Proyecto Manejo Integrado "De la Cuenca al Arrecife" de la Ecorregión del Arrecife Mesoamericano -MAR2R-

Minutes of the Workshop on Developing a Regional Strategy for Mangrove Conservation and Restoration in the Mesoamerican Reef



Guatemala City, September 18, 19 and 20, 2019

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Acronyms

CBD	Convention on Biological Diversity
CC	Climate Change
CCAD	Central American Commission for Environment and Development
CONPAH	Confederation of Autochthonous Peoples of Honduras
ENSO	El Niño–Southern Oscillation
FAO	Food and Agriculture Organization
GEF	Global Environment Facility
IUCN	International Union for Conservation of Nature
MAR	Mesoamerican Reef
MAR Fund	Mesoamerican Reef Fund
MAR2R	"Integrated Ridge-to-Reef Management of the Mesoamerican Reef" Project (MAR2R/CCAD/WWF)
MARN	Ministry of Environment and Natural Resources – Guatemala
MiAmbiente+	Honduras' Secretariat of Energy, Natural Resources, Environment, and Mines
NDC	Nationally Determined Contributions
OSPESCA	Central American Fisheries and Aquaculture Organization
OPEV	Presidential Office of Green Economy
REP	Ecosystems and Landscapes Restoration
SDGs	Sustainable Development Goals / Millennium Development Goals
SE-CCAD	Executive Secretariat of the Central American Commission for Environment and Development
SEMARNAT	Secretariat of Environment and Natural Resources
SER	Society for Ecological Restoration
SI	Smithsonian Institution
SICA	Central American Integration System
WWF	World Wildlife Fund

1. Introduction

After the Tulum Declaration in 1997, the stakeholders in the countries constituting the Mesoamerican Reef (MAR) region –Mexico, Belize, Guatemala, and Honduras– have turned it into a worldwide leader of adaptive management and active implementation of management actions. Similarly, MAR is a provider of comprehensive solutions at the regional, national, and local levels, which have had a positive impact on the governance of this ecoregion.

In varying degrees, the stakeholders working in the MAR region have implemented actions to conserve the mangrove ecosystem by creating, reviewing, and updating legislation / normative frameworks, strengthening their government bodies and declaring protected areas. Notwithstanding these efforts, the region continues to lose its mangrove cover. Quintana Roo has lost 5.5% of its mangrove cover since the state was created in 1974 (CONABIO, 2016); Belize lost 2% of its cover between 1980 and 2010 (Cherrington et al. 2010); Honduras lost almost 12% of its cover from 1985 to 2013 (Chi-Farn Chen, 2013). In the case of Guatemala, a study performed by FAO in 2005 estimates that 11 km^2 (1,100 hectares) of mangroves were lost in both coasts between 1980 and 2005, which constitutes almost 10% of the total mangrove cover in the country (FAO, 2005).

At present, the region does not have a unified strategy for mangrove ecosystem conservation and restoration. This is a critically important weakness when trying to guide the actions required to ensure healthy mangrove ecosystems and the continuity of the environmental goods and services that they provide. Consequently, the Mesoamerican Reef Fund (MAR Fund) and the Smithsonian Institution, with support from the German Embassy in Guatemala and the "Integrated Ridge-to-Reef Management of the Mesoamerican Reef" Project (MAR2R/CCAD/WWF) have started a process to participatively design a **Regional Strategy for Mangrove Conservation and Restoration in the Mesoamerican Reef**.

It is essential to work on an instrument with a regional vision that allows performing the following, based on available information:

- To order existing information;
- To clearly define common targets for mangrove conservation and restoration;
- To propose strategies that allow advancing the issues at the regional, national, and local levels, and
- To measure the progress achieved as a region.

As part of this process, a regional workshop was held on September 18, 19, and 20, 2019, in Guatemala City in which 69 key MAR-region stakeholders participated (Annex 1), who represented 44 government entities, communities, non-government organizations, academia and projects, with experience in management, restoration, and mangrove research.

The aims of the workshop were:

- To participatively identify priorities for mangrove conservation and restoration in the Mesoamerican Reef;

- To obtain input to develop a regional strategy for mangrove conservation and restoration, and sustainable use of mangroves in the Mesoamerican Reef.

This document contains the regional workshop report and, in the chapter of results, it systematizes the valuable contributions generated during the event, which will constitute the basis to design the regional strategy.

2. Workshop Agenda

Agenda for the Workshop "Development of a Strategy for the Conservation and Restoration of Mangroves in the Mesoamerican Reef" Day 1		
Time	Activity	Responsibility of
8:00	Registration of participants	MAR Fund
8:30	Welcome words	*Carlos Rodríguez Olivet* MAR Fund – MAR2R / CCAD
8:40	Opening remarks by dignitaries and authorities	*Dr. Michael Grewe* German Embassy *Licda.Luisa Fernández*: Ministry of Environment and Natural Resources of Guatemala
9:00	Introduction to the workshop	*María José Gonzalez*: MAR Fund *Luis Castellanos*: MAR2R
9:20	Indigenous people and Afro invocation	*Tata Juan José Chiriz*
9:30	Group photo	All participants
9:45	Coffee break	
10:00	Introduction to the workshop methodology based on the Adaptive Management of Vulnerability and Risk at Conservation Sites (MARISCO) and the participatory process to develop the strategy	Facilitator: *Olga Centeno*
10:20	Presentation on the current Situation of Mangroves in the MAR Region	*Steven Canty*: Smithsonian Institution
10:50	Adaptation to Climate Change Based on Mangrove Ecosystems and Vulnerability Analysis, proposed adaptation measures in Belize, Guatemala, and Honduras	*Nestor Windevoxhel*
12:20	Blue Carbon: goods and services provided by mangroves	*Miguel Cifuentes*: CATIE
12:40	Presentation on the current situation of watersheds in MAR	*Sonia Solís*: WWF
13:00	Lunch	
14:10	Presentation and validation of the proposed conceptual model (biodiversity objects, ecosystem services and human welfare of mangroves)	Facilitator with all the participants
14:20	Working groups: • Group 1 and 4 – conceptual model • Group 2 and 3 – proposal for vision strategy	Facilitator with all the participants
14:40	Plenary	All the participants
15:15	Systemic analysis on risk vulnerability	Facilitator
15:35	Assessment of the current state of biodiversity targets: Identifying Ecological Attributes and Indicators	Working groups
16:35	Plenary: presentation of results	All the participants
18:40	Closing for the day	*María José González*

