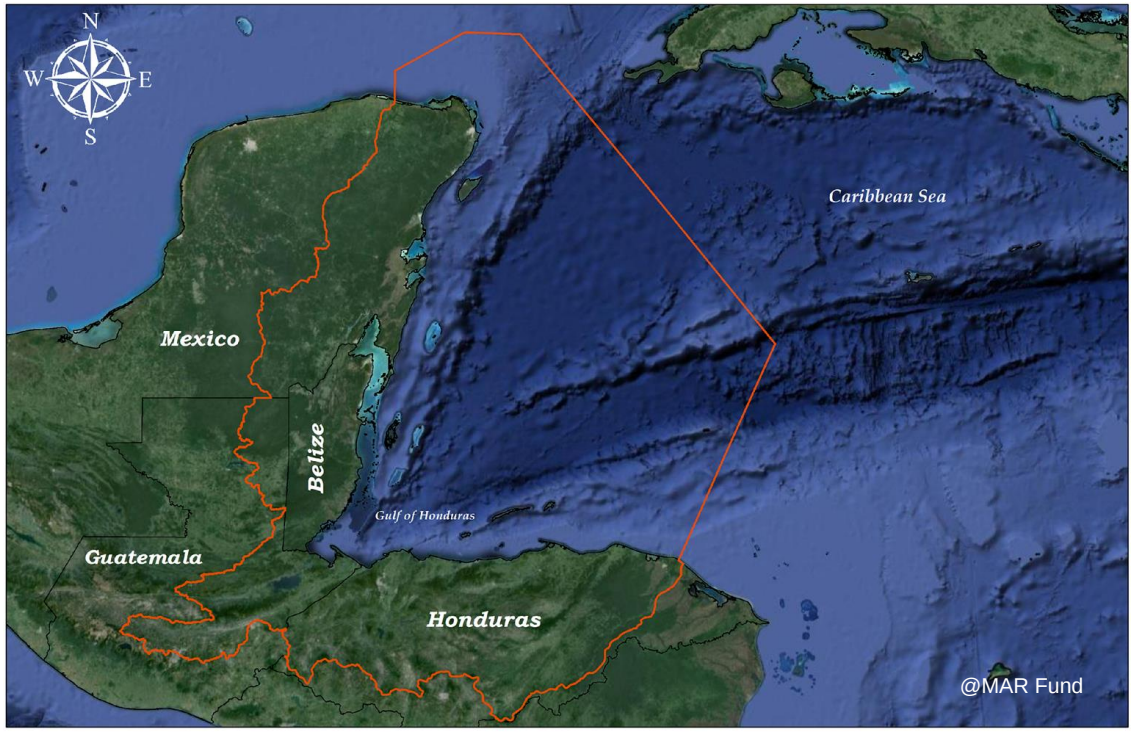


Lessons Learned

- It works! Following its first triggering event, the MAR Insurance Programme paid out USD 175,000.
- Presence of MAR Fund's Emergency Fund and pre-agreed response plans enabled efficient deployment of funds.
- Insurance structure and pay-out limits need to be informed by response capacity, rather than ideal response based on reef damage.

How does emergency reef response look like in practice?





Regional approach across the local and national levels, collaborating with key stakeholders across government and local communities.

