Mangroves of the Mesoamerica Reef Ecoregion

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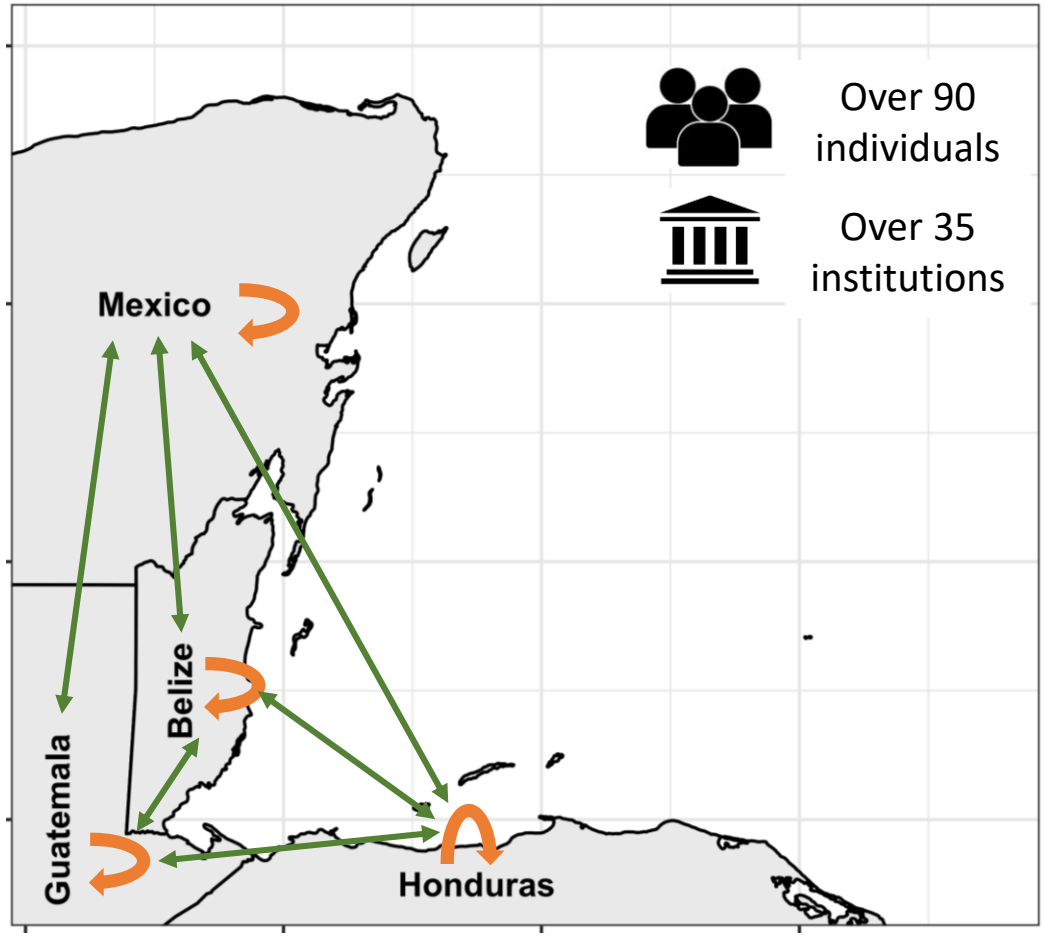
Mesoamerican Mangrove and Seagrass Network

- For those that would like to subscribe:
  MesoMSNet@gmail.com
- Extension of the *Healthy Reef for Healthy People Initiative*
- Connecting managers, government agencies, civil society, researchers and scientists
- Increasing knowledge sharing and learning experiences
- Building a map of previous, current and future projects and collaborations



What are mangroves

Diverse group of halophytic (salt-tolerant) plants that exhibit:

