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I. Introduction

As part of FMCN's ACCION project, WTW was selected to evaluate the feasibility of insurance concepts for ecosystems and communities in the Yucatán Peninsula (YP).

The ecosystems and communities include:

1. Coral Reefs
2. Small-scale fishers and aquaculture/mariculture producers
3. Mangroves

This report aims to highlight key findings of each concept, any gaps or challenges faced in analysis and what FMCN could consider when submitting a full-scale funding proposal to the GCF. Additional details and references can be found in the individual Component reports submitted to FMCN separately from this final report.

II. Coral Reefs

For the coral reefs component, the scope of work was: evaluate the feasibility of expanding the MAR Insurance Programme to protect coral reefs in Campeche and Yucatán and recommend next steps for FMCN to consider for supporting the conservation of these ecosystems. The four sites included in the analysis were informed by Consultancy 1.1.2, namely two reef areas in Campeche Bank (in Campeche) and two reef areas in Campeche Bank (in Yucatán).

Key findings on coral reefs

WTW conducted a hurricane wind risk assessment on four sites in the YP (informed by Consultancy 1.1.2 and validated by FMCN) and applied a parametric structure (see Figure 1) to identify how many times a possible product would have paid out (also known as how many events would have triggered).

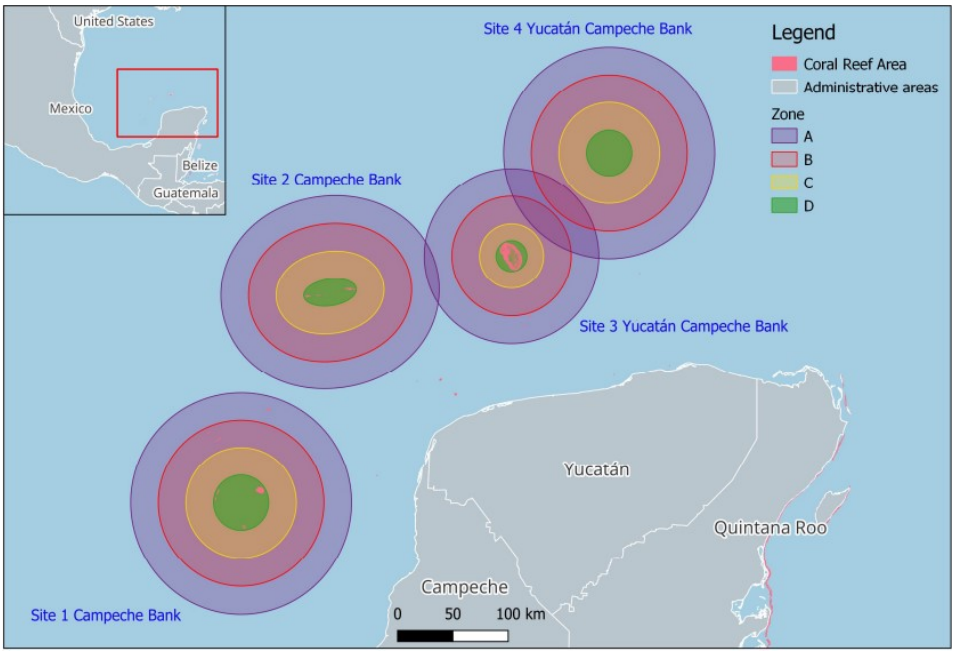

Figure 1. A visual representation of what the Cat-in-Nested-Circles parametric structure looks like across the four sites in the YP where each circle represents 25km from the coral reefs to track hurricane damage and capture potential pay-outs.

Source: WTW (2023)

Both the average number of triggering events per site between 1900-2022 (where Campeche's was 4.5 and Yucatán's was 0.75) and the annual average pay-out rate per site based on full history of 1900-2022 (Campeche's was 0.45% and Yucatán's was 0.16%) are considerably lower than the averages for the MAR Insurance Programme (respectively, at 8.4 and 4.74%).

- Even when taking into account changes in future hurricane risk due to climate change, the risk remains minimal.
- No site would have paid out more than 40% in the full history since 1900.

Conclusion: The level of hurricane risk in Campeche and Yucatán is minimal and therefore it would be hard to justify expansion of the MAR IP to Campeche and Yucatán.

The reefs in Campeche and Yucatán are composed of corals with low vulnerability to hurricane-associated damage so post-hurricane debris removal is not suitable for these selected reef sites. A previous consultancy on coral reef vulnerability under the ACCION project notes that shoreline protection value of reefs in Campeche and Yucatán is negligible compared to Quintana Roo (reefs are farther out and patchier) therefore the economic benefits of restoring Campeche and Yucatán's reefs are not matched with QR.

The same consultancy on coral reef vulnerability found in a survey that the main perceived threats to Campeche and Yucatán reefs were thermal stress (coral bleaching) and overfishing. This Consultancy also identified that the corals in Campeche are particularly vulnerable to coral bleaching.

Conclusion: Post-hurricane reef restoration in Campeche and Yucatán would have limited economic and ecological benefits if a hurricane causes reef damage. Also given prioritisation of reef threats, it is unlikely there would be a strong demand for hurricane coral reef insurance at this time.

Although the MAR Fund is the currently policyholder for the MAR IP, results from the discussion conclude that Yucatán and Campeche fall outside of their geographical mandate (see Figure 2). The MAR Fund is also based out of Guatemala with no legal ability to operate in Mexico or employ any staff there (currently any work conducted by MAR Fund outside Guatemala is through project partners). There is a lack of capacity in Campeche and Yucatán regarding documented reef restoration projects as well as trained brigades to undertake rapid response efforts.

Figure 2. The Mesoamerican Reef Ecosystem and MAR Fund's geographical scope of work shaded in grey, which shows Campeche and Yucatán outside of MAR Fund's jurisdiction.

Source: WTW (2023)

Conclusion: MAR Fund would not be able to take on the policyholder role but, should a parametric insurance programme be designed for the YP, MAR Fund would be well-positioned to advise local partners and a to-be-identified policyholder.