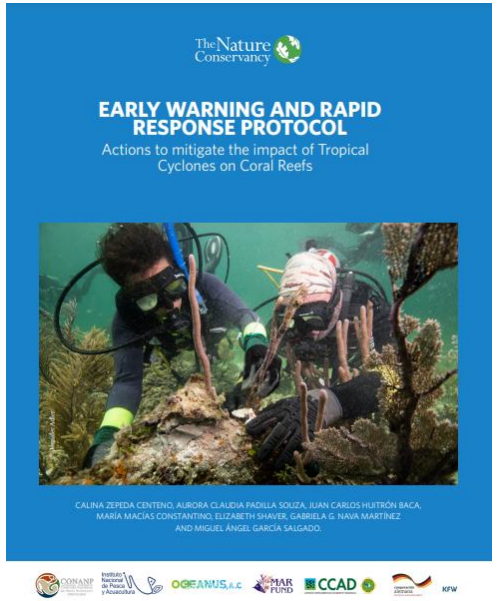
Early Warning Protocol

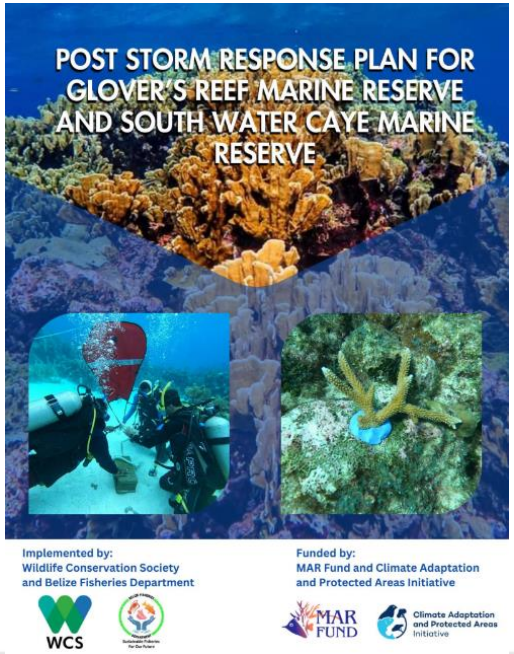
Early Warning Protocol

Response Governance (Committees)

Financial instrument

Brigades (Reef Guardians)





Response Governance

Early Warning Protocol

Response Governance (Committees)

Financial instrument

Brigades (Reef Guardians)

In collaboration with The Nature Conservancy

- **196 reef guardians/first responders (brigades)**
- **7 Response Committees (governance)**
- **20 Brigades**

Reef Brigades

Early Warning Protocol

Response Governance (Committees)

Financial instrument

Brigades (Reef Guardians)

Objective

Response groups effectively implement emergency response actions in order to address the damages caused by storms in coral reefs.

@ Sierra García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Credit: Mauricio Valenzuela

Immediate post-storm reef response can reduce negative impacts of hurricanes on the MAR

Early Warning Protocol

Response Governance (Committees)

Financial instrument

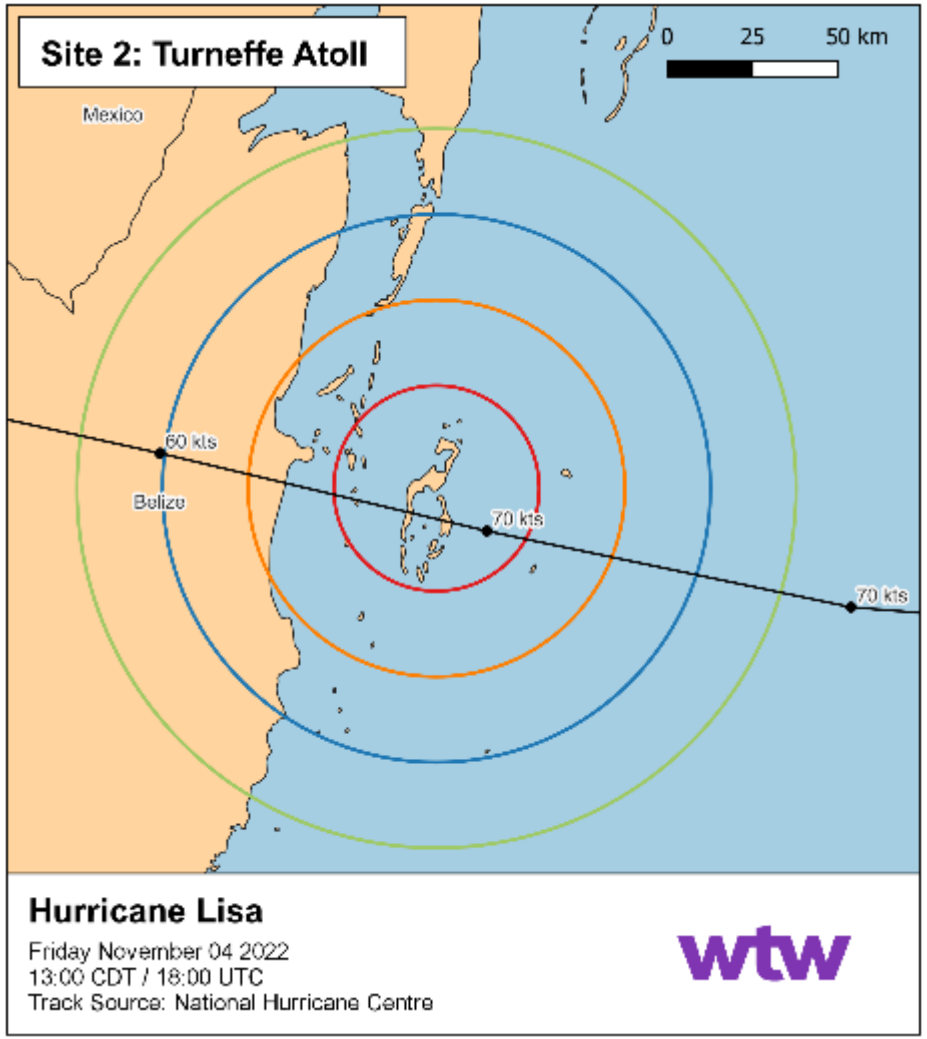
Brigades (Reef Guardians)