1. Complete fidelity to the mangrove environment

2. Contribute a major structural role
   and can form monospecific stands

3. Exhibit morphological adaptions

4. Have the ability to exclude or exude
   salt through physiological mechanisms

5. Taxonomic isolation from terrestrial relatives

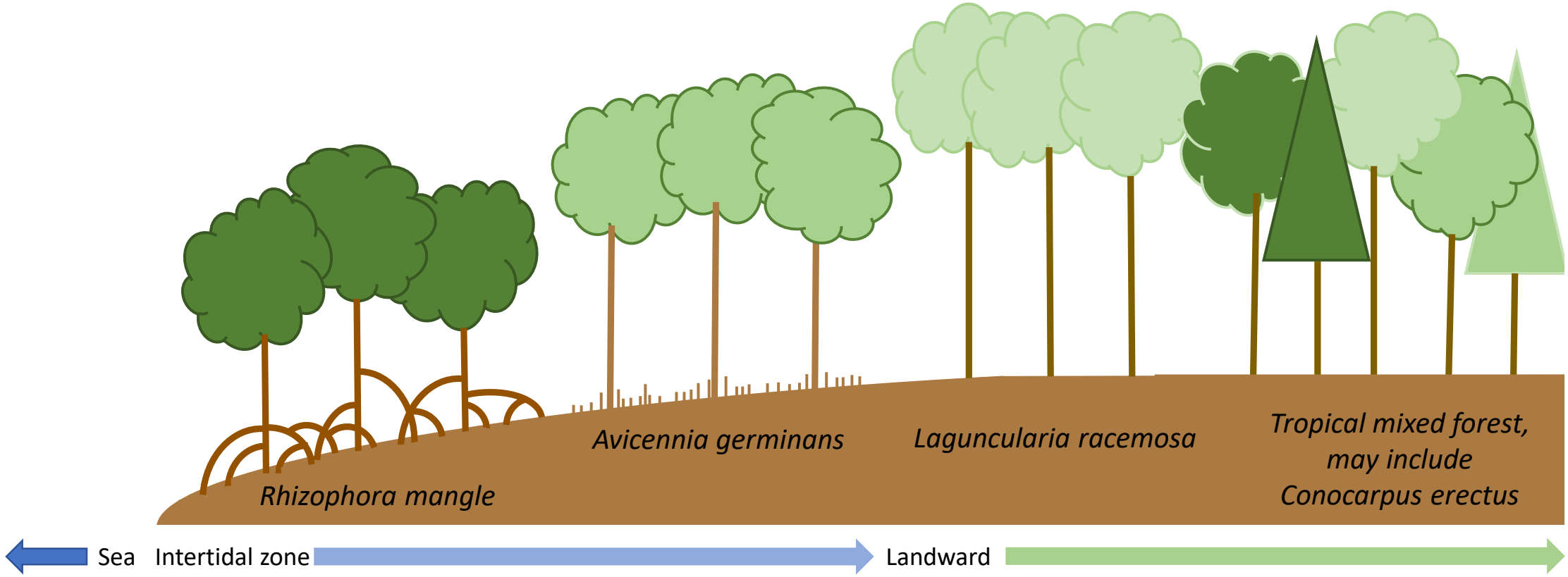
Mangrove species of the MAR

- Species found in the MAR
  - *Rhizophora mangle*
  - *Avicennia germanins*
  - *Laguncularia racemosa*
  - *Pelliciera rhizophorae* (rare)

- Associate species
  - *Conocarpus erectus*

Mangrove zonation

- Similar zonation patterns seen throughout the MAR
  - Generally forming single species stands



