



MANGROVE :

Ecological restoration strategies

How to use the platform

❖ PARTICIPANTS

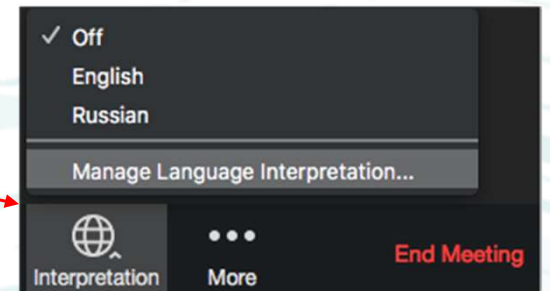
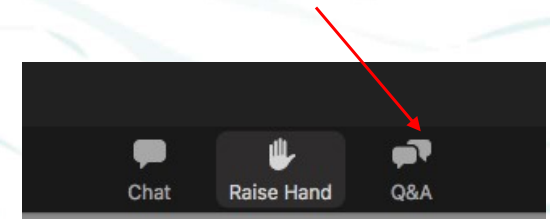
You can ask questions through the « question box ». The moderators see them and relay them to the speakers who will answer them in the "question and answer" sessions.

❖ TRANSLATION

If you need interpretation please choose the channel below...

❖ SPEAKERS

Think that everyone can see and hear you...and that you are being recorded for future broadcasts! Please turn off your microphones when you are not speaking.



Context & objectives

Series « Ecological restoration of mangroves »

Share concrete practices to support their replication with experiences from project/program managers and experts in the field.

How to implement them? What are the difficulties and how to prevent and overcome them ? What are the keys to success?

Context & objectives



ICO SOLUTIONS

Islands, Coasts, Oceans Solutions : Identify and share good initiatives and practices all around the world with our partners



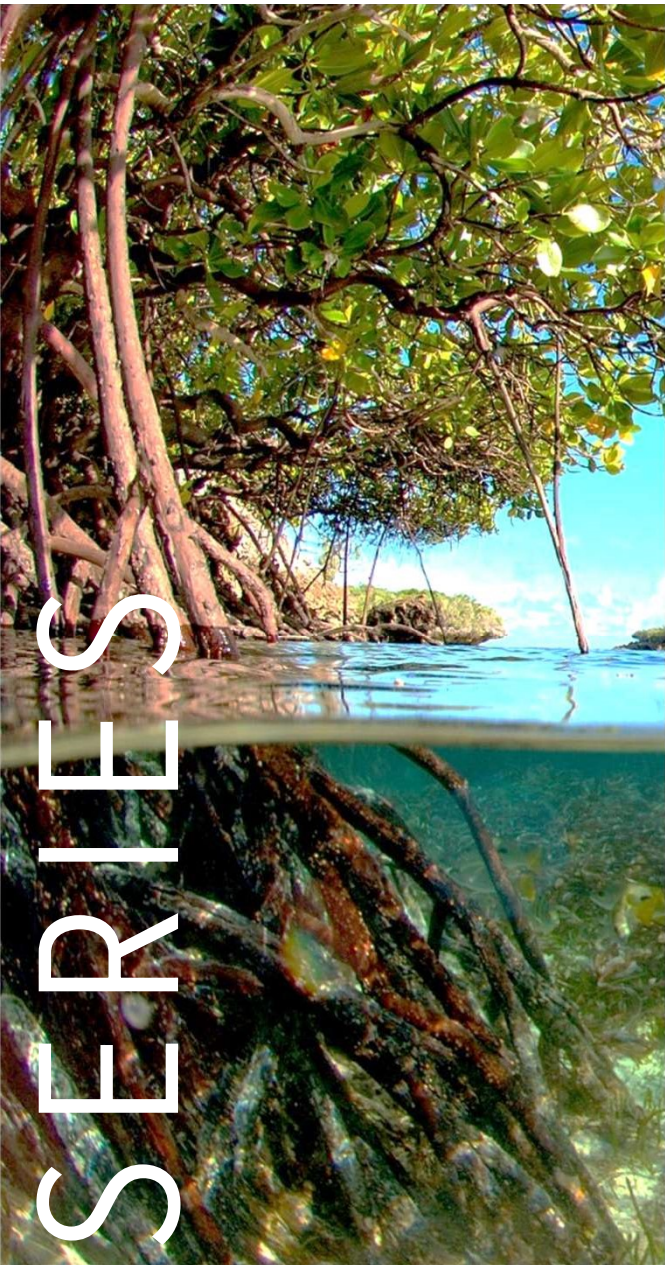
French public institution : acquire parcels of coastline threatened by urbanisation or degraded in order to turn them into restored, developed and welcoming sites that respect the natural balance.



International NGO : promotion and assistance in the management of Mediterranean island areas by the implementation of concrete actions in the field.



Small Islands Organisation, international NGO : supports small islands of less than 150 km² towards their sustainable development and the sustainable management of their resources (water & sanitation, waste, energy, biodiversity, landscape and cultural heritage).



MANGROVES : Ecological restoration strategies

- **Last week** >> 1st Episode : Avoid mangrove destruction – Understanding and reducing *pressures* (*replay on ICO Solutions website*)
- **Today** >> 2nd Episode : Mangrove Reforestation – Innovations and challenges
- **April 27th** (4:00 PM – UTC+2) >> 3rd Episode : Passive restoration technics – Understanding the natural process of regeneration

Organizing team



Fabrice Bernard
Moderator
Europe & International
Head-Officer
Conservatoire du littoral



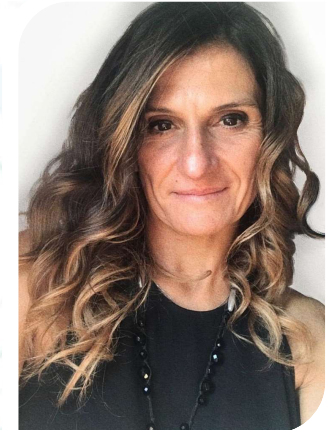
Enora Tregouët
*Organization /
Question Box*
Europe & International
Project officer
Conservatoire du littoral



Angélique Triguel
Back Office
Europe & International
Project Manager
Conservatoire du littoral



Cyrielle Grouard
Organization
Project Manager
PIM Initiative



Isabella Ranieri
Intepreter

Program – Episode 2

Active restoration technics – Innovations and challenges

❖ **Introduction** - Marie-Christine Cormier-Salem - IRD – 5'

❖ **First part** – Alioune Diallo, Gandoule Marine Protected Area – 7'

○ **Q&A** – 10'

❖ **Second part** – Johanna Jupin, Humedales A. C. – 7'

○ **Q&A** – 10'

❖ **Guide presentation** – Dr. Jorge A. Herrera-Silveira, CINVESTAV-IPN, Unidad Mérida – 5'

○ **Q&A** – 5'

❖ **Closing**

Speakers



**Marie-Christine
Cormier-Salem**

Director of Research in social sciences at the IRD

Johanna Jupin

International communication manager in Humedales A. C.

Alioune Diallo

Conservation Manager
Gandoule Marine Protected Area

Dr. Jorge A. Herrera-Silveira

Titular Professor, CINVESTAV-IPN, Unidad Mérida



MANGROVES : Ecological restoration strategies | 1st Episode – April 13th, 2023



Speaker



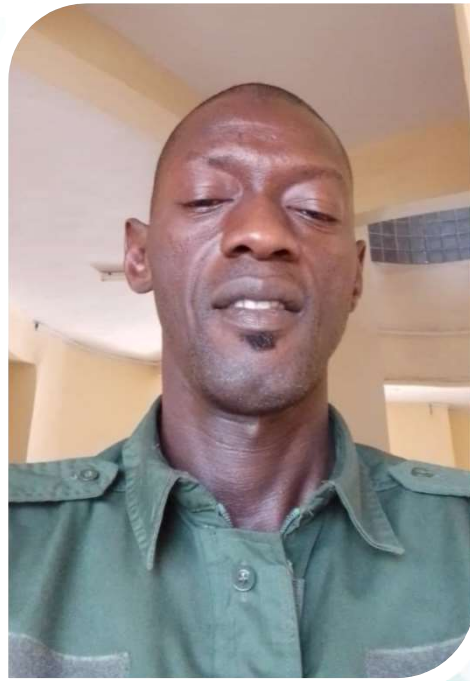
Johanna Jupin

International communication manager in Humedales A. C.