Agenda for the Workshop "Developing a Regional Strategy for Mangrove Conservation and Restoration in the Mesoamerican Reef" Day 2		
Time	Activity	Responsibility of
8:30	Presenting Day 1 summary and progress	*Carlos Rodríguez Olivet*
8:45	Identifying stressors and threats	Facilitator
8:55	Continued work on evaluating the current state of biodiversity targets: • Identifying stressors • Identifying threats	Working groups
9:55	Plenary: presentation of results	All the participants
11:00	Blue Carbon: Global and Regional Context	*Miguel Cifuentes*
11:35	Presentation: Mangrove Restoration	*Claudia Teutli*: UNAM
12:10	Presenting the methodology for the day	Facilitator
12:45	Identifying the factors that contribute to threats	Working groups
13:30	Lunch	
14:30	Methodological presentation of stakeholders and interest groups	Facilitator
14:40	Key actors and stakeholders	Working groups
15:40	Analyzing stakeholders by the full assembly	All the participants
16:00	Coffee break (To be served during group work)	
16:00	Methodological presentation: Prioritizing and Developing Strategies	
16:15	Identifying and Prioritizing Strategies and Actions Existing in the MAR Region	Working groups
17:15	Closing for the day	*Claudio González*: MAR Fund
18:30	Cocktail	

Agenda for the Workshop "Developing a Regional Strategy for Mangrove Conservation and Restoration in the Mesoamerican Reef" Day 3		
Time	Activity	Responsibility of
8:30	Presenting Day 2 summary and progress	Facilitator
8:45	Plenary: exercise of strategies	All the participants
9:40	Presentation on the experience of the project "Strengthening Management Effectiveness and the Resilience of Protected Natural Areas to Protect the Biodiversity Threatened by Climate Change," Puerto Morelos, México	Christian Alba CONANP
10:00	Coffee break	
10:15	Working groups for: • Actions • Cost estimates • Potential funding sources	Working groups
11:45	Plenary	All the participants
12:30	Next steps	Facilitator
12:45	Workshop closure	*Carlos Rodríguez Olivet*
13:00	Lunch	

3. Development of the Regional Workshop

3.1. Methodology

The workshop to design the ***Regional Strategy for Mangrove Conservation and Restoration in the Mesoamerican Reef*** was held using the methodology Adaptive Management of Vulnerability and Risk at Conservation Sites (MARISCO – https://www.marisco.training/). This methodology is used as a guide to undertake participative processes to design biodiversity conservation projects based on ecosystems, focusing on adaptation and resilience to risks, both inside and outside of protected areas.

The MARISCO methodology combines the use of other planning methods that include:

- Conservation Action Planning (CAP), a methodological tool to develop strategies and actions in spaces where it is important to care for biodiversity;
- Open Standards, developed by the Conservation Measures Partnership (CMP).

MARISCO is designed to be implemented in four work phases:

I. Preparation and initial conceptualization;
II. Systemic vulnerability and risk analysis;
III. Comprehensive evaluation, prioritization and strategy formulation;
IV. Implementing knowledge and no-knowledge management.

Modifications were made in the original methodology for the specific case of the regional workshop, adapting it to the design requirements of the Regional Strategy for Mangrove Conservation and Restoration in the Mesoamerican Reef, as well as to the diversity of stakeholders attending the workshop (community leaders, scientists, public officials, etc.), so that work was undertaken in the first three phases of the methodology (Annex 2. https://bit.ly/37x8uqb). The work performed included:

1) Master lectures by experts in mangrove conservation and restoration, as well as topics related to climate change, blue carbon, and watersheds, which allowed advances in preparation and initial conceptualization by defining the conceptual framework of the Strategy;
2) Experts and representatives of current projects were present at the workshop, so that there were two additional presentations: a) the Blue Carbon Initiative, and b) Restoring Mangroves, which further enhanced the workshop;
3) Performing a quick analysis of vulnerability and risk, by identifying mangrove ecosystem attributes, stresses and threats, using existing information as input, updating and validating data, initiatives and processes with all the participants;
4) Once the vulnerabilities and risks to mangroves were analyzed, a quick evaluation of these risks was performed. Furthermore, priorities were identified and proposals for actions and strategies were developed.

The workshop lasted two and a half days and it started with an invocation as per the world view of the peoples who were represented in it. The Tata Juan Chiriz stated that the workshop started on Day 9 of the Mayan calendar, which represents the thought of divine Air intermingled with complementarity, thus making it an auspicious day for meetings and progress. The second day of the workshop corresponded to day 10 of the calendar, Akabal, new dawn, new light, new horizons; auspicious to starting new projects and to amending the mistakes we make as human beings.

Moreover, Dr. Grewe, representative of the German Embassy, stated the commitment of his country to the initiatives that help to generate resilience to climate change (CC) in the region. Similarly, María José González, from MAR Fund, spoke of the background of the workshop, as well as of the work that has been undertaken in the Mesoamerican Reef region and the need to have a Regional Strategy for Mangrove Conservation and Restoration in the Mesoamerican Reef.