Conclusion

For the following reasons, we find it not feasible to expand the MAR Insurance Programme to include Campeche and Yucatán:

- Low hurricane wind risk.
- Lack of coral species and composition that would benefit from post-hurricane reef restoration activities as undertaken in the MAR IP.
- Uncertain demand for hurricane coral reef insurance in Campeche and Yucatán.

Next Steps

Should FMCN wish to continue exploring a **parametric insurance solution to support coral reefs in Campeche and Yucatán**, possible avenues for future research could include:

- Further analysis on coral bleaching and whether a product that responds to the hazard of marine heatwaves could be feasible.
- Further analysis on whether MPAs in the YP would benefit from a parametric product (e.g., to protect against business interruption from lack of tourism revenue after an event).
- Further research on avenues through which a parametric insurance product could help reduce overfishing.
- Maintaining strong relationships with local partners in Campeche and Yucatán that aim to build the technical capacity of coastal populations and/or community-based organizations that seek to restore and conserve the reef ecosystems.

As found in WTW's final report, should FMCN pursue the development of alternative parametric insurance products designed to better meet the needs of the reefs around Campeche and Yucatán, particularly when drafting a GCF funding proposal, we propose the following activities be included:

Table 1. Suggested activities to consider when developing alternative parametric products*

Component	Task
1. Engagement, Capacity Building and Enabling Environment	1. Stakeholder Engagement
	2. Awareness-raising and training with reef beneficiaries and users
	3. Review of regulatory landscape and insurance market; engagement with insurers
	4. Site and hazard selection based on 1.1 and desk-based analysis
2. Product Development	1. Data collection based on 1.4
	2. Response plan and costing
	3. Insurance product design and structuring
	4. Insurance product pricing
	5. Follow-up engagement to inform final product option
3. Operationalisation	1. Identification of policyholder
	2. Design of pay-out distribution protocols
	3. Development of long-term premium financing strategy
	4. Proof-of-concept insurance product marketing and placement

** Note: these components/tasks are not necessarily sequential.*

III. Small-scale Producers

For the **small-scale producers** component, the scope of work was: evaluate the feasibility of developing insurance product(s) for small-scale producers on the coasts of the Yucatán Peninsula within the fisheries, aquaculture and mariculture sectors. The sites included in the analysis are:

- Aguada Island, Campeche
- Celestún, Yucatán
- Punta Allen, Quintana Roo

Key findings on small-scale producers

There are limited risk financing instruments available to small-scale producers within the sectors of interest including: micro-insurance (life), lines of micro-credit, parametric agriculture insurance, government social protection programs and sovereign disaster risk funds (combined catastrophe bonds and insurance). Of those available, none are explicitly designed to mitigate the negative impacts of climate hazards, though some have the potential of doing so. None actively target vulnerability to climate-related hazards or adequately address women and vulnerable groups' unique needs.

Conclusion: To-date, there are no active risk financing instruments available to small-scale producers in Mexico within the fisheries, aquaculture and mariculture sectors that effectively address vulnerability from climate-related hazards. However, there is a demonstrated need and potential for such a product.

After discussions with FMCN, Sureste Sostenible, numerous fisheries experts and academics, and through surveys with fishing associations convened by Alianza Kanan Kay (AKK), it became apparent that inclement weather is a strong driver of lost income for fishers across the Yucatán Peninsula. This loss of income due to prolonged periods of bad weather for many fishers who rely regularly on multi-species fishing (such as red octopus, lobster, grouper, sea cucumber and snapper) is a major hurdle amplified by the impacts of climate change and anthropogenic pressures. Developing a parametric product requires a hydrometeorological hazard threshold, but multiple species have unique characteristics that are not uniform to develop one trigger (for example, reproductive performance, seasonality, etc.). We therefore propose a parametric product focusing on **the ability of fishers to fish safely** rather than hydrometeorological impacts on a particular species.

Conclusion: Validated through interviews and academic literature, the relevant hazards faced by fisherfolk which directly impact a fisher's ability to fish are high winds, significant waves and / or rainfall, which together contribute to low visibility and unstable conditions.

WTW has experience with demonstrating feasibility of risk financing products that respond to bad weather periods from our work in the Philippines, Indonesia and Honduras. By monitoring wind,

wave height and rainfall (parameters), it is possible to identify periods that a fisher faces multiple days of bad weather in a row, and consequently resulting in income loss. A risk financing product that protects against and pays out for this would make up for lost income from not fishing in unsafe weather.

Using historical ERA5 data (a source that is publicly available, internationally recognised and accepted by risk markets), we created an index that captures the three parameters that represent bad weather and sea conditions that may impact fishing activities over a 5-day period (called a pentad). Using standard deviation from the mean, the index captures whether those combined parameters are more or less extreme than what they normally would be expected based on historical and modelled experience.

ERA5 data is available on a 0.25-degree (or ~30 km) grid and after validating with FMCN and partners how far out fishers go out to fish, we established that fishers travel up to 50 km from the coastline in Quintana Roo, while fishers in both Campeche and Yucatán travel out up to 75 km from the coastline. Figure 3 shows the three sites overlain with ERA5 grid cells which capture the three parameters of interest. The red box establishes the boundaries that fishers go out to fish and where the product will apply to. Boxes can be iterated in future project stages.

