



King Crab Mariculture Business Plan Consultancy Terms of Reference 1/31/23

Introduction: The Mesoamerican Reef and MAR+Invest

The Mesoamerican Reef (MAR) extends over 1000 km across the coastlines of Mexico, Belize, Guatemala and Honduras. Rich in biodiversity, it includes the longest barrier reef in the Western Hemisphere and a complex array of reef types. Seventy-two percent of MAR's reefs are within Coastal and Marine Protected Areas (CMPAs). The MAR is critical for connectivity in the Wider Caribbean, as its reefs are "upstream" and ecologically connected to Florida, Cuba, and the Bahamas.

The MAR has the highest coral cover in the Western Caribbean. However, the region faces significant threats. The main sources of degradation are uncontrolled runoff of nutrients and sediments (from land, mangrove and seagrass clearing and dredging), lack of sanitation infrastructure, tourism-related coastal development, overfishing and climate change. Stony Coral Tissue Disease Loss is also affecting the MAR since 2018, when it was first detected in Mexico.

The annual value of the MAR is US\$ 4.5 billion, integrated by reef-related tourism (US\$ 3.9 B), reef-related fisheries (US\$ 183 M), and shoreline protection (between US\$ 320 and US\$ 438 M). (IDB – WRI. Economic Valuation of the Mesoamerican Reef. <https://publications.iadb.org/publications/english/document/Economic-Valuation-of-the-Ecosystem-Services-of-the-Mesoamerican-Reef-and-the-Allocation-and-Distribution-of-these-Values.pdf>)

However, much of this value is at risk. If the MAR continues to decline, by 2030 the per annum value of the system could fall by US\$ 3.1 billion a year (in tourism, fisheries and coastal development). Conversely, a shift towards healthy reefs by 2030 could unlock an additional US\$ 2.5 billion annually across the three sectors. (UN Environment, ISU, ICRI and Trucost 2018. The Coral Reef Economy: The business case for investment in the protection, preservation and enhancement of coral reef health. 36pp)

The Global Fund for Coral Reefs (GFCR) is a blended finance instrument to mobilize action and resources to protect and restore coral reef ecosystems. GFCR supports efforts to incubate and accelerate revenue-generating interventions that can sustainably finance the mitigation and elimination of unsustainable direct and indirect local drivers of coral reef degradation.

The Mesoamerican Reef Fund (MAR Fund) is a regional, private environmental fund with the objective of supporting the protection of the MAR ecoregion. Its mission is to drive regional funding and partnerships for the conservation, restoration and sustainable use of the MAR. MAR Fund is registered in the United States as a tax-exempt charitable organization. Although it is legally established outside the MAR, its purpose is to provide sustainable funding for



conservation in the ecoregion. A MAR Fund chapter has been registered in Guatemala City since August of 2014, where the coordinating office is established. MAR Fund also has staff in Mexico, Belize and Honduras.

In 2022, MAR Fund convened a partnership of organizations from the MAR countries, including New Ventures Group & Viwala, Mexican Fund for the Conservation of Nature, and Healthy Reefs for Healthy People Initiative to design and launch the MAR+Invest initiative with support of the GFCR.

MAR+Invest, is a blended finance mechanism with strong monitoring and evaluation of impacts, business acceleration and a capacity building program that aims to enable conditions for a sustainable ocean-based economy in the MAR. This initiative will invest in market-based initiatives that make a positive contribution to the health and resilience of the Mesoamerican Reef. It:

- Aims to deliver long-term conservation of the value of the natural capital of the MAR through active generation, development and growth of market-based opportunities that contribute to the reduction of the threats affecting the MAR.
- Will focus on businesses and projects working to solve long-term challenges faced by the MAR and demand diverse types of capital to be developed.
- Will focus on the generation of sustainable financing solutions for CMPAs of the MAR.
- Will develop financial mechanisms with investors and donors to manage risk, close early-stage capital gaps, provide technical assistance and finance for coral positive solutions.
- Aims to raise additional capital (philanthropic, development, commercial) for the initiative.