Strategically organized groups were created at the workshop in order to guarantee the representativeness of all the sectors attending. Full-assembly meetings were held to share and reflect on the topics relevant to the mangrove strategy. It is important to highlight that each one of these groups had the same facilitator and reporter for their group work to ensure follow-up and opportune gathering of contributions.

3.2. Presentations by Specialists

3.2.1. Analysis of the Current Situation of Mangroves in the MAR Region. Steve Canty

The presentation (Annex 3. https://bit.ly/2s4xYuU) underscored the importance of mangrove distribution throughout the Mesoamerican Reef, especially because it is important to think about mangrove management as a vital ecosystem for the region. Following are some important aspects of this presentation:

- Work should then be performed on ecosystem handling and management, and governance, especially pertaining to the legal frameworks that protect them or restrict access to them. As to governance, the presentation emphasized the importance of reviewing the alignment of legal frameworks with international frameworks in each country, as well as the lack of technical and financial resources for mangrove protection.
- In terms of their importance, the presentation proposes analyzing the mangrove ecosystem according to three aspects: **biodiversity** (mangroves as complex ecosystems), **eco-systemic services**, and **human wellbeing** (quality of life).
- Emphasis was also placed on the importance of mangroves in terms of connectivity and spatial scales for their management.
- Notwithstanding their importance, the region lost at least 30% of mangrove area between 1990 and 2010, at an average rate of 5,292 hectares per year.

- The **main threats, seen from the perspectives of the various stakeholders and sectors**, were mentioned. To that end, a survey aimed at managers and researchers had been performed previously. One of the results was that it showed a disconnection between members and decision makers.

- The existence of a mangrove network in which all participants and their institutions are welcome: MesoMSNet@gmail.com. This is a network that enables interaction and exchanging information, data, and experiences.

Participants' Comments:

- The CONPAH[1] community representative stated that it is necessary to listen to the criteria of the indigenous peoples living in the areas and territories; they want to participate to **reach positive solutions** for mangrove ecosystem conservation and restoration. It is important for each nation to commit preventing development that violates the rights of indigenous peoples.

3.2.2. Adapting to Climate Change Based on Mangrove Ecosystems and Vulnerability Analysis, Adaptation Measures Proposed in Belize, Guatemala, and Honduras. Nestor Windevoxhel

The presentation (Annex 4. https://bit.ly/2pMlxTS) highlighted the importance of establishing a role for ecosystems in adapting or resisting impacts of climate change, and the importance of **having clear and forceful data** on the **economic role of ecosystems** (goods and services). Furthermore, the following were mentioned:

- **Services provided by mangroves**: To buffer storms and floods; to retain freshwater; to constitute a habitat for biodiversity; to export biomass. It is important to mention the determining factors for optimal mangrove development (tropical temperatures, an abundance of light, low energy costs, a mixture of fresh and saltwater, and natural control through predators).

- The classification of hurricane intensity and frequency shows that Mexico and Cuba are among the 10 countries most affected. **The dimension of the problem is that the MAR region is in a highly sensitive area.** The historical average of hurricane occurrence is from 26% to 78% in the last ten years.

- The **main effects of climate change (CC) on the mangrove ecosystem that were identified are as follows**: mortality and conversion of mangroves and their effects on communities and other ecosystems, coastal erosion, increased water turbidity, decreased general productivity, and increased coastal saline intrusion.

[1] Confederación de Pueblos Autóctonos de Honduras (Confederation of Autochthonous Peoples of Honduras)

- **The importance of analyzing environmental safeguards and developing scenarios** and their assessment of financial and economic indicators.

- The following are some **steps to improve coastal resilience:**

    - Managing, maintaining and rehabilitating the ecosystem;
    - Strengthening the natural infrastructure (according to an ecosystemic approach) to reduce the impact of CC threats;
    - Engaging in land-use planning, moving infrastructures from highly vulnerable areas, whenever possible;
    - Increasing the capability to adapt in communities;
    - Improving capacities of sectors and governments to mobilize public and private capacities.

- The following **benefits** were mentioned: an increase in benefits; savings in costs, due to environmental rehabilitation; savings in costs of rehabilitating road, housing, and productive infrastructure.

- **Lessons that we have learned**: clear evidence of CC impact; strong participation of local stakeholders, commitment by the authorities involved; clear and profound acknowledgment of the role of ecosystems. We need trustworthy models with conclusive data, economic data that can be linked to interventions and their effects.

- Ecosystem-based Adaptation (EbA) measures will not prevent the effects of CC; they will only foster better adaptation. EbA measures do not exclude hard measures, they may be implemented jointly whenever it is necessary.

Participants' Comments:

- **It is important to write strategies, but it is more important to implement actions.**

- The conceptual proposal and the mangrove scheme that has been presented should be adopted for the strategy, since it provides an integral view of all the factors of the mangrove ecosystem, and clearly shows that the mangrove forest is more than just the trees.

- Donors should be considered as partners in these conservation actions.

- It is necessary to accelerate the process to define and refine the strategies already existing in the region.

- The topic of land-use planning should be further addressed.

3.2.3. Blue Carbon: Goods and Services Provided by Mangroves. Miguel Cifuentes

The presentation (Annex 5. https://bit.ly/33cM8XQ) provided special information on the environmental goods and services generated by mangroves, and the following important aspects were mentioned:

- Keeping human wellbeing as the main goal, since it is local communities that have urgent needs that must be met.

- Mangroves are ecosystems in which we may implement biodiversity conservation strategies. Mangroves are critical for fisheries, since 75% of commercial fish species spend part of their lives in mangroves.