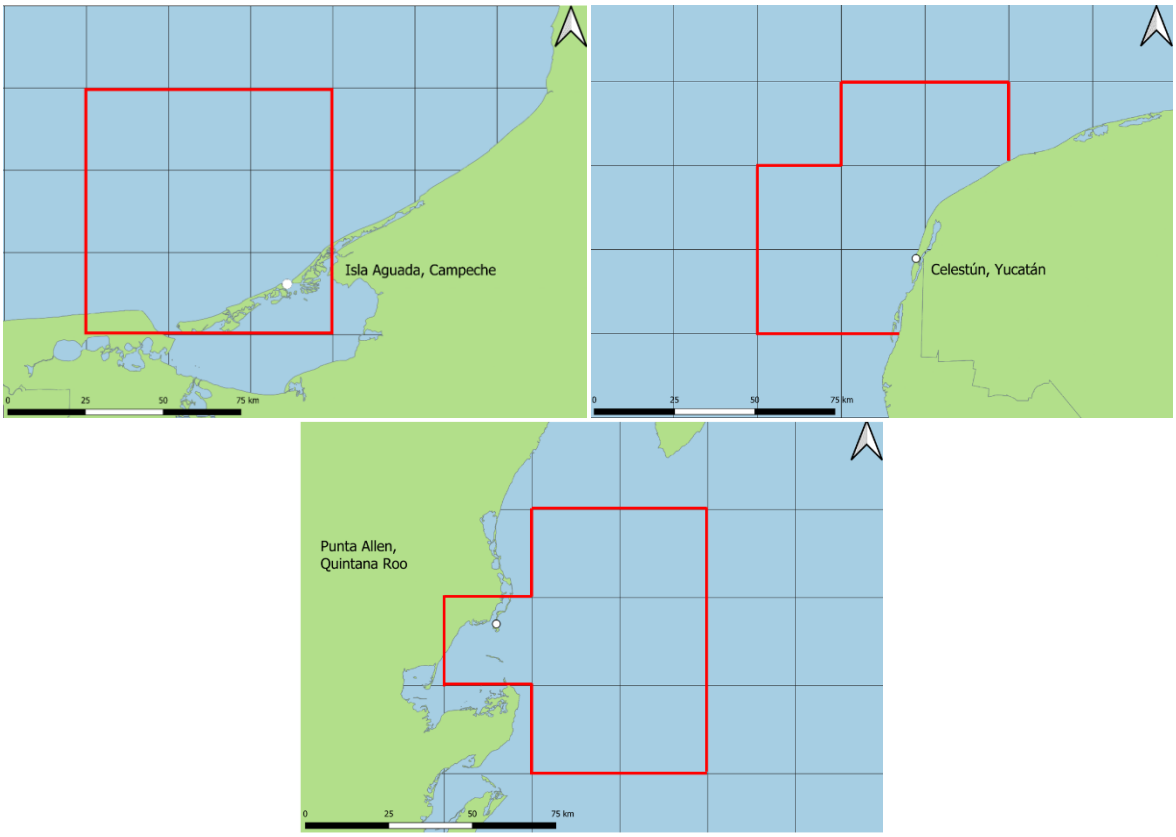

Figure 3. An illustration of the proposed ERA5 grid cells (in red) that best-represent how far out fishers travel to fish across the selected sites.

Source: WTW (2024)

WTW identified trigger thresholds based on historical, stochastic and modelled data that would balance how expensive the coverage would be (premium costs) with how often the product would pay out (annual limit).

For the purposes of this analysis, we structured the product to pay out once every four years (or a 25% annual pay-out probability), therefore setting the number of pay-outs over the entire 40-year dataset history (1980-2019 inclusive) at 10 (since the product pays out once every 4 years over a 40-year history). To demonstrate what the product could look like, we developed an illustrative – or "strawman" – structure which proposes a maximum annual pay-out per fisher of USD 500 (based on average monthly income data reported by AKK members in Celestún) and this figure can be refined during consultations in the future. We also provide a breakdown of estimated costs that would inform the total premium request, including Expected Loss, Load, Broking and Calculation Agent fees, Fronting fees and Local Taxes in the Component report. We propose validating these figures through engagement with insurers and assessing insurance market regulations and legislations related to parametric products in the full GCF proposal. The annual estimated premium would be $73 USD per fisher (for a total of 1,937 fishers across Campeche, Yucatan and Quintana Roo), and a total annual premium of $145,885 USD for the programme with the hope that premium financing will be subsidized by the GCF for a two-year pilot.

Conclusion: An estimated premium and annual pay-out has been developed based on a preliminary structure that would be refined with more data and feedback (i.e. from fishing cooperatives, insurers), noting the ultimate premium will only be known once the product goes to market.

Conclusion

For the following reasons, we find it feasible to further explore a "bad weather periods" product in the Yucatán Peninsula:

- Fisher livelihoods indeed suffer economically from the impacts of prolonged periods of poor ocean and weather conditions (wind speed, wave height and rainfall – also known as the 3 parameters).
- These hazards are neatly captured by data source, ERA5, which accurately reflects/proxies the parameters, is reliable, historically and publicly available and accepted by risk markets.
- The index is structured to capture deviation from average weather conditions, and therefore automatically adjusts to seasonal trends.
- Fisher feedback can be used to refine the structure to balance premium and annual pay-out limits and frequency.

Next Steps

Should FMCN wish to continue exploring a **parametric insurance solution for bad weather periods**, suggestions for future activities could include:

- Validation of the selected ERA5 grid cells to both represent fishing areas and fishers' distance travelled from the coastline per site.
- Engagement and training for fishers
- Demand assessment to refine structure of the product and understand willingness to pay for the product.
- Outreach to the insurance industry on their underwriting capacity and pricing (including costs like taxes, capital provision margins, etc.) to get a better sense for likely premium per fisher.
- Securing premium finance for the pilot.

