

## Mesoamerican Reef (MAR) Fund Insurance Programme

By

Simon Young, Sarah Conway, Jamie Pollard, Maya Dhanjal, Heather Martin,  
Caroline Smith

WTW

### Abstract

The Mesoamerican Reef (MAR) Fund aims to drive regional funding and partnerships for the conservation, restoration, and sustainable use of the Mesoamerican Reef. The MAR Insurance Program is designed to scale the MAR Fund's existing reef response fund, to enable reef restoration and conservation actions following damaging hurricane impacts. This parametric product, in place since 2021, currently covers 10 sites using a Cat in Nested Circles approach.

Overview

Peril/s	Tropical cyclone
Geography/Region	Western Caribbean Sea, along the Mesoamerican Reef offshore of Mexico, Belize, Guatemala and Honduras
Years of	A pre-coverage development project started in 2020. The insurance programme was first placed in 2021, and has been active since then
Exposure covered	Reef damage response costs
Trigger type/s	Pure parametric
Trigger mechanism/s	“Cat in Nested Circles” (CiNC)
Key information	Programme currently comprises 10 coverage sites, with a shared Response Level matrix defining the response level per TC category / nested circle and individual site payout amount per Response Level.
Annual Limit	USD\$ 1,500,000 (for 2024/25)
Issuer	AXA Climate via AXA XL Insurance Company UK Limited
Cedant	The Meso-American Reef Fund, Inc. (MAR) MAR Fund, which was established in 2004 in recognition of the need for regional coordination of conservation funds from Belize, Guatemala, Honduras, and Mexico. MAR Fund aims to drive regional funding and partnerships for the conservation, restoration, and sustainable use of the Mesoamerican Reef. This is achieved through numerous programs with varied objectives including promoting sustainable fisheries practices, supporting protected areas management, reef conservation, and emergency reef restoration.
Parties Involved	WTW is broker to MAR Fund and acts as Calculation Agent

## DETAIL

### Motivation

#### What is the context for wanting to obtain a parametric insurance product?

MAR Fund manages an Emergency Fund, through which it is able to respond to funding requests from local implementation partners to rapidly address local negative impacts on the reef (such as ship groundings) by deploying response brigades. The insurance programme allows the Emergency Fund to be scaled up quickly and substantially, by receiving payouts from the insurance programme, so that it can appropriately respond to financing needs from response brigades for major hurricane impacts.

#### How are reefs impacted by hurricanes and what are the benefits of rapid response?

The impact of hurricane events on reefs is well-established. Rough ocean conditions can cause mechanical damage to reefs, including breakages and displacement of coral. Furthermore, high winds and heavy rainfall associated with hurricanes often transport debris to the nearshore zone occupied by reefs, further exacerbating damage.

Rapid response to clean the marine environment, rescue damaged corals, and stabilize the reef can minimize the impacts of hurricanes. Funding is required to: initiate governance and coordination actions, undertake in-the-water damage assessment and marine clean-up, begin reef-repair, and collect and transplant viable fragments for care in nurseries.<sup>1</sup>

#### Are there any relevant past experiences that catalysed the purchasing of a parametric insurance product?

Past experience demonstrated that MAR Fund’s traditional funding mechanisms – mainly philanthropic grants to undertake specific projects over a multi-year timeline – were inadequate when substantial funding was needed quickly to respond to hurricane impacts while the window of opportunity for maximum positive impact on the speed and extent of reef recovery was open.

#### What type of coverage were you motivated to provide?

The motivation of the MAR Insurance Programme is emergency response funding. However, continued engagement throughout the region has revealed that a “business interruption” product geared towards supporting local implementing partners may be valuable. These partners are operating as blue economy businesses and therefore need financial resources swiftly post event to reinstate their operations.

---

<sup>1</sup> <https://marfund.org/en/wp-content/uploads/2024/06/MARInsurance-Brief-2024-a.pdf>

What is the aim of the policy?

Quick payouts to support response, which has a hugely magnified value if implemented within 6-8 weeks of the hurricane impacts.