- Mangroves are live barriers that protect us from increasing sea levels, storm surges, hurricanes, and erosion.

- One of the ecosystemic services that has been trending in recent years is the carbon-sequestering service (marine grasses, marshland, estuaries, and mangroves) as marine-coastal ecosystems that are important in capturing carbon, in terms of climate-change adaptation and mitigation. The other services are related to ecotourism, education, science, traditional values, and spiritual values.

- Hybrid methodology combining several tools.

- Studying assessment of the mangrove ecosystem and the services provided by them generates valuable information to strengthen the awareness of scientists, decision makers and other stakeholders.

- Mangrove ecosystems are doubly threatened: upstream alterations, aquaculture, agriculture (e.g.: rice and palm), chemical and physical pollution, and roads (hydrological alterations).

- Gaining knowledge of eco-systemic services is a first step, but it is essential to understand the influence that human beings have on service flows; to develop metrics to provide ecosystemic services; to obtain geographically-explicit information and models throughout time; to develop scenarios for the participative design of management plans, and to balance human needs with the health condition of ecosystems.

3.2.4. Current Situation of Watersheds in MAR. Sonia Solís

Regarding the presentation related to the situation of watersheds (Annex 6. https://bit.ly/2s2izLB) the following aspects were mentioned:

- The concept of watershed was presented as a territory receiving the water that drains into the same river or lake. A watershed is not only the river.

- A watershed is a **natural-resource management unit**: vegetable cover, soil, water, and biodiversity.

- The main threats to watersheds are deforestation: advance of the agricultural frontier; forest fires; using water for irrigation; poor awareness and little value granted to water resources and watershed management; weak governance, and pollution by untreated sewage and residential wastewater.

- The Integrated Watershed Management concept includes science, hydrological knowledge, sustainable practices, and water governance.

- The importance of knowing where water comes from.

- A study was performed on the agricultural and aquaculture transformation in the Mesoamerican Reef region (oil palm, sugar cane, aquaculture, fishing, etc.). It is important to underscore **the pressure being exerted on these areas with high conservation value; the increase of the global demand for these goods, and the threats to locations that are global priorities for conservation**.

- An exercise on water reserves in Guatemala and Honduras was also presented.

- The importance of working on mangrove topics compels us to consider the ecosystem as an integral territory and a "ridge to reef" effort. To reduce anthropogenic pressures on mangroves, it is essential to implement:

    - A process to restore watersheds (reforestation, forest-fire prevention and control, increase of cover, and incentives);

    - A process to reduce pollution (improving agricultural and agrochemical application practices; reducing the pollutants being discharged; limiting the expansion of the agricultural frontier, and managing solid waste);

    - Management and participation process: Acknowledging and integrating the "ridge to reef" approach (decision-making information, facilitating governance mechanisms, watershed management plans).

3.2.5. Complementary Presentations

3.2.5.1. The Blue Carbon Initiative. Miguel Cifuentes

In the presentation on The Blue Carbon Initiative (Annex 7. https://bit.ly/35sgKpS) it was indicated that it is a scientific working group that seeks to:

- leverage the scientific base;
- attract global attention;
- create standards;
- develop guides;
- provide support to policies;
- identify priority regions, and
- foster blue carbon mainstreaming.

In addition, efforts have been made to:

- perform carbon inventories in mangroves;
- appraise ecosystemic services;
- analyze social and ecological vulnerability;
- develop national policy frameworks (it allows national involvement in blue carbon, clarifies institutional roles, and the relationship with other policies / mechanism (e.g.: REDD+);
- promote "blue practice" networks (allows escalation, catalyzes processes).

Currently, the initiative seeks to work on:

- ensuring the adoption and ownership of governments (identifying and selecting leaders or champions);
- integrating blue carbon into international mechanisms;
- seeking adaptation-mitigation synergies;
- escalation by means of exchanges and networks (Sustainable Wetlands for Mitigation and Adaptation Program (SWAMP) Toolbox);
- possibility of creating a Blue Carbon Regional Program;
- SE-CCAD has been given a mandate by the Council of Ministries to place blue economy as one of its regional priorities;
- raise awareness and convince those with decision-making power, Ministers, and advisors to congressional deputies.

Participants' Comments:

- The MAR2R Project has received a mandate from CCAD to work on blue carbon; the CCAD will escalate the strategy to the Council of Ministers. Honduras will serve as CCAD protempore chair next year. It is expected that the Tulum and Roatán agreements will be re-launched.
- Honduras planted the seed by celebrating the Blue Economy Summit; it also launched the new Green Economy Presidential Office (OPEV in Spanish) and public policy.
- The experience of governance platforms for the Greater Caribbean and for the Pacific may constitute echoes to present blue carbon.
- Within the political sphere, it is recommended that congressional deputies, as well as their advisors, be included in the topic.

3.2.5.2. Mangrove Restoration: Strategy Proposal. Claudia Teutli

Insofar as the mangrove restoration experience (Annex 8. https://bit.ly/2XE7I6f) based on the work undertaken by Claudia Teutli, the following relevant aspects were mentioned:

- Regarding mangroves, the first step is to understand the spatial and temporal patterns as a result of the interaction between vegetation, soil, water, and atmosphere.
- The components to be monitored are ecological, economic, and social.
- The Society for Ecological Restoration (SER), as an important initiative to consider and consult by those working on mangrove restoration.
- **An important reflection to consider is that restoration projects have been implemented with a "trial-error" approach rather than with a strategy.**
- Following are some conclusions of the work that has been performed:
  - Reforestation has been the most widely used restoration action;
  - Creating a technical group and defining the site to be restored;
  - Diagnosis of the impacted site and "environmental forensics" reference;
  - Action and restoration plan;
  - Monitoring restoration success;
  - Linkage and sharing;
  - Institutional or group arrangements;
  - Using natural barriers, the restoration process applying natural engineering (metagenomics-bacteria).