As found in WTW's final report, should FMCN pursue the development of a parametric "bad weather periods" product designed to safeguard livelihoods of small-scale fishers and fisherfolk in the Yucatán Peninsula, particularly when drafting a GCF funding proposal, we propose the following activities under four key Components in this implementation roadmap be conducted:

Table 2. Implementation Roadmap Timeline

Component	Sub-Component	Y 1	Y 2	Y 3	Y 4	Y 5
1. Enabling Conditions and Pilot Scope	1. Insurance Market Assessment	X				
	2. Pilot Phase Scope	X				
	3. Financial Literacy Training	X				
	4. Survey	X				
2. Product and Pilot Programme Development	1. Product and Program Design	X				
	2. Product distribution	X				
3. Pilot	1. Product Finalization and Placement		X	X		
	2. Monitoring for Triggering Events		X	X		
	3. PELC Implementation*		X	X		
	4. Pay-out Distribution*		X	X		
4. Expansion and Long-term Programme Sustainability	1. Long-term Premium Finance Strategy			X		
	2. Agree Scope Expansion				X	
	3. Product and Program Expansion				X	
	4. Placement				X	
	5. Monitoring and PELC					X
	6. PELC Implementation*					X
	7. Pay-out Distribution*					X

** Only if a triggering event occurs.*

IV. Mangroves

For the **mangroves** component, the scope of work was: to develop a Mangrove Damage Model (MDM) and evaluate the feasibility of an insurance concept designed for mangrove ecosystems in the Yucatán Peninsula.

Two financial mechanisms that ultimately enhance the resilience of mangrove ecosystems to extreme hazard events, as well as support mangrove-dependent livelihoods are:

1. Parametric insurance: which is well-suited to provide funds following acute hydrometeorological events. Parametric insurance products can be designed to protect mangroves particularly if pay-outs are directed towards mangrove restoration efforts. This is better suited against indemnity insurance which has a lengthier damage assessment process.
2. Blue carbon credit programmes: which can incentivize ongoing conservation and restoration activities. There are successful blue carbon credit programmes globally that generate revenue through credit sales, are rooted in the local community, and support the co-benefits that mangrove ecosystems provide to coastal communities and mangrove-dependent livelihoods. In Mexico, a blue carbon credit programme with demonstrated success is the San Crisanto Mangrove Restoration Project. However, the regulatory and legal landscape to develop such a programme in Mexico is complex.

Conclusion: There are insurance products that exist, demonstrating it is feasible to protect mangrove-linked investments such as carbon credits, or to protect the livelihoods of communities who depend on mangrove ecosystems, through risk financing.

The Development of a Mangrove Damage Model (MDM)

WTW conducted a literature review to understand the mechanisms through which hurricane wind and associated sub-perils (hurricane driven precipitation and storm surge) cause damage to mangroves.

Hurricane winds are the sub-peril responsible for the greatest damage to mangroves through physical damage to the structure and composition of mangroves (e.g., uprooting of trees, trunk breakage, breaking of branches, defoliation of the mangrove canopy, reduction in the structural and floristic characteristics of the forest, changes in species dominance). These changes interrupt the hydrological regime, and cause changes to sediment dynamics and nutrient cycles, often leading to secondary mortality of trees.

Hurricane driven precipitation primarily causes damage through interruption of the hydrological regime of mangroves (e.g., extensive flooding and associated deposition of sediments, changes in salinity, changes in oxygen concentrations, leading to mortality of mangroves).

Hurricane driven storm surges primarily cause damage through sedimentation, deposition, erosion and inundation of mangroves which cause mortality through altered hydrological regimes.

Conclusion: Hurricane winds are the primary cause of damage to mangroves and based on availability of data, were selected as the hazard to model in the MDM.

The MDM has three components (Figure 4): **hazard**, **vulnerability** and **exposure**. Within each, there are sub-components which are deemed important to determine the relationship between hurricane winds and damage to mangroves.

Key outputs for each module:

- **Hazard**: Maximum wind speed per 1 km^2 grid cell, per historic event
- **Vulnerability:** Appropriate damage function per 1 km^2 grid cell
- **Exposure:** Tonnes of aboveground biomass per 1 km^2 grid cell
- **Damage:** Total loss of aboveground biomass per 1 km^2 grid cell

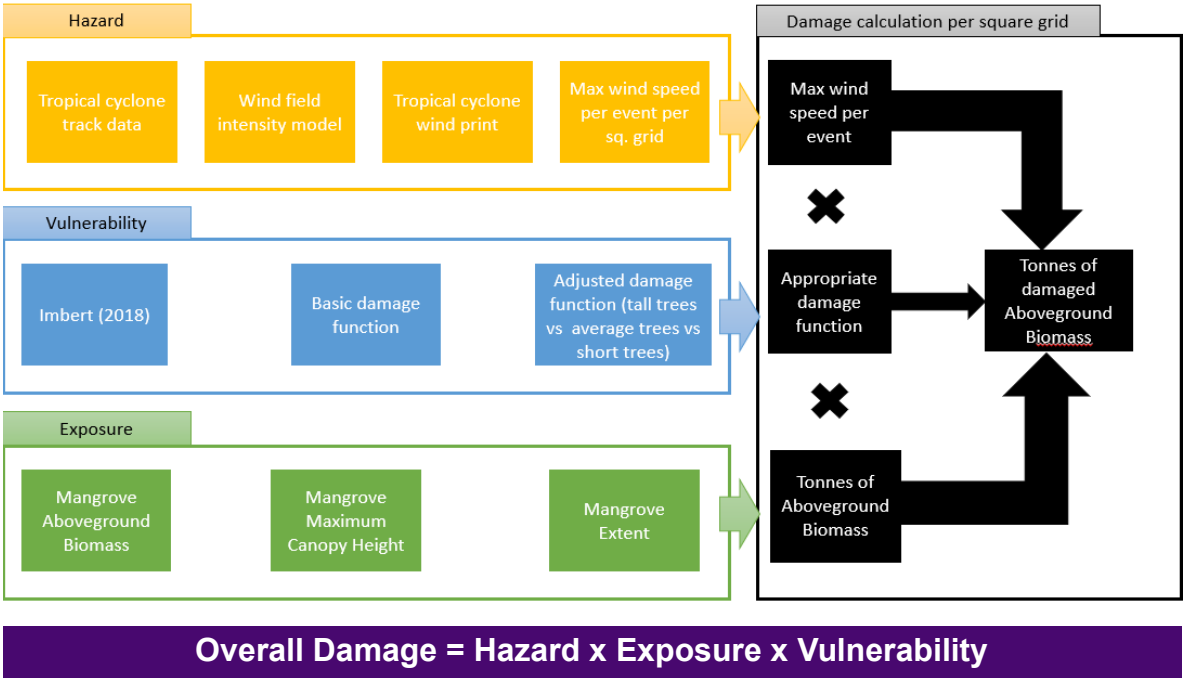

Figure 4. An overview of the sub-components of the hazard, vulnerability and exposure modules in the Mangrove Damage Model, used to calculate total hectares of damaged mangrove forest across the four key sites.