Collaboration
France-Mexico

Speaker



Alioune Diallo
Conservation Manager
Gandoule Marine Protected Area



Senegal

Speaker



Dr. Jorge A. Herrera-Silveira
Titular Professor, CINVESTAV-IPN, Unidad Mérida



Cinvestav
UNIDAD MERIDA

Mexico

Introduction



**Marie-Christine
Cormier-Salem**

Director of Research in
social sciences at the IRD



France

Introduction

Active Restoration Technics

- **Active vs Passive, artificial vs natural**, Top-down versus Bottom-up process
- **From reforestation to ecological Restoration**: A set of technics and measures
- **Beyond Technics**: Why and What for? Who are the beneficiaries ?
- **Policy of Carbon**: a paper's market, the mystification of REDD+



Innovations and challenges

- **Lessons of the past failures**: is it necessary (still, always) to reforest the mangroves?
- **Indicators of success**:
 - relevance, coherence, effectiveness, efficiency, impacts, sustainability
 - in terms of CO2 sequestration, biodiversity, amenities
- **Trade-off between SDGs**: Climate Change mitigation, Biodiversity conservation, Justice



Projet de restauration de l'écosystème Mangrove dans l'AMP du Gandoule et sa périphérie



Alioune Diallo

Conservateur de l'AMP du Gandoule



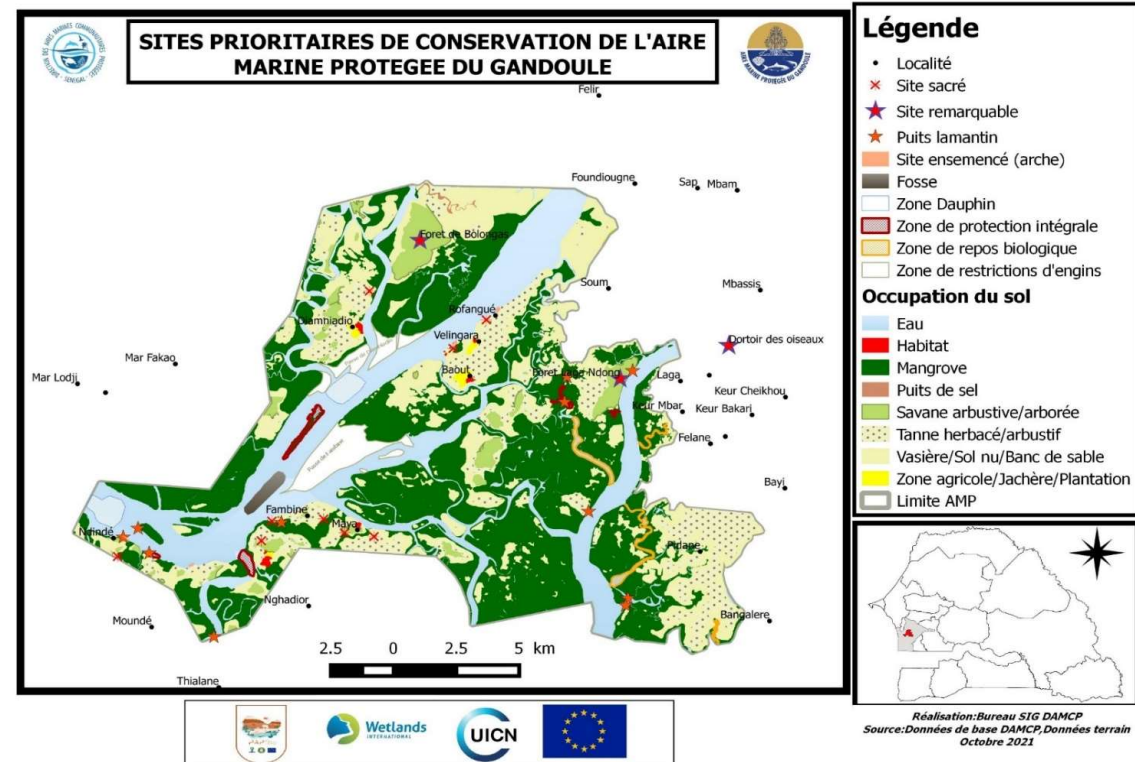
Sénégal



Contexte et justification



Localisation : RBDS. Ecosystème marin côtier; Problématique : Salinité ; Coupe de bois; extraction de sable marin; pêche non durable; pollution; érosion côtière...



Phase de prospection et méthodologie

2.1. Discussions avec les communautés

- ❖ historique du site;
- ❖ foncier et autres règles locales sur le site;
- ❖ appropriation et participation;
- ❖ descente sur le terrain; etc.

2.2. Prospection des sites

- ❖ substrat du site;
- ❖ hydrologie;
- ❖ biodiversité animale et végétale;
- ❖ topo séquence;
- ❖ paramètres physico chimiques;
- ❖ indentification pressions sur res. nat.;
- ❖ géo référencement et carto.



Phase de collecte

- ❖ Identification des zones de collecte;
- ❖ Mobilisation des collecteurs;
- ❖ Qualité des semences;
- ❖ Dispositifs pour préserver les semences;
- ❖ Stockage des semences avant repiquage...



Phase de repiquage

- ❖ Sécurité en mer;
- ❖ Tri sélectif des semences;
- ❖ Transport des semences au lieu de reboisement;
- ❖ Alignement dans les colonnes et les lignes;
- ❖ Repiquage des semences;
- ❖ Pancartage;
- ❖ Délimitation et géo référencement;
- ❖ Cartographie des sites...

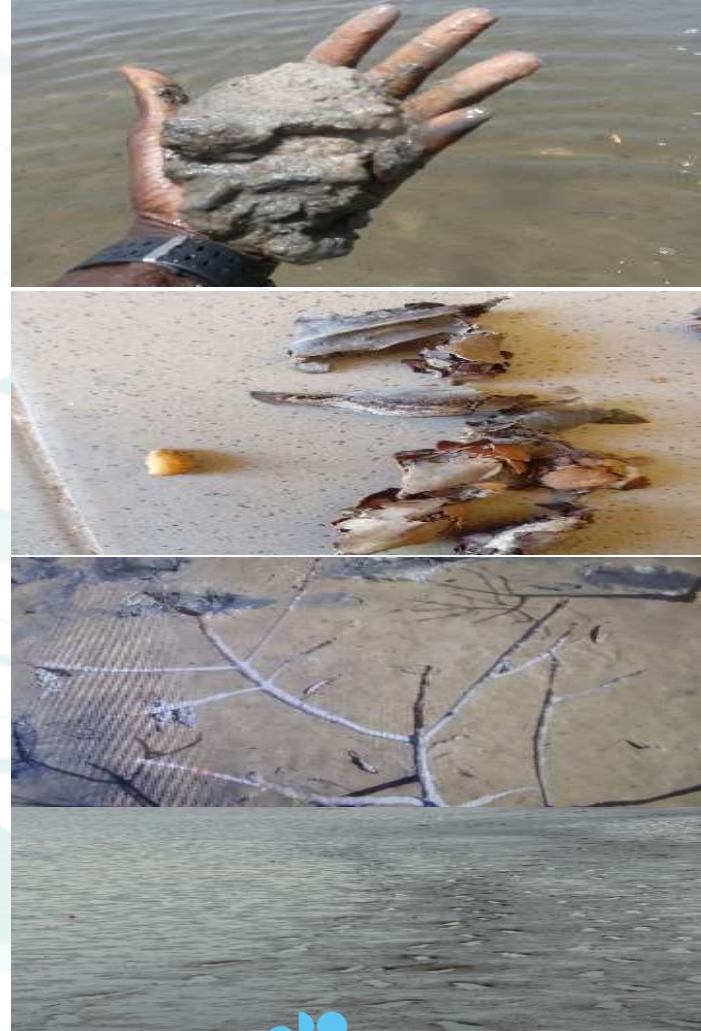


Phase de suivi: Protocole de suivi

Timeframe	Date	Zone / Parcelle	Paramètres Ecologiques (BIOTOPE)					Paramètres Biologiques (BIOCENOSE)				
			Salinité g/L	pH OD	Temp. (°C)	Texture sol / Ensablement	Signes perturbation / Empiètement	Stade moy. Phénologique	Hauteur moy. (cm)	Traces de vie animale (alevins, empreintes, trous de crabes, nids)	Nombre Reg. Naturelle	Technique de restauration
Début (T0)												
T0 + 3 mois												
T0 + 6 mois												
T0 + 9 mois												
T0 + 12 mois												
T0 + 18 mois												