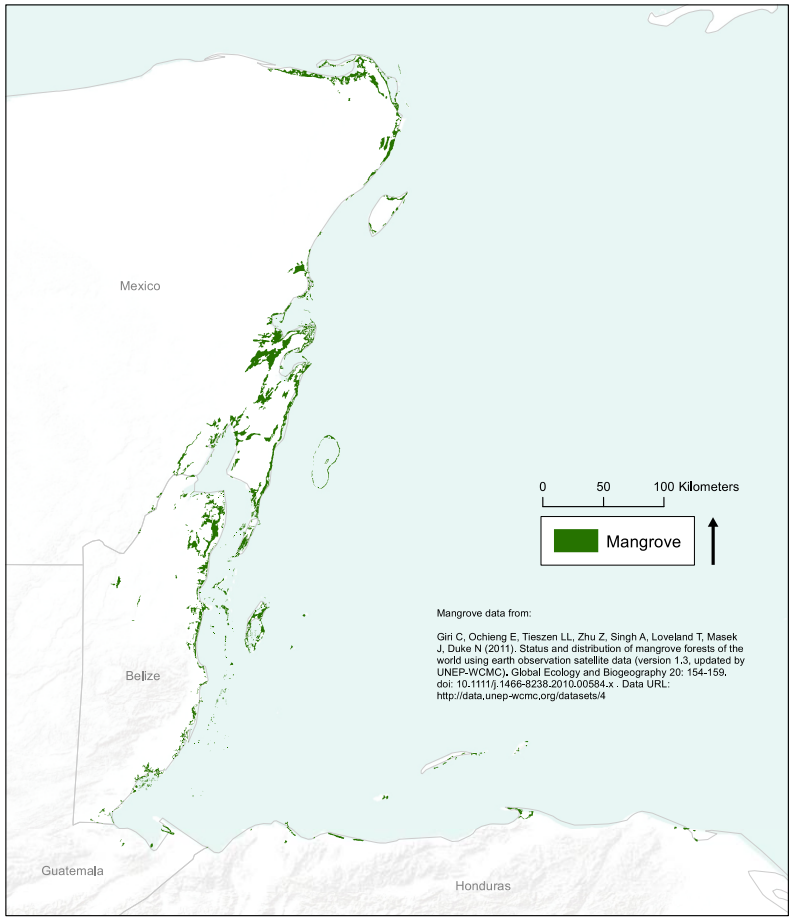
Mangrove distribution

- Total mangrove area (2010 estimates)
  - MAR – 239,176 ha

- Distribution of mangroves by country
  - *Mexico* – 128,049 ha (53.5%)
  - *Belize* – 74,684 ha (31.3%)
  - *Guatemala* – 1,170 ha (0.5%)
  - *Honduras* – 35,273 ha (14.7%)

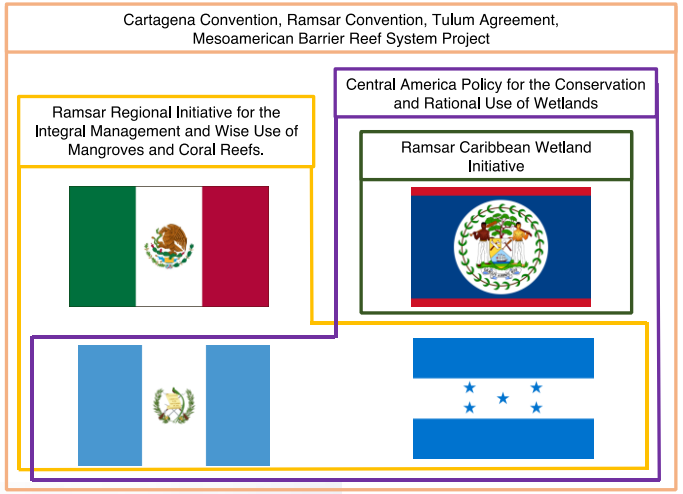
(Canty et al., 2018)

- Mapping efforts at the global scale
  - https://data.unep-wcmc.org/datasets/4
  - Resolution is low and underestimates distribution