Developing a guide / manual for mangrove restoration (demonstration and experience-sharing workshops). A unified guide for all organizations, Wetlands International, Universidad Nacional Autónoma de México (UNAM). A proposal for the next steps is to develop a guide or manual for mangrove restoration and to hold regional demonstration and experience-sharing workshops.

Participants' Comments:

- Participants indicated that the MAR2R Project has a specific line to restore mangroves, but it is necessary that what is done in Mexico, should be done in the other three countries in the MAR region. MAR2R's Component 2 includes demonstration projects. It was proposed that a datasheet be developed to present it to the project in the coming week.
- The United Nations Environment Program (UNEP) and the SPAW Protocol encouraged Guatemala to join the Protocol in order to reap its benefits. The idea is to provide support to the region, but also the Greater Caribbean region. They are developing a mangrove, coral and sea grass strategy for the whole region, and it will be ready in January 2020. There is also a study on the current situation of the three ecosystems and it will end with a restoration guide and specific examples of three hot spots to develop a business plan in order to determine how much it would cost.

3.2.5.3. Experience of the Project "Strengthening Management Effectiveness and the Resilience of Protected Natural Areas to Protect the Biodiversity Threatened by Climate Change," Puerto Morelos, México. Christian Alba

Some of the aspects mentioned in this presentation (Annex 9. https://bit.ly/33dnIgX) were:

- The project uses a highly participative methodology to develop the mitigation measures to adapt to climate change.
- The targets of conservation that have been identified include mangroves.
- The Government of Mexico has implemented the Resiliency Project during four years; SEMARNAT, CONANP, GEF, UNDP.

4. Results

The MARISCO methodology underscores the importance of the participation of key stakeholders who are informed about the area where an action is to be undertaken. In this regard and because 69 people participated in the workshop, to achieve the proposed objectives, the participants were organized in four working groups. The multi-disciplinary and multi-sectoral composition of these groups was ensured. Each group was in charge of undertaking all the processes of the methodology for each conservation element of the mangrove ecosystem.

4.1 Proposal of a Vision for the Strategy

The first step of the methodology consisted of all participants jointly defining which should be the vision of the Regional Mangrove Conservation and Restoration Strategy in the Mesoamerican Reef. To undertake this work, two of the organized groups were assigned the task of reflecting on the vision, emphasizing the key words that it must contain.

Based on the ideas, key words, and proposals contributed by working groups 2 and 3, the following vision was proposed:

Vision:

"*The mangrove ecosystem has conditions that make it resilient to the effects of global change (climate change and other anthropogenic effects) and it is acknowledged as a sustainable-development priority in the Mesoamerican Reef, as it allows conserving the natural capital as the basis for providing goods and services that contribute to human wellbeing.*"

Input was also provided for proposals of targets, strategic lines and elements that help to keep to the vision:

- **Governance**
    - Aligned public policy, which entails work being efficiently coordinated among the different sectors, establishing mechanisms to ensure transparency and accountability, and improved institutional capacities.
- **National and International Legal Frameworks**
    - Updated, strengthened and aligned to livelihoods and fostering the right to a healthy environment.

- **Full and Effective Participation**
    - Considering aspects pertaining to the rights of communities, users and beneficiaries, improvement in community management associated to the livelihoods of the peoples living in the MAR region, fostering models for participative use, management, and conservation.
- **Sustainable Resource Management**
    - Keeping and increasing / recovering mangrove cover in the MAR region, less exposure to the massive-tourism resource, efforts aligned with the UN Decade of Ecosystem Restoration and the Bonn Challenge commitments, by fulfilling the commitments acquired by the countries by means of the National Determined Contributions (NDCs), the Sustainable Development Goals (SDG), and other commitments: the Convention on Biological Diversity (CBD), CC, the Sendai Framework, etc.
    - Organized promotion of the landscape and "ridge-to-reef" approaches, restoration ecology.
- **Knowledge Management**
    - Applying ancestral and traditional science and knowledge, applying social and environmental safeguards, exchange of information, promotion of science and management for public access, integration of methodologies for traditional knowledge.
- **Sustainability**
    - Considering and analyzing the availability of state investment and various investments by the international cooperation; generating financial instruments; mangrove-protection incentive programs.

4.2 Conceptual framework for the Strategy

In the MAR region there are many previous studies and work that allowed presenting a proposal for a conceptual framework on the mangrove ecosystem (Annex 3). Based on this proposal, participants performed an analysis and engaged in a discussion on what the framework for the Strategy should be.

Attendants discussed and agreed on using an integral conceptual framework to manage mangrove systems whereby the aim of undertaking ecosystem conservation and restoration actions will be human wellbeing.

Furthermore, they discussed about a change in vision, seeking to consider mangroves not only as forests, but rather as an ecosystem that includes mangrove forests, land and marine plants and animals; soils, and mangrove hydrology (Figure 1). The diagram constituted a starting point to identify attributes, stresses, and threats to the ecosystem.