The pay-out structure is stepped, meaning that pay-out amounts (or levels) correspond to the increasing amount of resources required to respond to more damaging hurricane impacts. The pay-out levels are tailored to be specific to each of the 10 reef sites (Figure 1), depending on the number of responders that are available (salaries, subsistence), response costs (equipment, fuel), and duration of the response activities. Current response levels vary from USD 70,000 to USD 350,000 depending on the site though this is reviewed annually ahead of the policy renewal.



Figure 1: Locations of ten sites/reefs covered under this policy.

What was the role and perception of basis risk?

To ensure that the parametric product structure adequately captures damaging hurricane events, and to minimise basis risk, WTW developed a “cyclone reef damage model” which quantified reef damage by combining information on hurricane wind fields, reef exposure and reef vulnerability. The final structure performed well compared to the full damage model, paying-out for historical events identified as damaging by the full model. The original parametric product design and subsequent modifications (e.g., to pay-out / response levels) have all been designed in very close collaboration with the Insured and with the local implementation partners to achieve best-possible product design.

## Description of the Coverage

### How was the risk profile determined and evaluated?

WTW built a full reef damage model to capture the risk profile of response needs / costs and to act as a baseline against which various parametric designs could be compared to evaluate the quality of the proxy. Financial conditions were dictated to a significant degree by premium availability, as well as to match resource availability at each site (given that response brigades are small (and cannot be quickly upscaled for a response) and the time window is limited) and to maximise the value of diversification across the full programme.

### Describe the trigger mechanism and how it was evaluated?

Single trigger, stepped by hurricane category and nested circle intersection (examples shown in Figure 2) so that parametric loss rate increases with both hurricane intensity and proximity to the reef site of interest. Validated against a full reef damage model built by WTW.