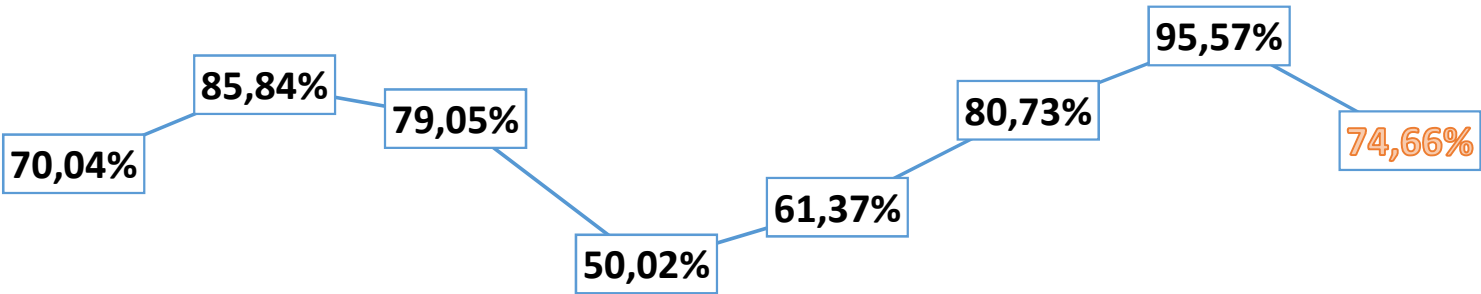
Conclusion : Leçons apprises échecs et succès

- ❖ Ensablement dans certaines parcelles ;
- ❖ Sol dur et compact sur certaines parcelles ;
- ❖ Zones caractéristiques d'*avicenia africana* et de *conocarpus erectus* ;
- ❖ Zones où les périodes de faibles marées ne touchent pas (mouillage) le sol ;
- ❖ Absence de régénération artificielle témoignant parfois la fertilité ;
- ❖ Le reboisement de propagules immatures dans certains endroits contribuant à la hausse des pertes ;
- ❖ Le reboisement dans les bowés (bowal),
- ❖ zone de pêche en période de marée hautes de la part des autochtones ;
- ❖ Attaques d'insectes ;



Conclusion : Leçons apprises échecs et succès

SUCCÈS REBOISEMENT PROJET VIMASA DANS LE DELTA DU SALOUM



Keur mbar Bangalère Baout Bambougar Massamba Bambougar Malick Sippo Néma Bah tendance évolutive (succès) des superficies reboisées





Intro / Part I

Question & Answers

Hydrological Restoration of Mangroves in degraded wetlands in the Marismas Nacionales Sinaloa



Johanna Jupin

International communication manager
in Humedales A. C.



Collaboration
France-Mexico



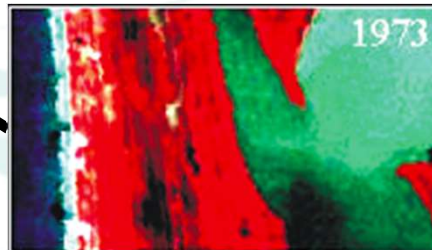
Hydrological Restoration of Mangroves in degraded wetlands in the Marismas Nacionales Sinaloa



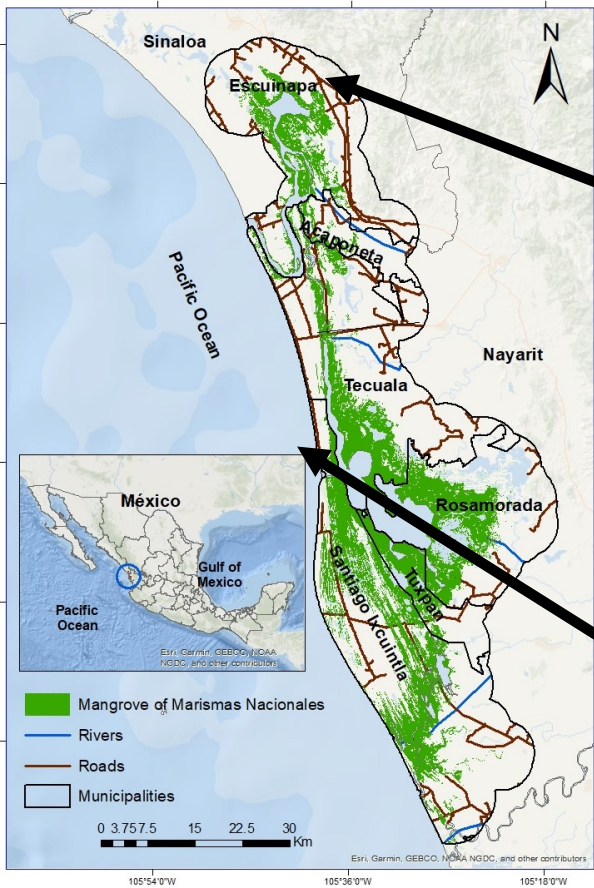
Initial state

40 m wide

2 km wide



Ruiz-Luna et al., 2005; Fuentes et al., 2002



Quintero-Morales et al., 2021

Hydrological Restoration of Mangroves in degraded wetlands in the Marismas Nacionales Sinaloa



Association Humedales A. C.

Civil Society organization since February 2017.

Our mission: the restoration and conservation of deteriorated ecosystems or those at risk of deterioration, until they recover their functionality to preserve their richness and biodiversity.

From 2016 to the present, about **300 ha** of mangroves have been reforested in the Marismas Nacionales Sinaloa (MNS) area with a success rate of 85%.

Members



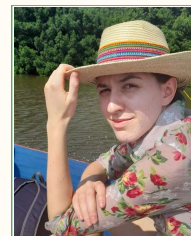
**Engr. Agro.
Juan C. García
Maldonado**
Administration
Area



**Dr. Leonardo
Moroyoqui R.**
Restauration
Area



**M.Sc. Perla E.
Lerma L.**
Communication
Manager



**M.Sc. Johanna
Jupin**
International
Relations
Manager



**Engr. Agro.
Abelardo
Astorga C.**
Tree Nursery
Logistics



**Dr. Francisco
Javier Flores
Verdugo**
Course-
Workshops

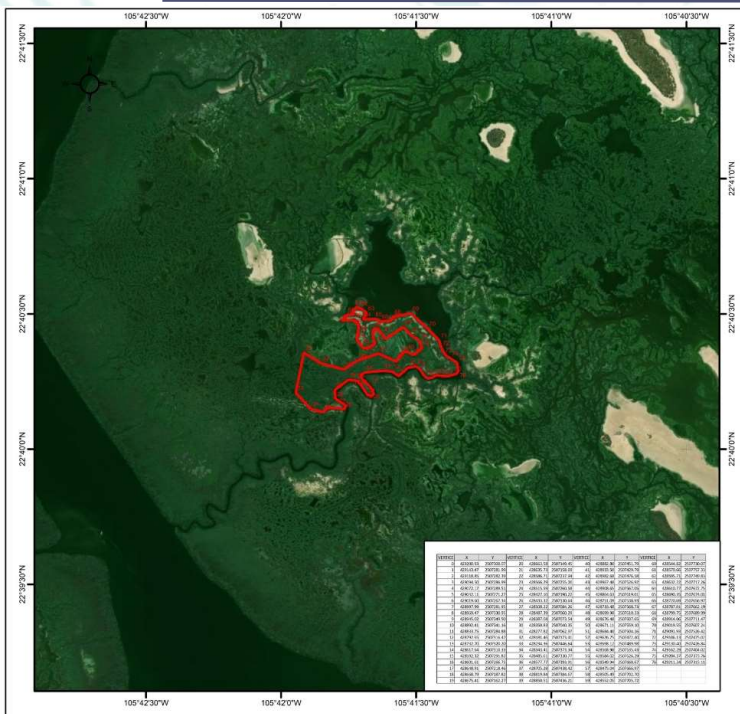


**C. Dante D.
Aguilar Farias**
Field
Logistics



**Engr. Geodesta
Ernesto Beltrán
García**
Hydrology
Specialist

Hydrological Restoration of Mangroves in degraded wetlands in the Marismas Nacionales Sinaloa



Study area: is part of the Ramsar Site #732 and corresponds to the project Hydrological Restoration of Mangroves (Federal Property: ZF-DGVS-212-SIN).