Source: WTW (2024).

Each of these outputs are aggregated to site level, to generate a total modelled loss of aboveground biomass, per site shown in Figure 5. These sites were selected based on the outputs of a consultancy under the ACCION project, which assessed mangrove vulnerability in these locations.

1. Reserva de la Biósfera los Petenes (RBLP), Campeche
2. Reserva Estatal Dzilam de Bravo (REDB), Yucatán
3. Área de Protección de Flora y Fauna Manglares de Nichupté (APFFNM), Quintana Roo
4. Reserva de la Biósfera Sian Ka'an (RBSK), Quintana Roo

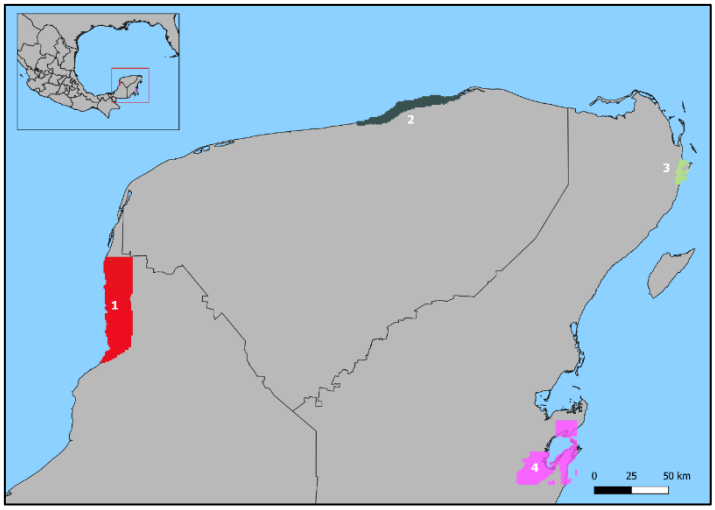

Figure 5. The geographical location of each site in the YP that the MDM was applied to.

IV.1.1. Exposure

Mangrove Exposure is characterized in terms of mangrove extent, aboveground biomass, and maximum canopy height. Aboveground biomass, and maximum canopy height datasets were developed by Simard et al. (2019) at approximately 30 metres resolution, over the period 2000-2009 and the satellite outputs of the ACCION Consultancy on Mangrove vulnerability were used for mangrove extent (period 2013-2023). The maximum canopy height and aboveground biomass datasets do not fully overlap (Figure 6 and Figure 7), so an Inverse Distance Weighting (IDW) interpolation method was used to interpolate known data values for aboveground biomass, and maximum canopy height across the across the mangrove extent within each site.

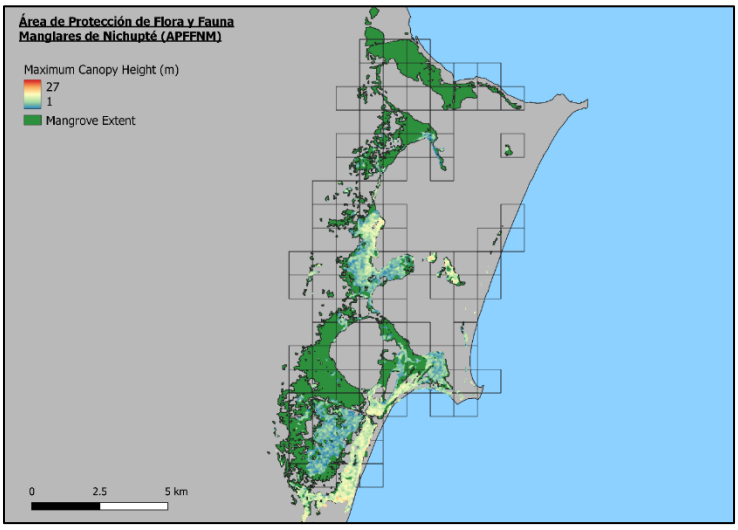

Figure 6. An example of Maximum Canopy Height in APFFNM, overlaid with the mangrove extent dataset.

Source: WTW (2024).

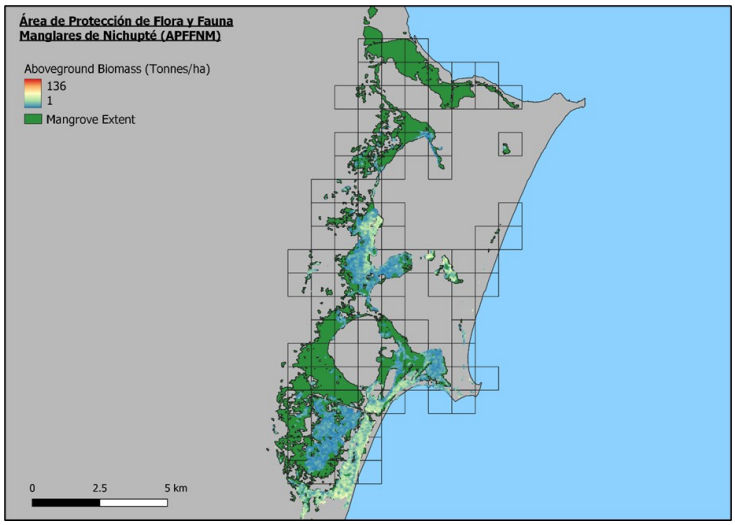

Figure 7. An example of Aboveground Biomass in APFFNM, overlaid with the mangrove extent dataset.

Source: WTW (2024).