Healthy Reefs for Healthy People and its Delicious Solution to Nutrient Pollution on Reefs

Healthy Reefs for Healthy People Initiative (HRI), a partner of the MAR+Invest initiative, has been monitoring the health of the Mesoamerican Reef since 2005, producing seven reef health Report Cards that describe reef condition and recommendations for improvements (www.healthyreefs.org). Macroalgal proliferation has been the most persistent problem facing the MAR and many coral reefs globally. It affects coral growth, prevents the settlement of new recruits (coral larvae), and harbors pathogens serving as disease vectors. The loss of living coral and increase of nuisance macroalgae reduces the reef's health, resilience and ecosystem services values (biodiversity, food security and coastal protection). It is caused by both top-down (reduced herbivory) and bottom-up (increased nutrient pollution) factors. The nutrients can originate from agricultural runoff from massive watersheds far removed from the reefs, or from inadequate sewage treatment in proximate coastal communities and tourist hotspots. These primary sources of nutrient pollution differ from reef to reef in a complex



pattern that is not well understood. However, if we can increase the number of fish and invertebrates that consume the deleterious macroalgae, we can reverse the ecological phase shift associated with fleshy macroalgal blooms that smother the living corals and even remove nutrients through the growth and consumption of these algae. Coral reefs will then be able to cope with higher nutrient loads without the negative ecological consequences.

HRI has already helped achieve full protection of herbivorous parrotfish throughout the MAR region, and is now focused on enhancing herbivorous crab populations. The Caribbean King Crab is a very efficient herbivore with high commercial seafood demand and value (equivalent to lobster). It is the largest spider crab in the Caribbean (up to 3 kg) and is widely distributed on reefs, but in relatively low densities likely due to high mortality of their earliest life phases. Thus, we can enhance their population by raising them to a more capable juvenile phase – ready for life on the reef. King Crabs inhabit crevices at depths of a few meters down to 200m. They are distributed in low to medium abundance throughout the MAR, the Caribbean and the Gulf of Mexico. All of the MPAs in the MAR with coral reefs have habitat and conditions suitable for supporting crab reseeding projects to enhance herbivory.

King Crabs tend to have a special taste for fleshy macroalgae, *Dictyota* in particular, collecting them delicately with their pincers and not damaging or scaping the coral tissues as do other grazers, like parrotfish and urchins which can have bioerosion impacts on the reef at higher densities. This is not recorded with herbivorous crabs. King Crabs are territorial and tend to stay in aggregations of one large male with 3-6 females. Natural predators are few and include octopus, sharks, and crocodiles – all also in relatively low abundances. King crab is considered a good candidate for large-scale mariculture due to its short larval duration, its large size, its rapid growth and high value as a delicious seafood.

HRI's King Crab pilot land-based project in Mexico has been successfully underway for the last two years, and is ready for scaling up. However, other countries/locations may not have a land-based facility supported by pumps, filtration and uninterrupted power supply such as INAPESCA to host larval rearing. Thus, the business model for more widespread application across the MAR will closely resemble the "Belize" style King Crab Mariculture operation which may be smaller in scale on a per unit basis, relying on a more low-tech approach yet much broader in impact due to the wide scale applicability and potential across the entire region.

As part of the MAR+Invest project, we now need to increase efficiency and production in land-based mariculture and design a regionally applicable business model which makes restoring herbivory and enabling better conditions for coral restoration a profitable activity. To do this, we open 2 consultancies, one focused on Research and Development (R&D) and the other focused on business model development, both will be in close collaboration.