Project: Restoration of a polygon of 25 hectares from 2024-2029.

Total of sustainable trees:
30,000 plants

- 2,000 plants of *R. mangle*
- 20,000 plants of *L. racemosa*
- 8,000 plants of *A. germinans*

Additional 10,000 seedlings

Funded by donations

Total cost: €150,000

- €5 / tree
- €6,000 / hectare

Supported by



& collected over 2023-2029

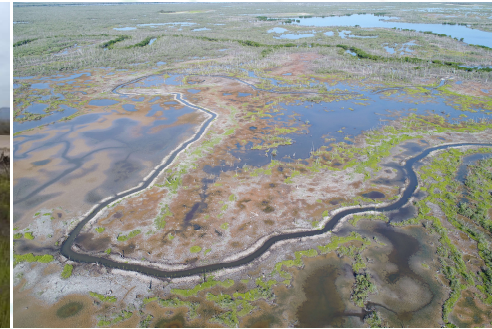
 DIRECCIÓN GENERAL DE VIDA SILVESTRE	ESTADO: SINALOA MUNICIPIO: ESCUINAPA PROYECTO: MARISMAS NACIONALES SINALOA PROMOVENTE: HUMEDALES SUSTENTABLES A.C.	Simbología POLIGONO 25.00 hectareas • Vertices	
	1:25,000 0 0.25 0.5 1 Km		

Hydrological Restoration of Mangroves in degraded wetlands in the Marismas Nacionales Sinaloa

4. Seed Collection



1. Prospection



2. Studies



3. Construction Channels and Terraces



Hydrological Restoration of Mangroves in degraded wetlands in the Marismas Nacionales Sinaloa

5. Establishing of A Tree Nursery



6. Plant Acclimatization



Maintenance & Monitoring over 6 years



8. Reforestation



7. Transport



Conclusion

Key points to improve project success:

- Detection, evaluation, and preparation of potential areas to be reforested
- Selection, conditioning and production of a total of 40,000 seedlings in the nursery
- *In situ* reforestation with propagules from the study area
- Maintenance, monitoring and evaluation of the restoration program over a period of six years.



How can you support us?

<https://www.atreeforyou.org/fr/mexique-restauration-des-mangroves-dans-les-zones-humides-de-marismas-nacionales-sinaloa/>

Restauration des mangroves dans les zones humides de Marismas Nacionales Sinaloa, au Mexique

Je plante pied de palétuvier

pour un don de 5,00 €

AJOUTER AU PANIER

1 pied de palétuvier: 5,00 €

Objectif : 30 000 pieds de palétuvier pour un montant de 150 000,00 €

👁️ déjà financé : 84 pieds



Part II

Question & Answers

Speaker



Dr. Jorge A. Herrera-Silveira

Titular Professor,
CINVESTAV-IPN, Unidad Mérida



Cinvestav
UNIDAD MERIDA

Mexico

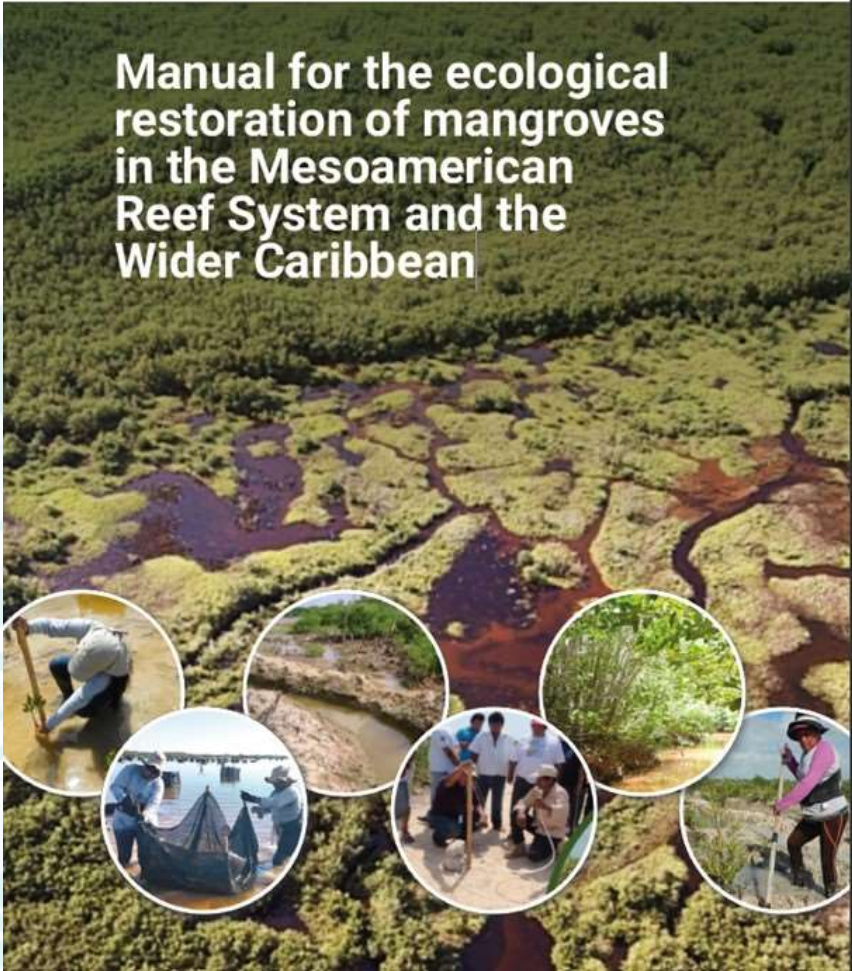


PROYECTO MANEJO INTEGRADO
**DE LA CUENCA
AL ARRECIFE
DE LA ECORREGION
DEL ARRECIFE MESOAMERICANO
(MAR2R)**



Manual for the ecological restoration of mangroves in the Mesoamerican Reef System and the Wider Caribbean

Dr. Jorge Alfredo Herrera Silveira, Dr. Claudia Teutli-Hernández, Dr. Diana Cisneros-de la Cruz, Dr. Daniel Arceo-Carranza, Biol. Mar. Andrés Canul-Cabrera, M. C. Javier Pedro Toral-Robles, Biol. Oscar Pérez-Martínez, Q. I. Daniela Sierra-Oramas, Biol. Karla Zenteno, Biol. Heimi Us-Balam, Biol. Eunice Pech, Dr. Xavier Chiappa-Carrera; Dr. Francisco Comín