Figure 8 shows the results of the IDW Interpolation for site 'APFFNM'. The values for aboveground biomass are measured in tonnes per hectare, and so these were converted to the unit of tonnes, based on the mangrove area within each site.

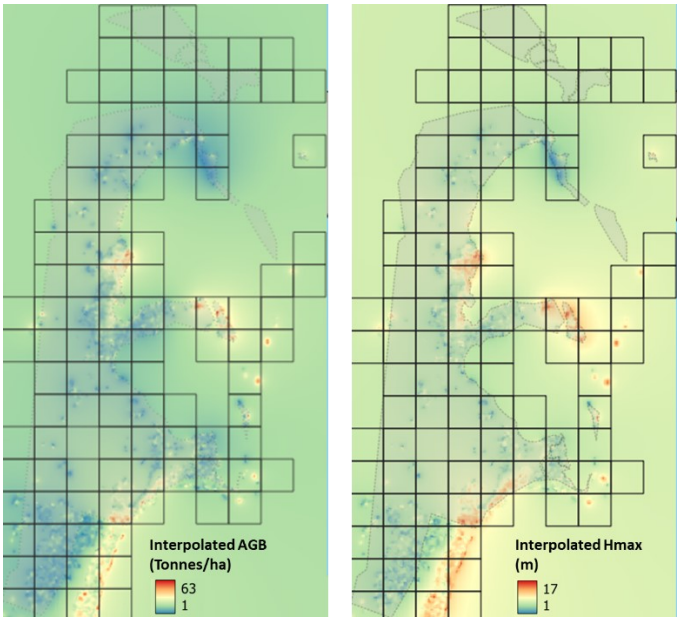

Figure 8. The results of the IDW Interpolation for (i) Aboveground Biomass and (ii) Maximum Canopy Height for APFFNM.

Source: WTW (2024).

IV.1.2. Hazard

The MDM uses the historical hurricane track data from the International Best Track Archive for Climate Stewardship (IBTrACS) (NOAA, 2024) as the basis for generating wind fields, from which peak wind speeds can be extracted for use in the hazard component of the MDM. The IBTrACS dataset is global and contains the most complete set of historical tropical cyclone best-track data. The dataset has merged outputs from twelve different reporting agencies or historical databases to create an open-source, unified, best-track dataset. Figure 9 shows an example of the windspeed hazard from Hurricane Delta (2020) and the mangrove extent for the Área de Protección de Flora y Fauna Manglares de Nichupté (APFFNM). The peak wind speed is extracted from the centroid of each grid cell.

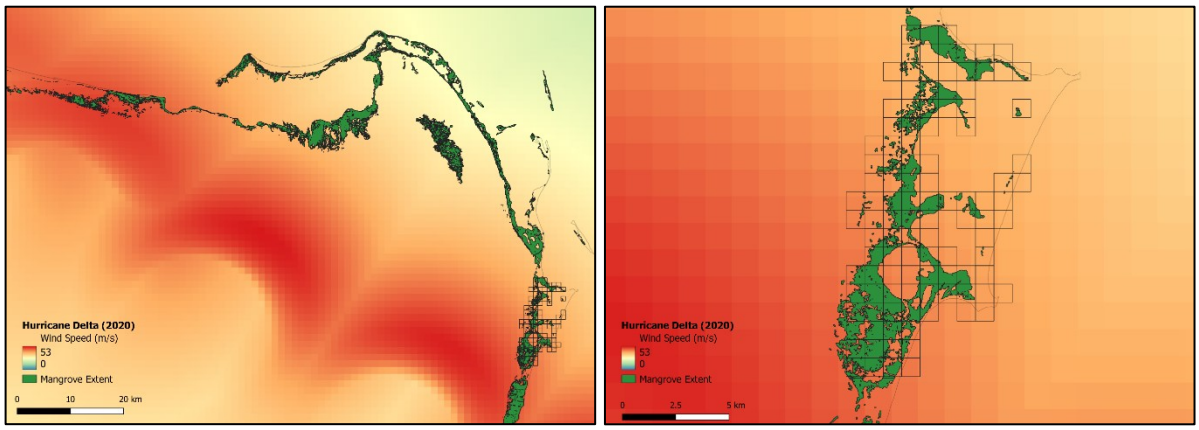

Figure 9. Left: An overview of the wind field generated for Hurricane Delta in 2020. The peak wind speed (ms^{-1}) was extracted at each grid cell. Right: A zoomed in visual representation of the wind field generated for Hurricane Delta across the APFFNM grid.

Source: WTW (2024).

IV.1.3. Vulnerability

Vulnerability relationships describe the susceptibility of the underlying exposure to damage from a given hazard. The MDM uses the median, maximum canopy height in a grid cell to determine vulnerability. Canopy height was selected as a key factor that determines mangrove vulnerability to hurricane wind, based on peer-reviewed literature and data availability. The relationship established in literature states that taller mangroves are more vulnerable to wind damage than shorter mangroves due to the lack of flexibility in taller, more mature mangroves.

Vulnerability curves were constructed based on a study in the Caribbean which analysed the relationship of canopy height to wind damage, and provided quantitative data regarding thresholds of damage to mangroves, for different wind speeds and mangrove heights (Figure 10).