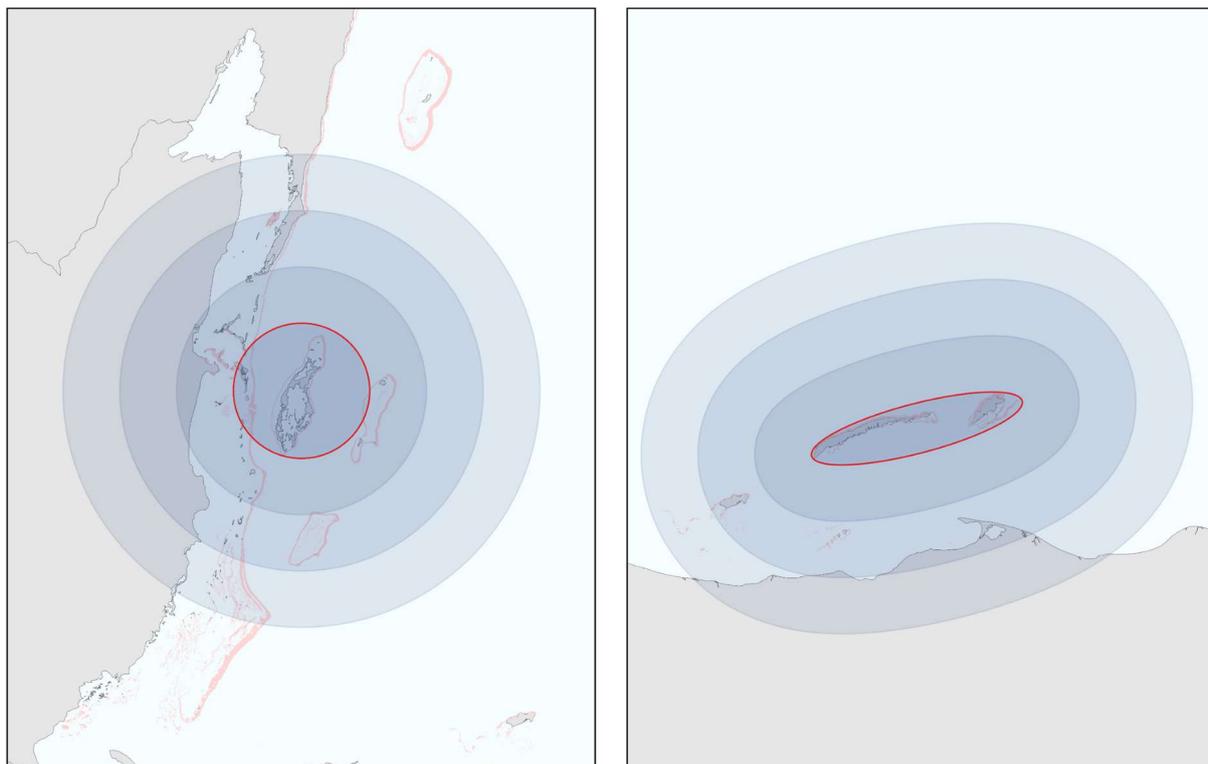


Figure 2: Cat-in-nested-circles (CINC) zones for two example reef sites, Turneffe Atoll (left) Roatan and Guanaja (right).

The parametric product triggers based on hurricane track position and wind speed intensity as reported by the National Hurricane Centre. The product uses 6-hourly observational points and 1-minute sustained wind speed in knots. The pay-out calculation is undertaken on the UTC calendar day after the

hurricane has finally left the parametric structure. The pay-out is based on the maximum wind speed recorded in each concentric circle, using the observed point or the straight-line intersection between two observational points. In the latter case, the wind speed at the intersection is determined by linear interpolation between the two observational points.

Were there any back-up triggers or alternative mechanisms included to manage basis risk/ provide client with flexibility?

No, though noting that MAR Fund’s Emergency Fund can provide limited support for response if the insurance programme doesn’t trigger, and also has flexibility to assign an incoming payout amongst different reef sites even if a site doesn’t “trigger” and contribute to the payout amount.

Table 1: Response Level Matrix

Trigger Min (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

## Payout

What is the payout structure for the policy?

For any hurricane event, there is a parametric loss rate calculated at any affected site via the parametric loss matrix (see Tables 1 & 2), which leads to a payout amount for that site. These payouts are aggregated across all affected sites for a given hurricane for the total event payout, which is also subject to an annual programme limit (i.e. max. payout limited to USD\$ 1,500,000 for 2024-2025 hurricane season). The response level relates directly to estimated response durations gathered via local reef responders, and is reviewed annually to reflect changes in response capacities.

Table 2: Pay-out per reef site and response level

Reef Sites	Level 1	Level 2	Level 3	Level 4
Hol Chan	90,000	120,000	170,000	220,000
Turneffe Atoll	90,000	130,000	180,000	220,000
Glover’s Reef and South Water Caye	90,000	130,000	180,000	220,000
Banco Chinchorro	90,000	120,000	170,000	220,000
Xcalak	70,000	100,000	130,000	170,000
Punta de Manabique	70,000	90,000	130,000	170,000
Utila	70,000	90,000	130,000	160,000
Roatan and Guanaja	140,000	190,000	270,000	350,000
Cayos Cochinos	90,000	130,000	180,000	230,000
Tela Bay	70,000	100,000	140,000	180,000

What is the disbursement mechanism for funds to be made available to the client?

Insurer(s) pays the Insured directly via wire transfer, with the payment initiated immediately after the Calculation Agent issues an event report and payout amount. Disbursement was successfully tested for a payout in November 2022, with funds transferred from both Insurers without any problem.

How quickly is the policy expected to pay out?

Payouts are targeted to be received by the Insured 10 days after issuance of the event report, which in turn is 2-3 days after the hurricane finally leaves all sites.

Has/did the policy pay out over its duration and if so, what was the client's experience?

The 2022/23 policy paid out for Hurricane Lisa in November 2022<sup>2</sup>. The pay-out amount was for 10% of the Turneffe Atoll site limit (USD\$ 1,750,000), amounting to USD\$ 175,000. Funds were received from Insurers in 9 and 12 days after the event report was issued, fully meeting Insured's expectations<sup>3</sup>.

The payout structure has since been revised to more accurately reflect response capacities and uses pre-defined amounts rather than percentages of a site event limit.

---

<sup>2</sup> Note that for the 2022 policy payouts were calculated as percentages of maximum site event limits

<sup>3</sup> <https://www.wtwco.com/en-gb/news/2022/11/hurricane-lisa-triggers-first-pay-out-of-mesoamerican-reef-insurance-programme-to-finance>