PMG
 Programa Mexicano del Carbono
 Rio TEMATICA DEL CONACYT

Laboratorio Nacional de Restauración Costera

ISLAND COAST OCEAN SOLUTIONS

RÉPUBLIQUE FRANÇAISE
 Liberté Égalité Fraternité

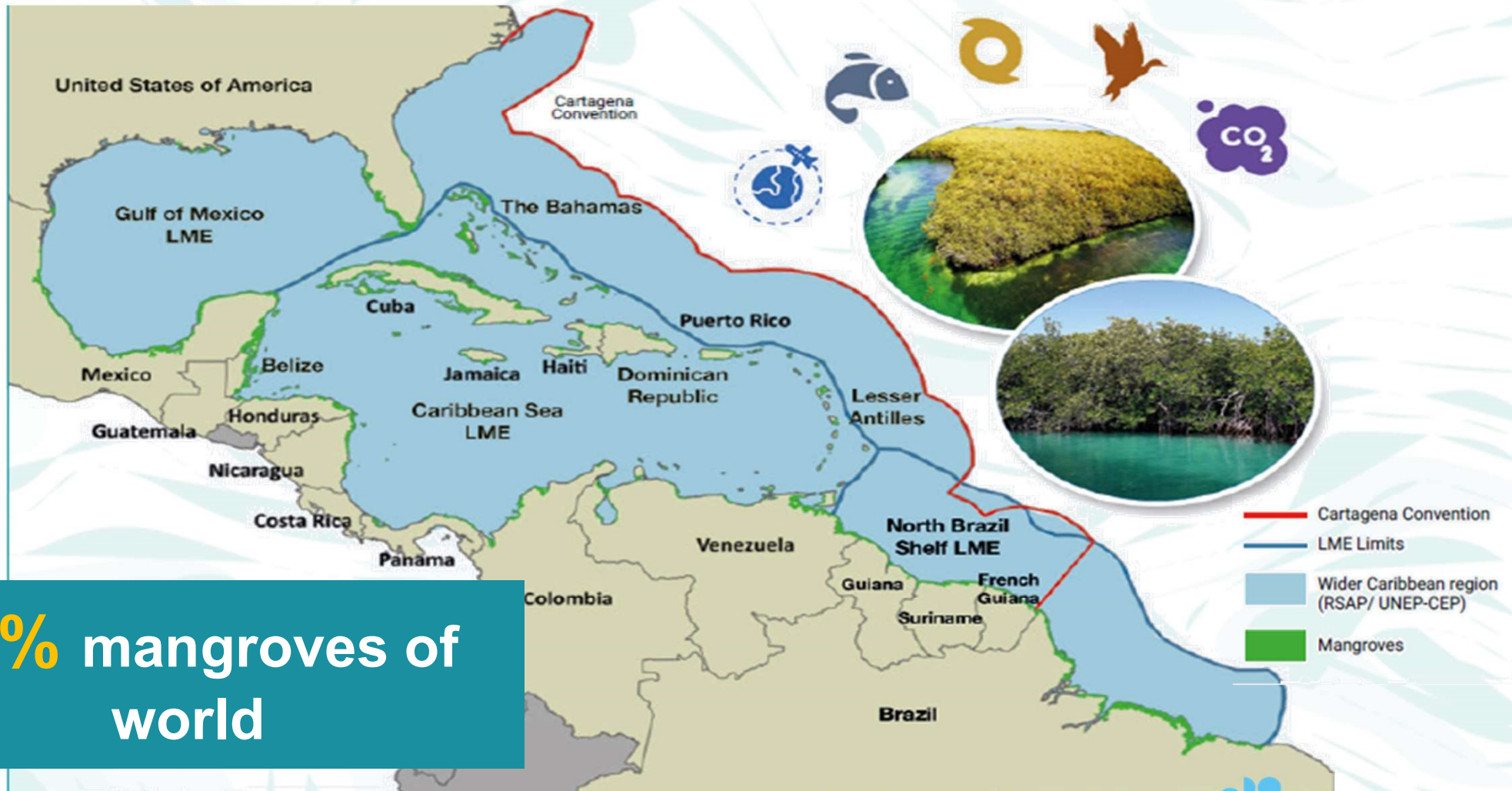
Conservatoire du littoral

Objective

This manual is presented as a **reference document** for those working in this field, **to guide** implementers, project executors, designers, consultants and funders in the **development of mangrove ecological restoration projects**.