Responders are organized to **immediately assess damage** and remove all debris and sedimentation smothering corals

They are equipped to **re-attach, stabilize, and recover broken coral fragments** and repair structural damage to colonies

They are also trained to **collect and transplant viable fragments for care in nurseries** and monitor the rescued corals

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

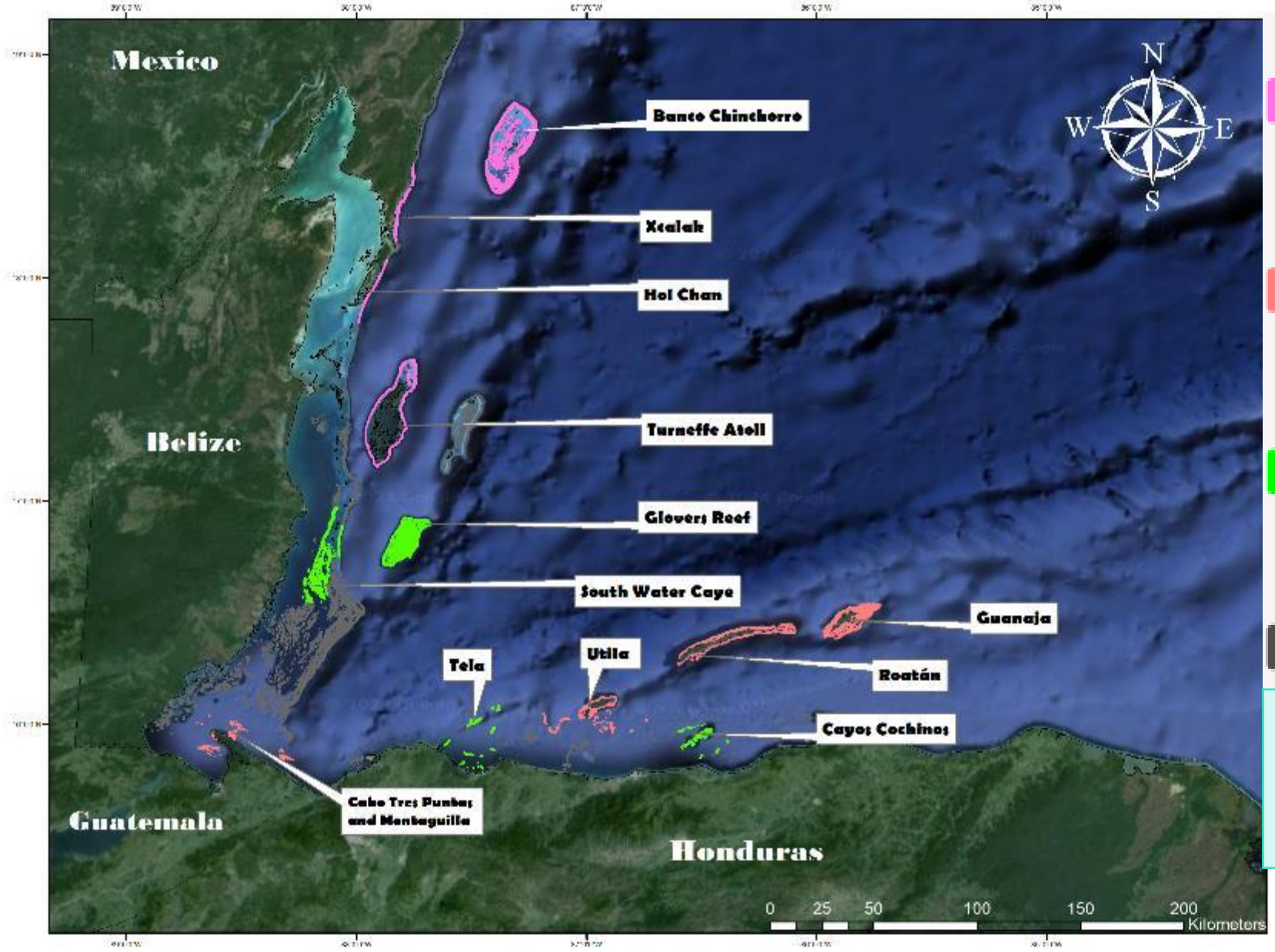
Governments support and endorse the programme which is critical for its success