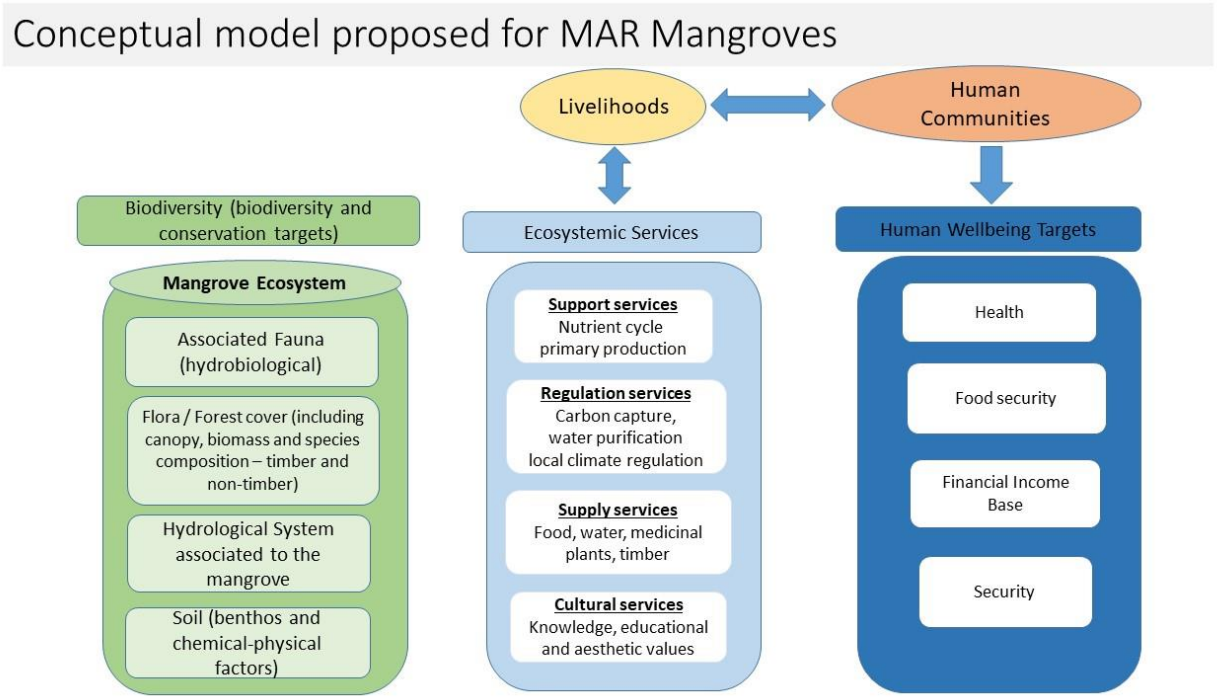


Figure 1: Conceptual model proposed for the Regional Strategy for Mangrove Conservation and Restoration in the Mesoamerican Reef.

As can be seen, the mangrove ecosystem has been identified as the main biodiversity target, which has four conservation targets (fauna, flora, hydrological system and soils). Furthermore, the ecosystem generates a series of services for coastal populations and these are their main livelihoods. It has been shown that a healthy ecosystem generates a positive impact on the targets of human wellbeing.

4.3. Identifying stresses and attributes

Once the four targets for the mangrove ecosystem had been defined and agreed on, each working group started the process to identify the contributing factors and the stresses for each target. Considering that:

- The key ecological attributes are the properties and integral elements of the ecological systems that preserve their functions and provide them with the necessary adaptation and resilience to cope with shocks.
- Stresses describe the symptoms and signs of the degradation of key ecological attributes due to the lack of availability or quality of master factors, evidenced as the loss of minimum levels of biomass, information and connectivity.

Each working group met separately to discuss the matter and then a meeting of the full assembly was held to present the results, so that everyone became aware of them and contribute their input to each conservation target. In some cases, similar attributes or stresses were identified for several conservation targets.

4.4 Identifying the main threats affecting mangroves.

Taking the conceptual framework defined on the first day of the workshop as a starting point, as well as the results of the MAR Ecoregional Assessment 2008[2], along with the results of the perception survey for experts, performed by the Smithsonian Institution and MAR Fund before the event, the following threats were identified:

1) Global climate change (increase in temperatures and sea level; reduced CO_3);
2) Discharge of wastewater / sewage + leachates infiltration;
3) Development of tourist + urban-coastal + road and transportation infrastructure (roads, ports, dredging works);
4) Use of agrochemicals and pesticides;
5) Navigation (anchoring damage, spills, boat propeller scarring);
6) Mangrove deforestation (mangrove extraction);
7) Agroindustry;
8) Dams (surface waters and groundwater) + interruption of the hydraulic flow in the system;
9) Oil and lubricants;
10) Changes in land use in relevant watersheds / changes in soil use / changes in the upper watershed / illicit funding / illegal drug activities;
11) Changes in land use in mangrove areas and pollution deriving from aquaculture;
12) Overfishing;
13) Cattle raising;
14) Silting (although two groups defined it as a more of a stress than a threat; it is worthwhile taking it into consideration).

[2] Source: Arrivillaga and Windevoxhel 2008.

4.5 Proposals for strategies and actions identified

Once the Vision for the Regional Strategy for Mangrove Conservation and Restoration in the Mesoamerican Reef and its conceptual framework had been defined, and the attributes, stresses and threats had been identified, working groups started to identify proposals for strategies, actions, and in some cases even budgets for each conservation target (CT). Strategies that, due to their nature, are crosscutting to the four conservation targets were also included. The following classifications were finally agreed on:

I. Associated fauna (water and land);
II. Flora / forest cover (including canopy, biomass and species composition – timber and non-timber);
III. Hydrological system associated to the mangrove;
IV. Soil (benthos and chemical-physical factors);
V. Crosscutting strategies.

4.5.1. Strategies proposed for the Fauna associated to the mangrove conservation target

1) Economic alternatives to reduce pressure on resources: Ecosystemic management;
2) Improving / strengthening the commercialization chain;
3) Restoring / rehabilitating wetlands;
4) Land use plans;
5) Sustainable – responsible agriculture;
6) Local empowerment policy (environmental education, sharing and public-policy empowerment);
7) Strengthening PA governance;
8) Research and monitoring (generating the baseline);
9) Following up / exchanging existing initiatives (El Cuco, El Salvador) to replicate adjusted versions in each country.