Wider Caribbean and MAR



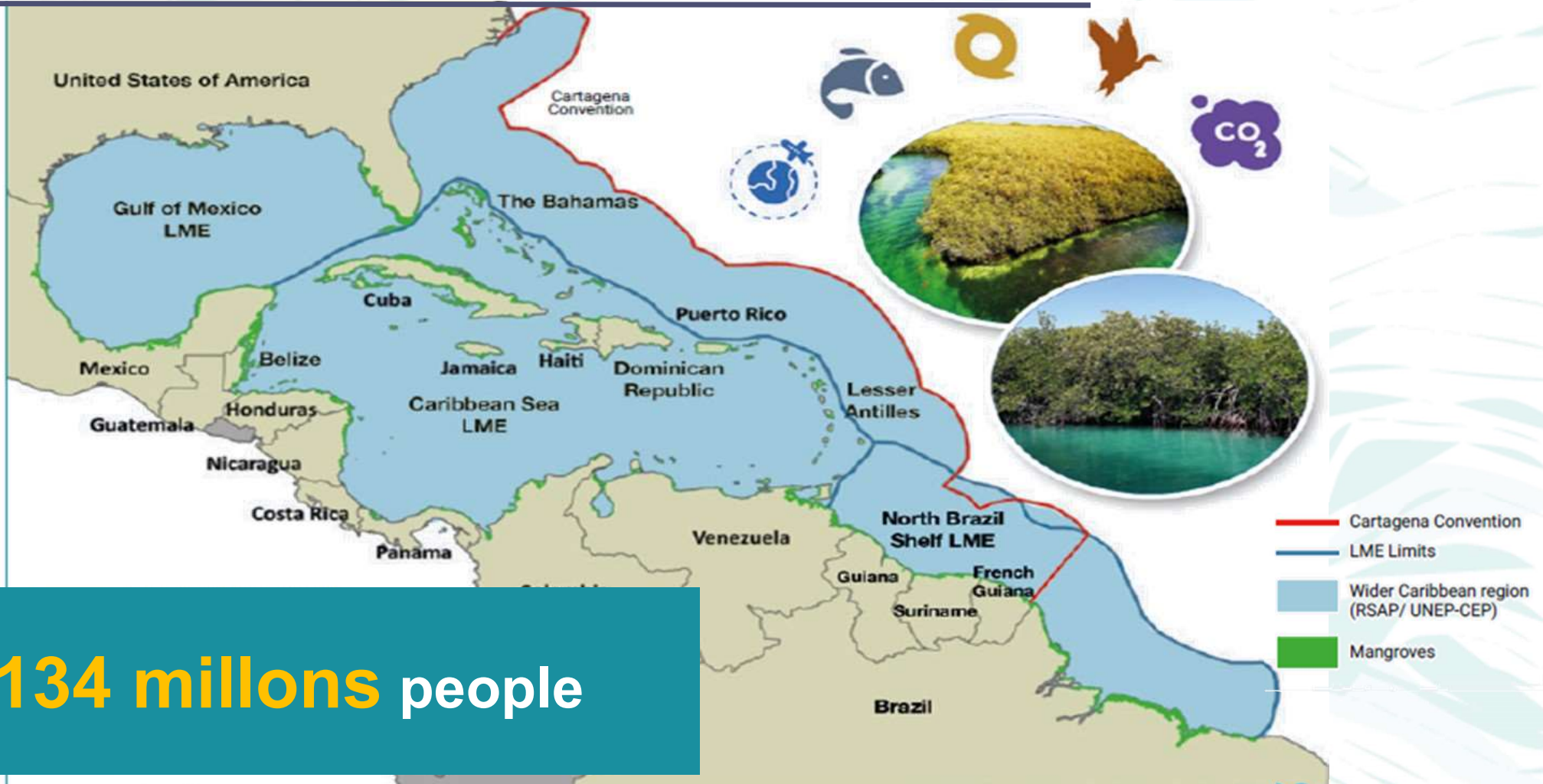
26% mangroves of world

Wider Caribbean and MAR



\$23-45 mil/ha USD
in Caribbean of Coastal Protection

Wider Caribbean and MAR



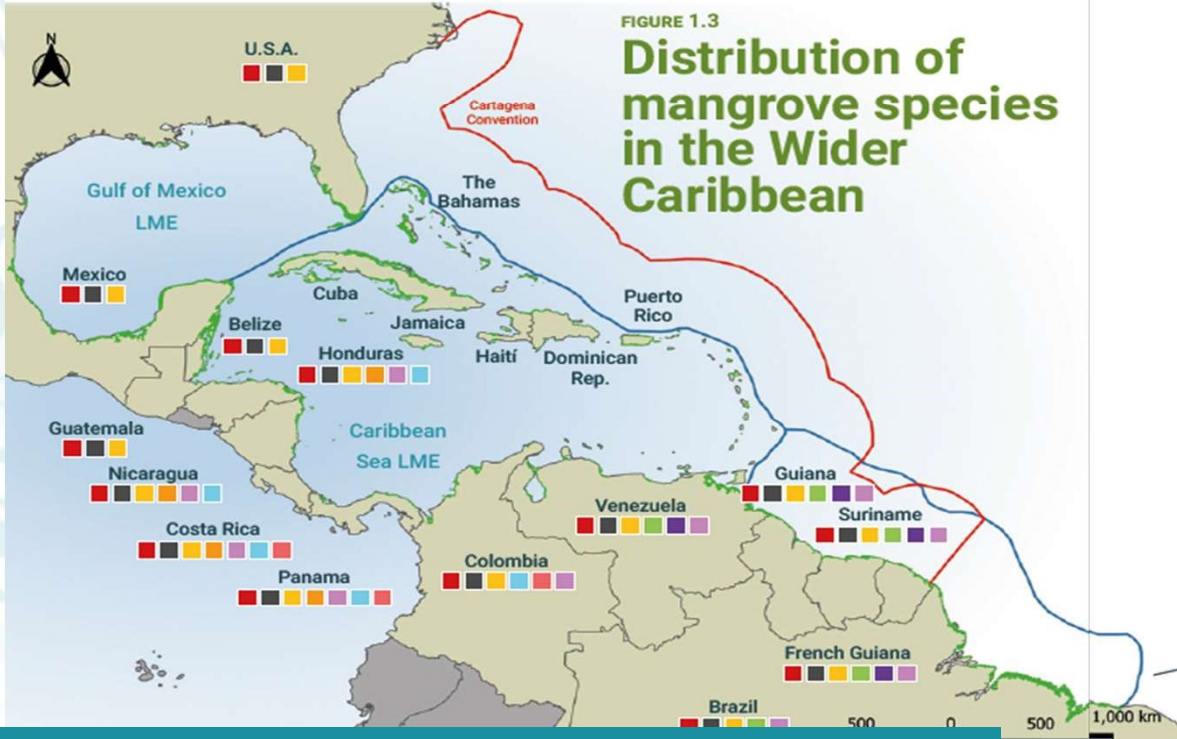
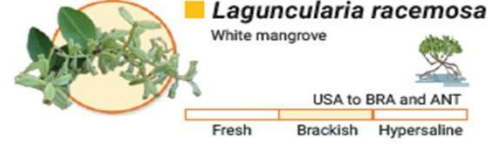
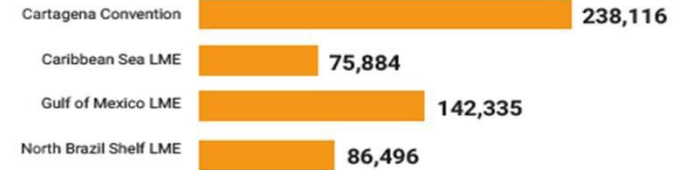
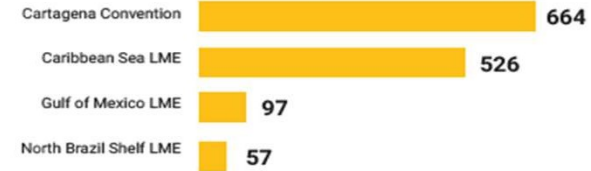


FIGURE 1.3
Distribution of mangrove species in the Wider Caribbean

Hectares of lost and degraded mangrove



Mangrove sites with restoration potential



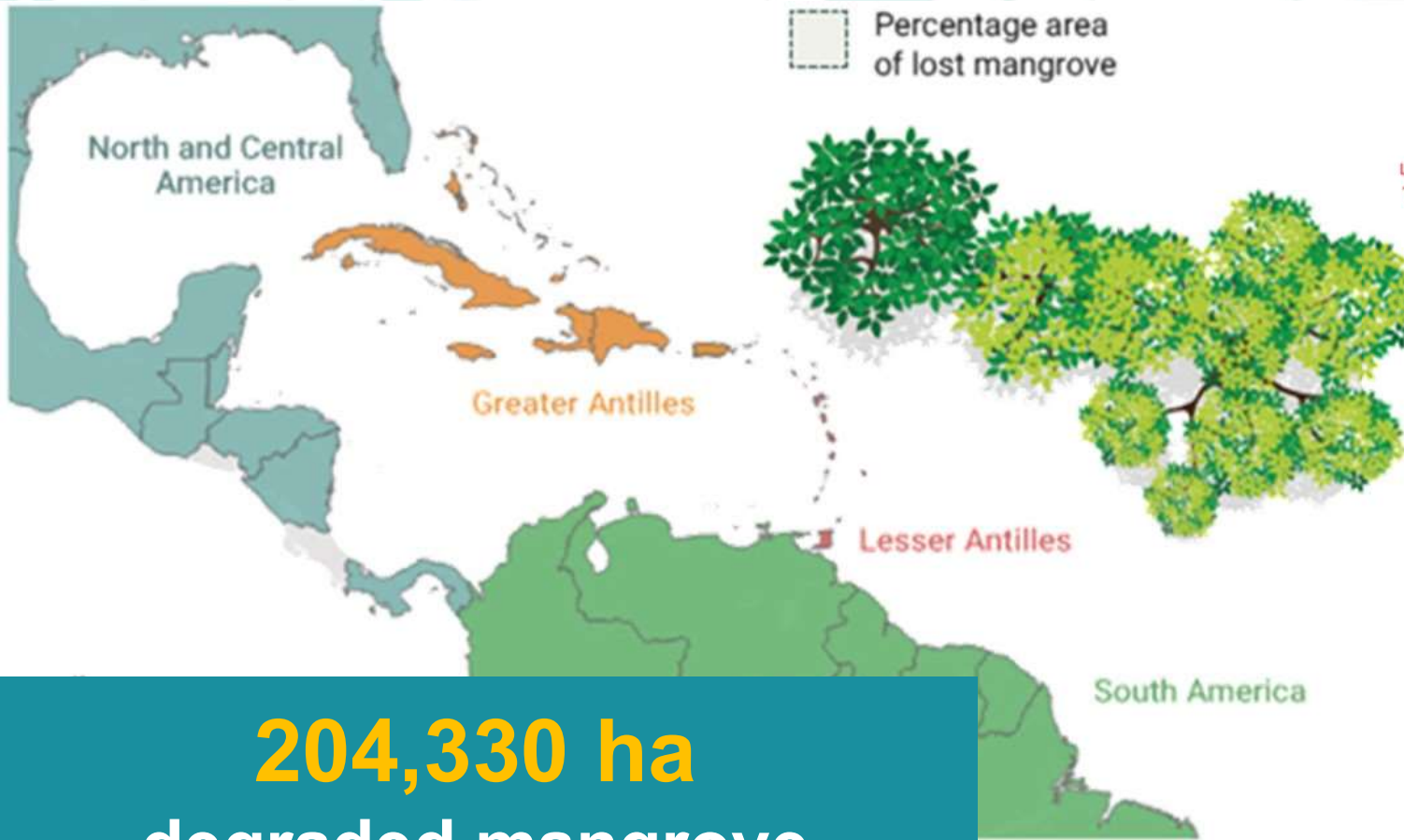
- United States of America - USA
- Mexico - MEX
- Honduras - HON
- El Salvador - SLV
- Nicaragua - NIC
- Costa Rica - CRI
- Panama - PAN
- Colombia - COL
- Ecuador - ECU
- Venezuela - VEN
- French Guiana - GUF
- Brazil - BRA
- Antilles - ANT



Prepared by Pedro J. Robles-Toral, Andrés Canul-Cabrera and Diana J. Cisneros.