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



Reefs covered, first year policy (2021-2022)

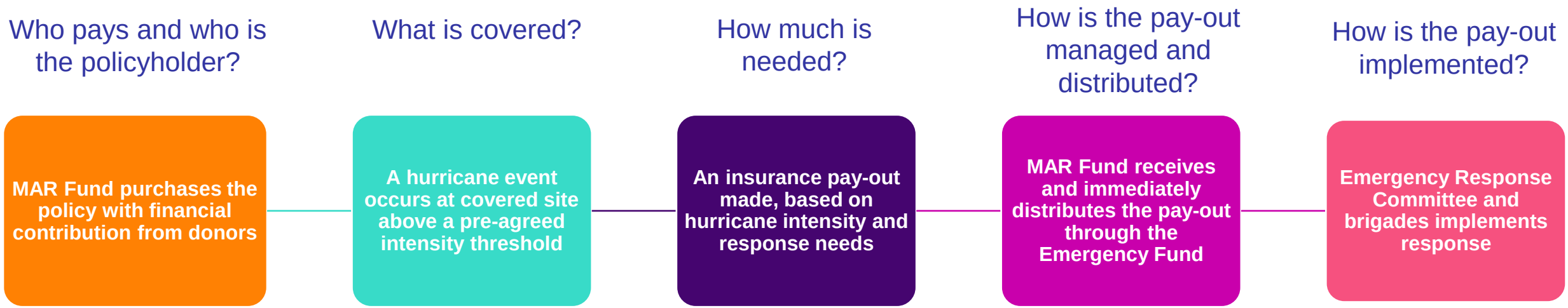
Reefs covered, second year policy (2022-2023)

Reefs covered, third year policy (2023-2024)

Coral Reefs

Fourth coverage, June 1st 2024-May 2025

The financial solution: MAR Insurance Programme



Donors and partners of the programme:

- InsuResilience Solution Fund (ISF)
- Ocean Risk and Resilience Action Alliance (ORRAA)
- UNDP-AFCIA Small Grant Program
- ICRI/UN Small Grant Program
- AXA Climate
- The Nature Conservancy
- Regional, national and local authorities in the four MAR countries

MAR FUND

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