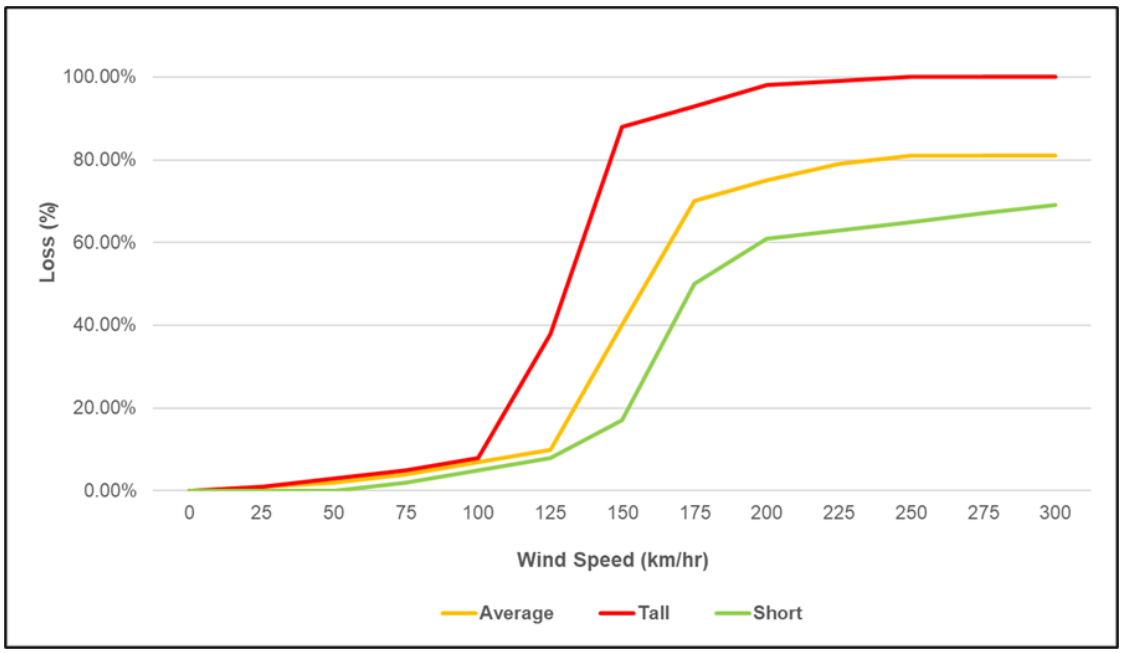

Figure 10. Vulnerability curves developed for the Mangrove Damage Model.

Source: WTW (2024).

Vulnerability was assigned to each grid cell containing mangrove extent (Figure 11). Each grid cell was tagged as having a median, maximum canopy height of 'short', 'average' or 'tall' based on the results of the interpolation of the maximum canopy height dataset, as previously described in Figure 8. The proportion of cells assigned as having a 'short', 'average' and 'tall' median, maximum canopy height, for each site is shown in Table 3. For APFFNM, RBLP and RBSK, over 50% of the grid cells were tagged as having a 'short' maximum canopy height. In REDB, the largest proportion of grid cells (44%) were tagged as having an 'average' maximum canopy height. Across all sites, fewer grid cells were assigned a 'tall' maximum canopy height compared to the 'short' and 'average' classifications.

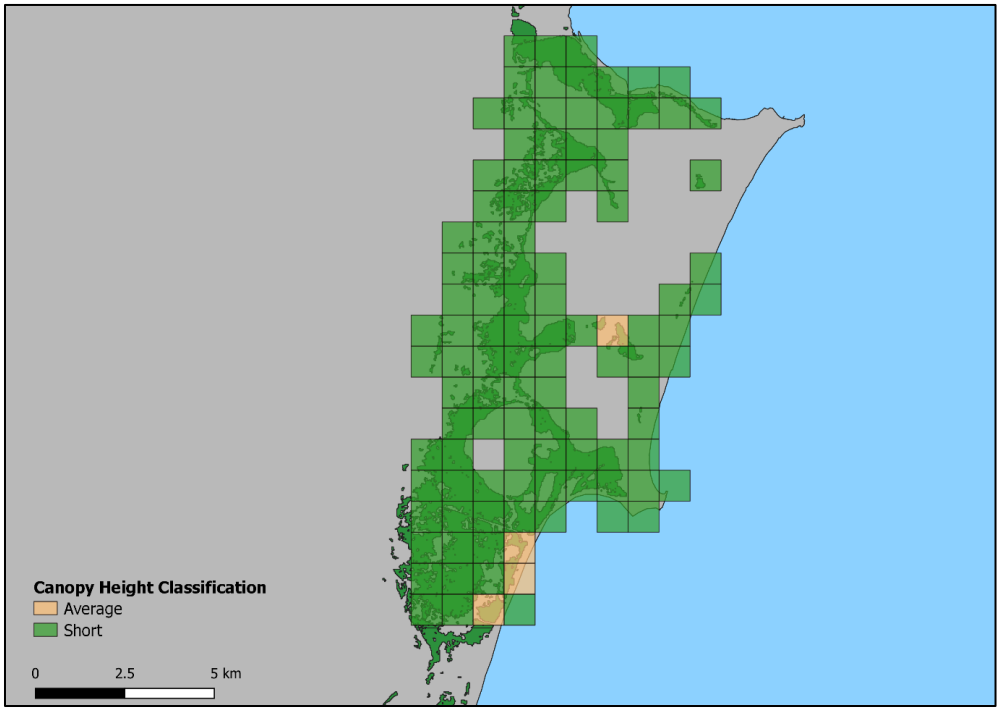

Figure 11. The classification of grid cells in APFFNM according to the results of the IDW interpolation and zonal statistics run on the Maximum Canopy Height data (QGIS).

Source: WTW (2024).

Table 3. An overview of the proportion of grid cells at each site tagged as have median maximum canopy height (Hmax) of 'short', 'average' and 'tall'.

Site	Short (% of total)	Average (% of total)	Tall (% of total)
APFFNM	98	2	0
RBLP	50	42	8
RBSK	72	25	3
REDB	33	44	23

IV.1.4. Damage

The MDM was run for all historical hurricanes which passed within a 500-km buffer of each of the sites and exceeded a Saffir Simpson Scale category one hurricane in at least one of the grid cells. For each event, the hazard, vulnerability, and exposure was used to calculate the tonnes (Mg) of damaged aboveground biomass per 1 km^2 grid square. The total amount of damaged aboveground biomass is then aggregated for each mangrove site. Historical events are ranked in terms of (i) loss of aboveground biomass and (ii) peak wind speed. Damaging events and high wind events showed good correlation, which highlights that wind is the primary determinant of damage to mangrove in comparison to the underlying vulnerability. Table 4 provides an overview of the top three modelled damaging historic events, for each site and their corresponding modelled loss of aboveground biomass. A valuable next step would be to validate the outputs of the modelling with literature and engagement with local communities, where online data is absent. Further to this, it would be

extremely beneficial to test and validate the model in another country with extensive data availability.