4.5.2. Strategies proposed for the Flora / Forest Cover conservation target

1) Governance and shared institutional strengthening;
2) Implementing better-practice instruments;
3) Knowledge management;
4) Sustainability;

4.5.3. Strategies proposed for the Hydrological System associated to the mangrove conservation target

1) Incorporating blue carbon flows into national accounts and reports;
2) Using adaptation measures based on ecosystems;
3) Land use planning aimed at water use in the watersheds associated with mangroves;
4) Fresh water capture systems (water harvesting);
5) Developing infrastructure based on nature to allow saving water and contributing to livelihoods;
6) Introducing environmental sanitation mechanisms where there are none and strengthening existing ones;
7) Strengthening the legal and regulatory framework;
8) Developing the regulatory framework (including adequate fines and sanctions) for navigation (anchoring damage, spills, boat propeller scarring);
9) Eliminating direct disposal of oil and lubricants into the water.

4.5.4. Strategies proposed for the Soil conservation target

1) A national mangrove restoration strategy that is coordinated in order to recover mangrove coverage in the MAR region;
2) A regional strategy to monitor the condition of mangrove soils;
3) Harmonizing indicators in the region;
4) Standardizing methods to establish the condition mangrove soils in the MAR region;
5) Defining a differentiated mangrove restoration protocol for each MAR area and/or region;
6) A committee to undertake a review and assessment of how protocols to measure mangrove health are being applied;
7) Implementing mangrove restoration actions in the MAR region, seeking to maintain the balance of net cover;
8) Actions to monitor the present situation of cover for its follow-up;
9) Committee for satellite monitoring of cover;
10) Creating a scientific committee to advise and train members in the region on topics such as restoration and the causes for loss of ecosystems;
11) Generating environmental-education materials based on science.

4.5.5. Crosscutting strategies proposed for Mangrove Restoration and Recommendations

In this regard, groups proposed a series of ideas and strategies that are considered crosscutting to the four conservation targets; these were:

1) Inclusive participation
    a. Creating a national group or groups to establish priority sites; generate inclusive information; link benefit distribution plans; develop an action plan with demonstrative projects; evaluate local needs; promote community organization: adequate information, local decision making;
    b. An exhaustive review of existing entities: national forest restoration group –mangrove sub-group;
    c. Education for resilience: identifying male and female leaders (negotiators); gurus dominating conversations: equivalent value; How do young people see this topic? (survey) – new and value added: School for leaders.
2) Addressing social-environmental safeguards;
3) Integrated-management approach;
4) Innovation and appropriate technology;
5) Trans-generational knowledge transfer;
6) Inter-generational responsibility;
7) Following up international agreements; e.g. SDGs;
8) Strengthening governance relating to mangroves;
9) Standardizing norms in the MAR region;
10) Research and knowledge management aimed at solving management issues in mangrove areas;
11) Raising awareness on the importance and benefits of adequate resource management: businesspeople, indigenous peoples, etc. Adjusting it to the various sectors;
12) Protected area system with high mangrove representation;
13) Creating a fund for research initiatives, pilot projects (innovative governance models), scholarships.

5. Conclusions

- With the inputs from the regional workshop and the systematization of information related to MAR mangroves, the proposal for the **Regional Strategy for Mangrove Conservation and Restoration in the Mesoamerican Reef** will be developed. This proposal will be sent to workshop participants for consultation, in order to receive their input and comments in the periods of time established to that end.

- An aspect that was acknowledged by workshop participants was the importance of having an instrument such as the **Regional Strategy for Mangrove Conservation and Restoration in the Mesoamerican Reef**, which will contribute to coordinating the actions that will allow increased impacts, since even though there have been many actions undertaken in the past twenty years, the threats have increased. Dispersed investments in the region are another factor that makes it difficult to achieve regional impacts.

- The methodology used in the workshop and the attendance of key stakeholders from various sectors helped to show mangroves as much more than mangrove-tree cover, and to consider at least four key targets for its conservation:
  I. Associated fauna (water and land);
  II. Flora / forest cover (including canopy, biomass and species composition – timber and non-timber);
  III. Hydrological system associated to the mangrove;
  IV. Soil (benthos and chemical-physical factors);
  V. Crosscutting strategies.

- The main challenge of the strategy will be its implementation, and thus, it is essential to have an action plan that establishes time limits, identifies the persons in charge, and determines the funding sources for its implementation.