9 mangrove species

Wider Caribbean and MAR



204,330 ha
degraded mangrove



Ecological Restoration Strategy



1

Setting up the working group



Institutional and group agreements



Continuity and ownership of the ecosystem and the services it provides



Planning and implementation of ecological restoration

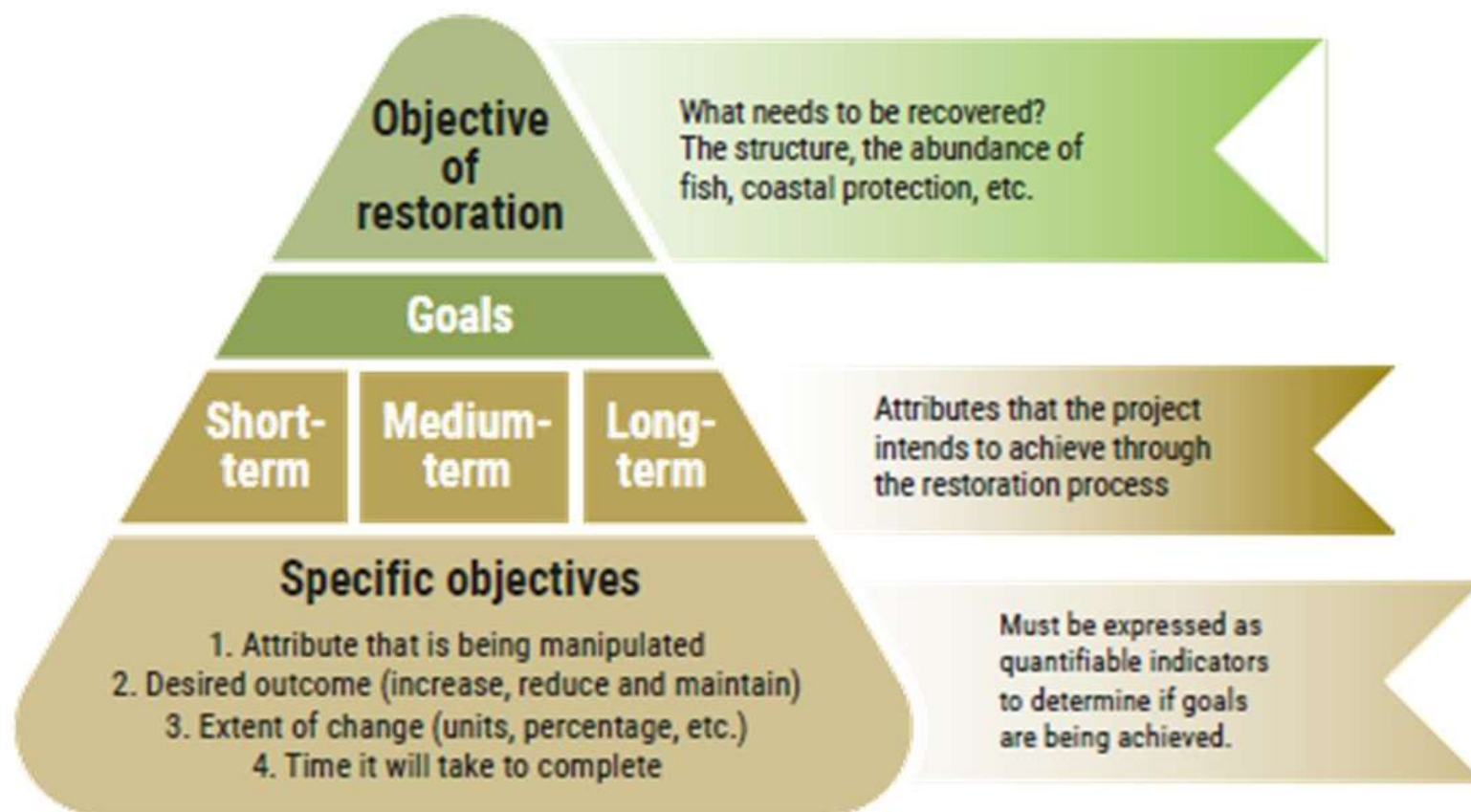


Financial sustainability and social responsibility



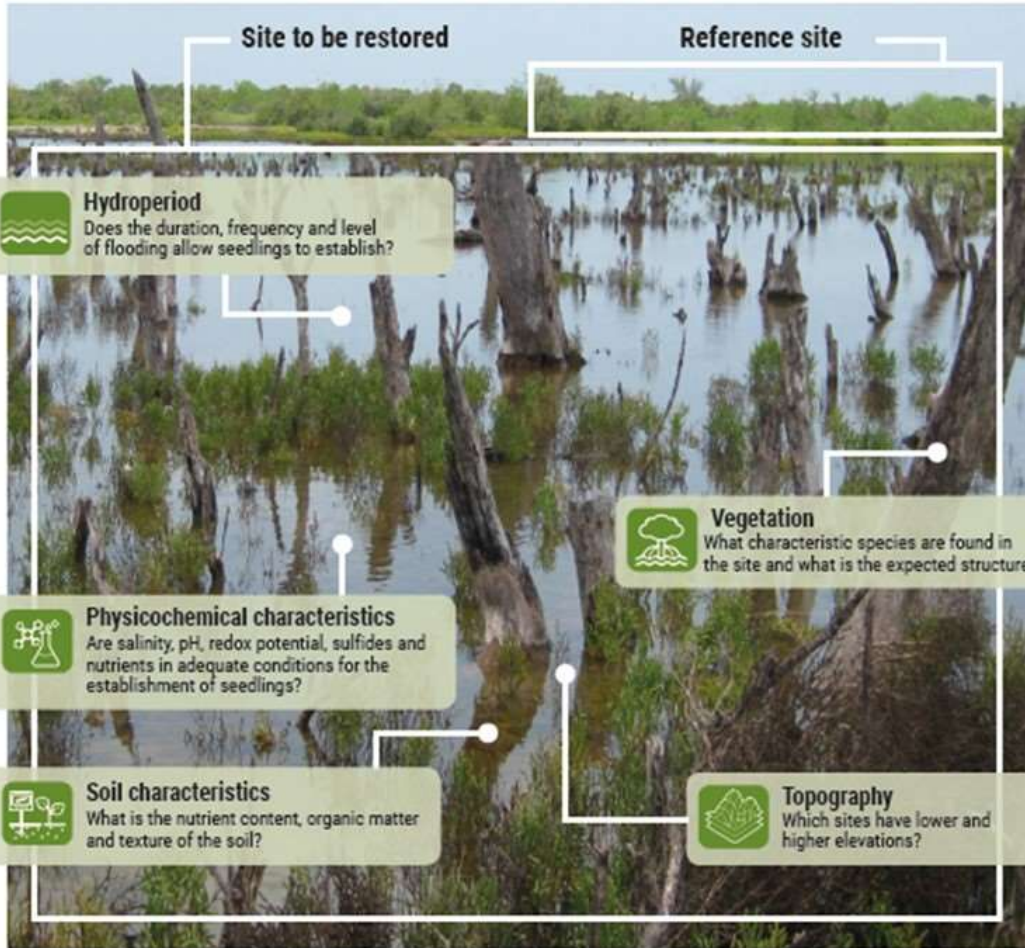
2

Site identification and defining the objectives and goals



3

Forensic Ecology



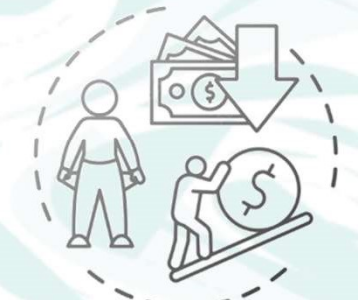
Allows identify:

-Why mangrove died?

CSI-Mangrove

-What was **historical use** of mangrove?

-Wich is **socio-económic context** of the site?