Table 4. An overview of the number of mangrove-damaging events per site and modelled loss in aboveground biomass (AGB).

Site	Total number of damaging events	Top three damaging events	Modelled loss in AGB (Mg)	Modelled loss of AGB as % of total exposed AGB
APFFNM	24	Gilbert (1988)	31,750	64.5%
		Wilma (2005)	29,751	60.4%
		Beulah (1967)	8,945	18.2%
RBLP	21	Isidore (2002)	380,128	32.4%
		Hilda (1955)	72,517	6.2%
		Roxanne (1995)	72,516	6.2%
RBSK	25	Dean (2007)	770,782	59.7%
		Carmen (1974)	450,629	34.9%
		Janet (1955)	435,009	33.7%
REDB	23	Gilbert (1988)	833,233	83.0%
		Isidore (2002)	733,735	73.1%
		Beulah (1967)	608,073	60.6%

IV.1.5. The Development of a Mangrove Risk Financing Product Concept

The following concepts are important for a parametric product (Figure 12):

- **Insured**: an entity who exerts management rights over a mangrove area, and plans to generate blue carbon credits
- **Event**: maximum tropical cyclone windspeed in a defined area
- **Pay-out use**: purchase of carbon credits and/or mangrove restoration actions
- **Structure**: comparison between the modelled loss in aboveground biomass, and high wind events demonstrates that a parametric product that captures high wind events over the selected mangrove areas is likely to be an effective proxy for damage to the mangroves.

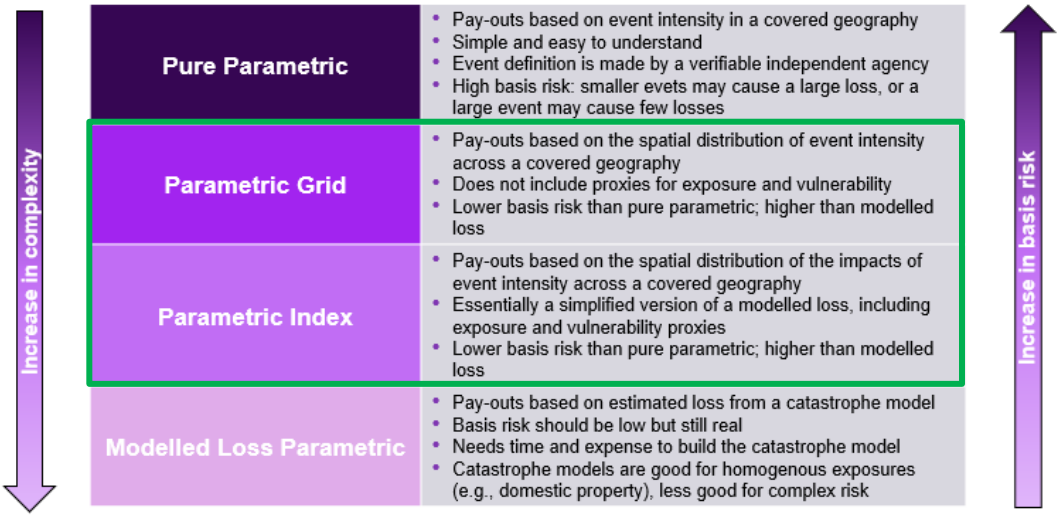

Figure 12. Forms of parametric insurance

Source: WTW (2024).

Conclusion: Either a parametric index or a parametric grid approach could be suitable for underpinning an insurance product that protects blue carbon investments. Initially, a parametric grid approach should be investigated, validated by the MDM. Following refinements, the MDM could underpin a parametric index.

Conclusions

For the following reasons, we find it feasible to further explore the development and implementation of an insurance product to protect mangroves in the Yucatán Peninsula against hurricane wind:

- Wind is frequently cited as the main cause of damage to mangroves. Mangroves are important ecosystems which are critical for carbon sequestration, amongst other things.
- These hazards are neatly captured by data source, IBTrACS, which accurately reflects/proxies the parameters, is reliable, historically and publicly available and accepted by risk markets.
- The creation of a damage model shows multiple damaging events per site, and these damaging events have good correlation with high wind events.

Next Steps

Should FMCN wish to continue exploring a **parametric insurance solution for protecting mangroves against hurricanes,** suggestions for future activities could include:

- Further enhancements to the MDM, including: exploring the relationship between other vulnerability factors and wind damage, explore the inclusion of other datasets (e.g., soil organic carbon data, rainfall data).
- Validation of key damaging events with stakeholders due to the limited data published online with regards to impacts to mangroves from these events.
- Demand assessment to refine structure of the product and understand willingness to pay for the product.
- Outreach to the insurance industry on their underwriting capacity and pricing (including costs like taxes, capital provision margins, etc.) to get a better sense for likely premium.
- Securing premium finance for the pilot.

V. Gaps and Challenges

The gaps and challenges experienced under this Consultancy can be grouped largely into two main areas (Table 5): lack of available data and information, and lack of input data from other consultancies in a timely manner.

Table 5. An overview of the gaps and challenges experienced under the Consultancy.

Gaps and Challenges	Details
Lack of available data and information	Lack of reliable, comprehensive, up to date information on existing government schemes on risk financing products.
	Lack of gender-disaggregated data on fishers.
	Lack of comprehensive data on impacts of past events on reefs, i.e., monitoring of reefs at regular time intervals (this is generally an issue in this space).
	Lack of information of the isolated impact of hurricane driven precipitation on mangroves, which meant it difficult to justify including this in the MDM.
Lack of and reliance on input data in a timely manner	Delay in receiving information from previous consultancies or fishers in a timely manner.
	Reliance on other consultancies for inputs into analysis.

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