Annex 1. List of participants

No.	Country	Name	Institution	e-mail
1	Belice	Alison Arriola	UNESCO	arriola_alison@yahoo.com
2	Belice	Andreina Acosta	Blue Ventures	andreina@blueventures.org
3	Belice	Angeline Valentine	MAR Fund	avalentine@marfund.org
4	Belice	Azelea Gillett	Coastal Zone management Authority	dataresearcher@coastalzonebelize.org
5	Belice	Carianne Johnson	5Cs	cjohnson@caribbeanclimate.bz
6	Belice	Heidy Waters	TIDE	hwaters@tidebelize.org
7	Belice	Myles Phillips	WCS	mphillips@wcs.org
8	Belice	Ninon Martinez	UB	nmartinez@ub.edu.bz
9	Belice	Roosevelt Blades	UNESCO	unesco.secgen@moe.gov.bz
10	Guatemala	Ana Beatriz Rivas	MAR Fund	arivas@marfund.org
11	Guatemala	Anabella Barrios	CALAS	anabella_barrios@yahoo.com
12	Guatemala	Anaité López	INAB	silvia.lopez@inab.gob.gt
13	Guatemala	Blanca Rosa García	UICN	blanca.garcia@iucn.org
14	Guatemala	Carlos Godoy	CONAP	carlos.godoy@conap.gob.gt
15	Guatemala	Carlos Rodriguez	MAR Fund	crodriguez@marfund.org
16	Guatemala	Claudio González	MAR Fund	cgonzalez@marfund.org
17	Guatemala	Dámaris Eguizabal	MAR Fund	deguizabal@marfund.org
18	Guatemala	Dolores Cabnal	Asociación Ak-tenamit	lola@aktenamit.org
19	Guatemala	Dr. Michael Grewe	Embajada Alemania	wz-1@guat.auswaertiges-amt.de
20	Guatemala	Emilio Pitán	Asociación Amantes de la Tierra	e.pitan@fundaeco.org.gt
21	Guatemala	Guillermo Gálvez	FUNDAECO	g.galvez@fundaeco.org.gt
22	Guatemala	Ing. Erick Alvarado	CONAP	erik.alvarado@conap.gob.gt
23	Guatemala	Jorge Ordoñez	FCG	jordonez@fcg.org.gt
24	Guatemala	Jorge Ruiz	Wetlands International	jorge.ruiz@wetlands.org
25	Guatemala	José Ismael Ordóñez	Wetlands International	ismael.ordonez@wetlands.org
26	Guatemala	Joseph Chirix	Asociación Sotzil	joechirix@gmail.com

No.	Country	Name	Institution	e-mail
27	Guatemala	Juan Cusanero	Asociación Sotzil	jucel.7@gmail.com
28	Guatemala	Juan José Chiriz	Asociación Sotzil	juanjo1320@gmail.com
29	Guatemala	Lucy Calderón	MAR Fund	lcalderon@marfund.org
30	Guatemala	Luisa Fernández	MARN	lmfernandez@marn.gob.gt
31	Guatemala	Manuel Lorenzana	KfW	manuel.lorenzana@kfw.de
32	Guatemala	Marco Cerezo	FUNDAECO	m.cerezo@fundaeco.org.gt
33	Guatemala	María José González	MAR Fund	mjgonzalez@marfund.org
34	Guatemala	Melany Ramírez	UVG	mlramirez@uvg.edu.gt
35	Guatemala	Mónica Morales	ADA2	administracion@ada2.org
36	Guatemala	Néstor Windevoxhel	Consultor	nwindevoxhel@gmail.com
37	Guatemala	Olga Centeno	Consultor	ocentenog@gmail.com
38	Guatemala	Patricia Cabrera	MAR Fund	pcabrera@marfund.org
39	Guatemala	Pedro Julio García	USAC-CEMA	pjuliogarcia@gmail.com
40	Guatemala	Pilar Velásquez	WWF	pvelasquez@wwfca.org
41	Guatemala	Samuel Coloma	CONAP	samuel.coloma@conap.gob.gt
42	Guatemala	Sonia Solís	WWF	ssolis@wwfca.org
43	Guatemala	Úrsula Parrilla	UICN	ursula.parrilla@iucn.org
44	Guatemala	Yvonne Ramírez	FCG	yramirez@fcg.org.gt
45	Honduras	Aldo Flores Marín	MiAmbiente	aldo.floresmarin@yahoo.com
46	Honduras	Arlene Rodriguez	CURLA-UNAH	arlene.rodriguez@unah.edu.hn
47	Honduras	Belkis Ramírez	BICA Roatán	protectionroatan@bicahn.org
48	Honduras	Claudia Guerrero	CEM	claudia@estudiosmarinos.org
49	Honduras	Domingo Alvarez	CONPAH	nellygc_80@yahoo.es
50	Honduras	Elsser Brown Evans	MOPAWI	elsser_brown@yahoo.com.mx
51	Honduras	Gustavo Cabrera	CCO	gustavocm67@gmail.com
52	Honduras	Ian Drysdale	HRI	drysdale@healthyreefs.org
53	Honduras	Skarleth Pineda	MiAmbiente	spineda85miambiente@gmail.com
54	México	Alejandra Serrano	Casa Wayúu/ELAW	ale@elaw.org
55	México	Christian Alva Basurto	CONANP	christian.alva@conanp.gob.mx

No.	Country	Name	Institution	e-mail
56	México	Claudia Teutli	UNAM	teutliclaudia@gmail.com
57	México	Jorge Herrera	CINVESTAV	jorge.herrera@cinvestav.mx
58	México	Laura Abril Eloisa Valencia Lara	Asociación Sembrada Semilla Sagrada	lar_abril@hotmail.com
59	Costa Rica	Julio Montes de Oca	UICN	Julio.MONTES@iucn.org
60	Costa Rica	Miguel Cifuentes	CATIE / Blue Challenge	miguel.cifuentes@catie.ac.cr
61	Costa Rica	Ronald McCarthy	Consultor	ronaldmccarthy1862@gmail.com
62	EEUU	Alejandra Navarrete	The Ocean Foundation	anavarrete@oceanfdn.org
63	EEUU	Karen Douthwaite	WWF	karen.douthwaite@wwfus.org
64	EEUU	Steve Canty	Smithsonian Institute	cantys@si.edu
65	El Salvador	Juan Ramón Cortéz	MAR2R	jcortez@sica.int
66	El Salvador	Luis Castellanos	MAR2R	luis.castellanos@sica.int
67	El Salvador	Melany Machado	Proyecto COSUDE Golfo Resiliente CCAD	melanymachado@yahoo.com
68	Jamaica	Ileana Lopez	UN Environment	ileana.lopez@un.org
69	Jamaica	Nicole Brown	CANARI	nicolebrown@canari.org