SOCIOECONOMIC

1297



4

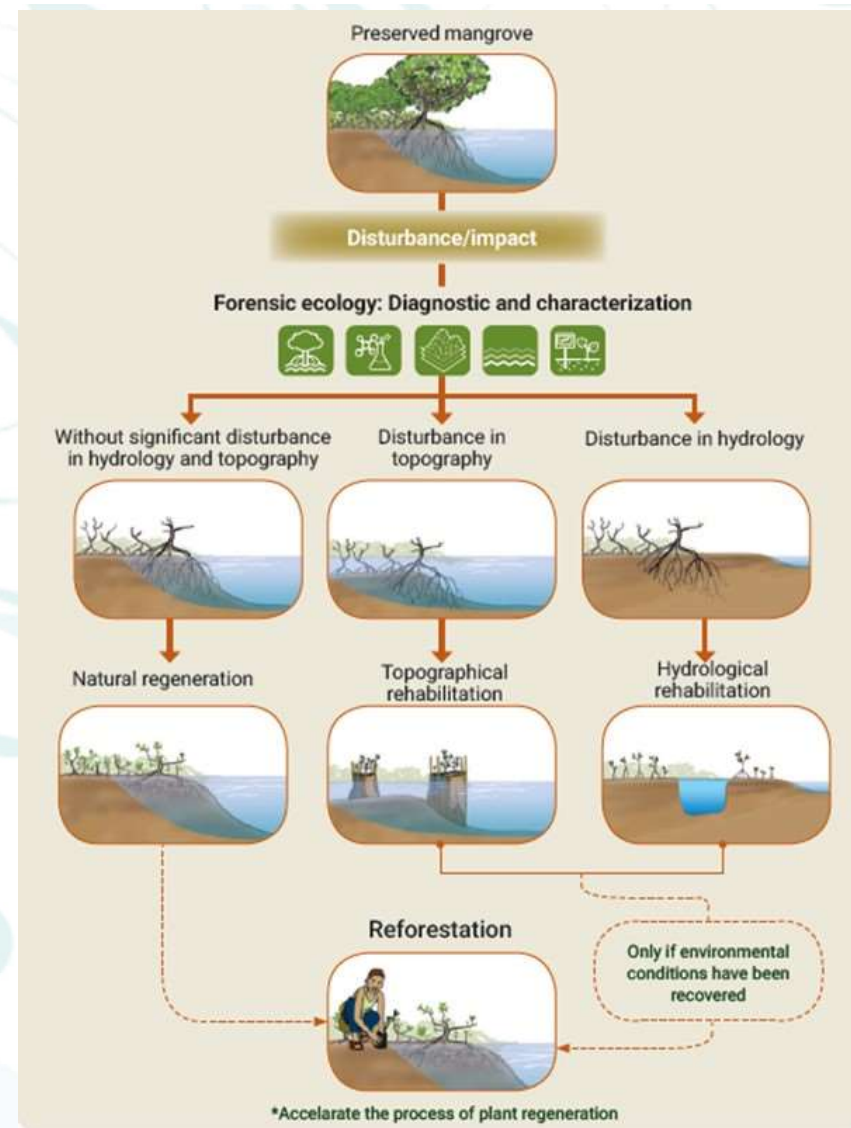
Restoration actions



Action plan:

Based on the results of the Forensic Ecology, site-specific actions are used:

"the suit made to measure"



Single action or set of actions: continuous R-passive and/or R-active



Hydrological Rehabilitation

Objective: Restore the hydrology by reconnecting water flows with freshwater and/or marine brackish sources in the degraded zone, in order to restore the flooding level, duration, and frequency that enables the restoration of physicochemical conditions of water and soil.

- Desilting of natural canals
- Creating new canals
- Desilting of waterways



Topography Rehabilitation

Objective: Modify the field level in order to restore adequate flooding patterns and levels for the establishment and growth of plants.

- Sediment removal (lowering topography)
- Dispersal centers (raising topography)



Reforestation

Objective: Accelerate the recovery of mangrove structure and function. It should be implemented only if the environmental conditions are suitable for the establishment and survival of seedlings.

- Direct planting
- Nursery

5

Monitoring



1. Ecological indicators



2. Socioeconomic indicators



Socioeconomic



Ecological

Collaborative engagement

Social valuation of the ecosystem

Economic impact

Public policies and funding

Hydrology

Natural regeneration

Plant structure and composition

Macroinvertebrates and vertebrates

Physicochemical properties

Landscape

Biological

6

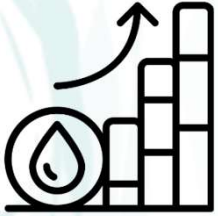
Engagement



During all process

<p>Before, during, and after the restoration project</p>		
<p>Engagement</p> <p>The need to positively engage local/regional agents in actions (inform, consult, educate, participate)</p>	<p>Socialization</p> <p>Sharing experiences, benefits, form (future of the restored space) and substance (efficiency and equity of restoration benefits).</p>	<p>Governance</p> <p>Communication, distribution of roles among participants, transparency.</p>
<p>Dissemination: popular, educational, and scientific</p>		

Conclusion



- Implement strategies that **maximize the cost-benefit** ratio



- To seek **synergy between the actors** in the restoration process.



- To **strengthen the capacities** of local communities



SERIES



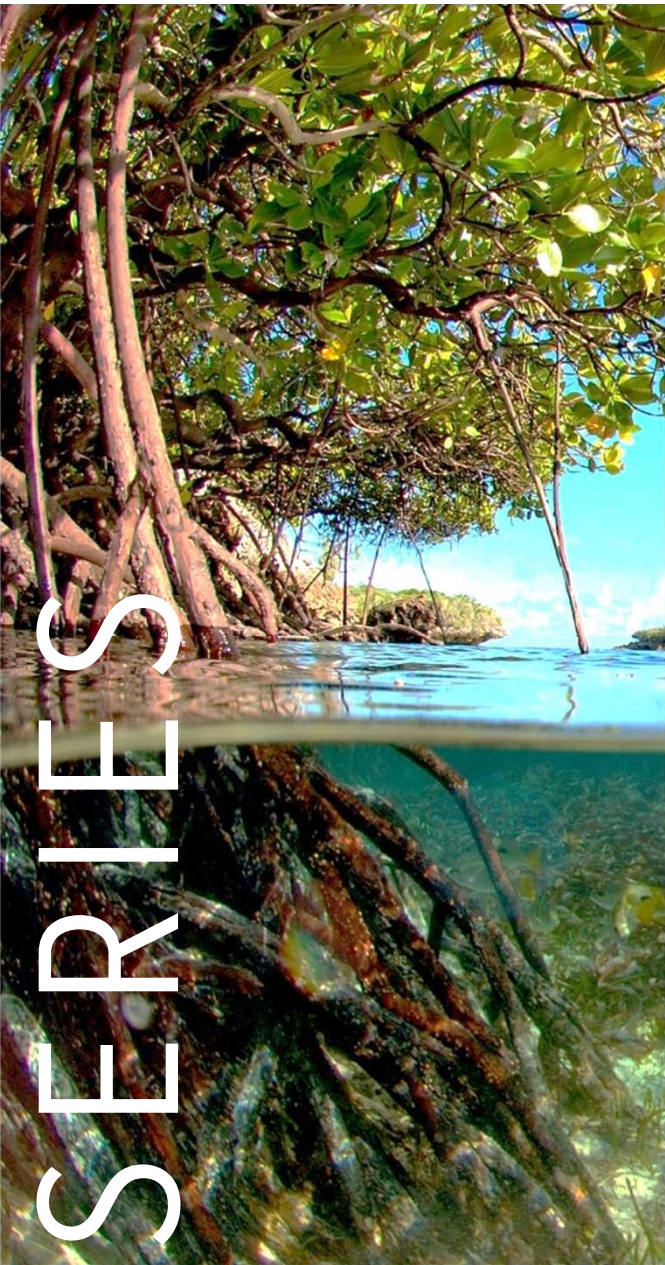
Part III

Question & Answers

Expert's summary

- Rationale behind failure and success : from diagnostic to actions co-construction
- The cost and benefits of interventions
- Beyond metrics, a living socio-ecosystem
- Be locally relevant and globally sustainable
- Be pro-active .. or passive : Community-Based Management and NBS





NEXT

WORKSHOPS

MANGROVES

ecological restoration

- **April 25th (4:00 PM – UTC+2)** >> 3rd Episode Passive restoration technics – Understanding the natural process of regeneration
- Watch the **Replay from our first episode** : Avoid mangrove destruction – Understanding and reducing pressures >>
 - Website ICO Solutions : <https://ico-solutions.eu/fr/workshops/series-strategies-for-ecological-restoration-of-mangroves/>

Thank you for your attention!
See you soon for the next episode

Contact us : icosolutions@conservatoire-du-littoral.fr

ICO Solutions Calendar : www.ico-solutions.eu



MANGROVES : Ecological restoration strategies | 1st Episode – April 13th, 2023