Objectives of the Business Model consultancy



Through close collaboration with the R&D team, build a comprehensive business model that includes efficient production and marketing of King Crabs as an eco-friendly seafood product and as a reef ecosystem restoration tool their herbivory services to support reef health, coral restoration. There are 2 potential revenue streams which can be applied separately or in combination. For example, fishers may only choose to employ only the seafood marketability component, while community groups and NGOs will likely have a combination of restoration revenue and seafood marketability within their revenue (or cost covering systems). If fishers outplant juveniles on open fishing reefs for the longer grow-out phase they will still be providing ecosystem restoration and improvement services, until harvest. Crabs placed within FULLY protected MPA zones will have more lasting ecological impacts due to their increased reproductive output as they age and grow larger, thus reseeding other fished areas on the MAR with King Crab.

Methodology

The technical proposal shall include a detailed methodology on how the consultancy will be developed, or scope of work, including at a minimum review and expansion of the two existing king crab mariculture systems in Mexico and Belize. In addition, a third alternative using abandoned shrimp ponds should be explored for feasibility.

The consultant(s) will need to have their own equipment in order to perform the consultancy without delays and will include any needed travel in their proposed project budget.

Supervision and coordination

The contract of the consultancy will be provided by MAR Fund. The MAR+Invest coordinator will act as focal point for this consultancy. She will coordinate with the HRI team who will also supervise and provide information for the development of the consultancy.

The final products and report will be approved ultimately by MAR Fund.

Expected products

- An inception report containing a detailed presentation of methodological components and a table of content of the final document.
- Interim report at 3 months.
- Final technical market report including but not limited:
 - Market study
 - Value proposition
 - Marketing plan



- Key resources and stakeholders
- Strategic alliances
- Risks evaluation
- Operational costs and timelines for different production systems
- Financial projections with current value for crab
- Potential funding sources for start-ups

Written report and Power Point presentation on key findings.

Enterprise Support and Operational Sustainability Analysis

Consultants will also provide advice on the best organizational strategy for technical capacity building and expansion within the Healthy Reefs Initiative, including legal and organizational options for the most efficient and effective means of expanding king crab growing capacity while financially sustaining HRI's technical commitment to the enterprise. This should include an organizational assessment to plan for execution, with clearly defined roles. Hybrid enterprises (profit supporting non-profit) are more well established in the social enterprise sector - which can be used as a model for this analysis.

Timeline

Both the R&D and Business Model consultancies will have a maximum duration of 6 months each, running concurrently and starting on the date of the contract signature.

Payments

Payment	%	Requirements	Date
1	20	Signed contracts, banking information and inception report	Within 10 days after signature of the contract
2	40	Interim report at month 3	Within 10 days of the report reception
3	40	Delivery of the expected products and final presentation	Within 30 days upon the reception and validation of the final products

Confidentiality and copyright



The consultant commits to carrying out the assigned tasks with the highest standards and ethical considerations. MAR Fund reserves the right to instruct the consultant on the information that must be treated with confidentiality.

MAR Fund holds the copyright to the products generated through this consultancy.

Profile of the consultants

The consultant(s) or consulting agencies will have the following profiles:

- 1) Business and Marketing plan consultant(s): with at least 5 years business and market study experience in similar aquaculture/impact/social/blue economy projects.
- 2) Impeccable verbal and written communication skills in English and Spanish. Capable of producing high-quality technical documents in both languages.
- 3) Knowledge of local context in the MAR.
- 4) Strategic and innovative thinking.

Preferably these two consultancies will be linked through a collaborative agreement approach team with specialties relevant to the terms of this consultancy

Documents required

The consulting agency will provide:

- A technical proposal with detailed work plan, methodology, timetable of activities and deliverable planning as well as any other relevant information
- An economic proposal, in USD, with the detailed budget by products and expenses concept. The total amount must include all expenses of the consultancy including needed travel.
- A portfolio of similar projects done by the consulting agency
- CV of each leader and the core team
- Three references

The required documentation will be sent before Feb. 15th 2023 to the following emails: mcfield@healthyreefs.org, craig@healthyreefs.org and ajones@marfund.org. In case of incomplete documentation, the proposal will not be taken into consideration.