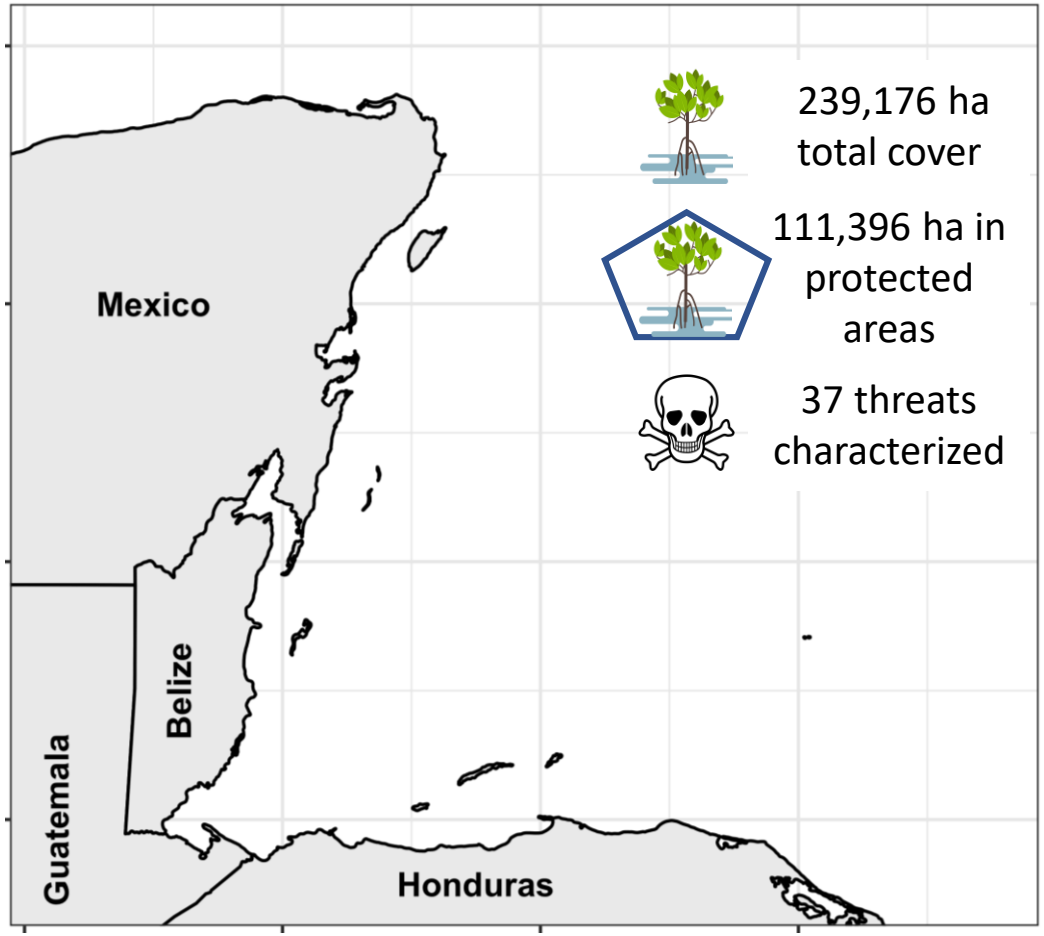
Review of Mangrove management

- Management frameworks
- Identification of key threats
- Disconnection between managers and researchers
- Status of mangroves



Governance

- Stringent legislation
  - Legally protected in all four countries
  - 42 Protected areas
- National governance frameworks are complex
- Countries not aligned on regional and international agreements
- Lack of resources - the major cause of protected area failure (Gill *et al.,* 2017)

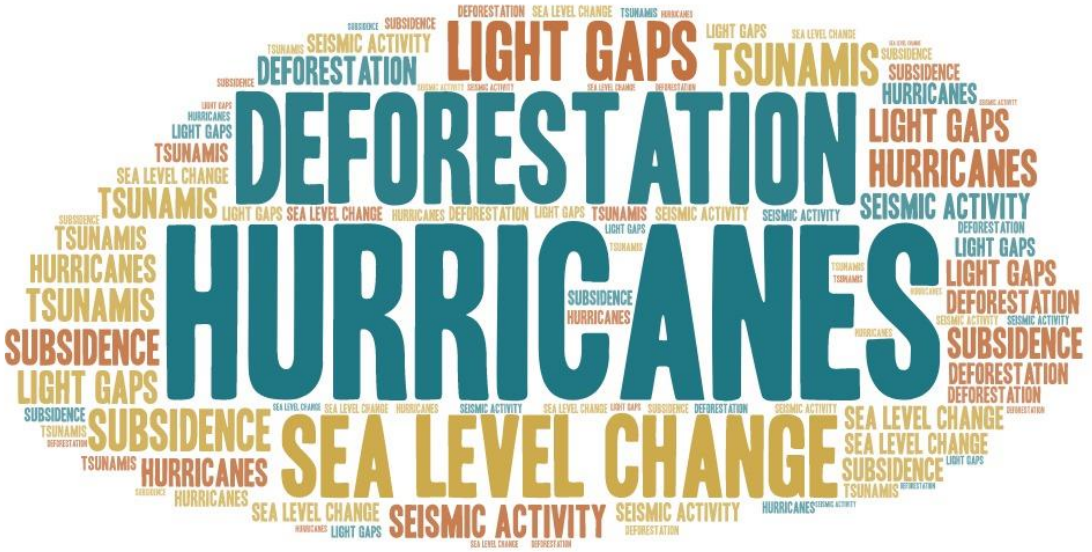


(Canty *et al.,* 2018)

Threats to mangroves in the MAR

Managers

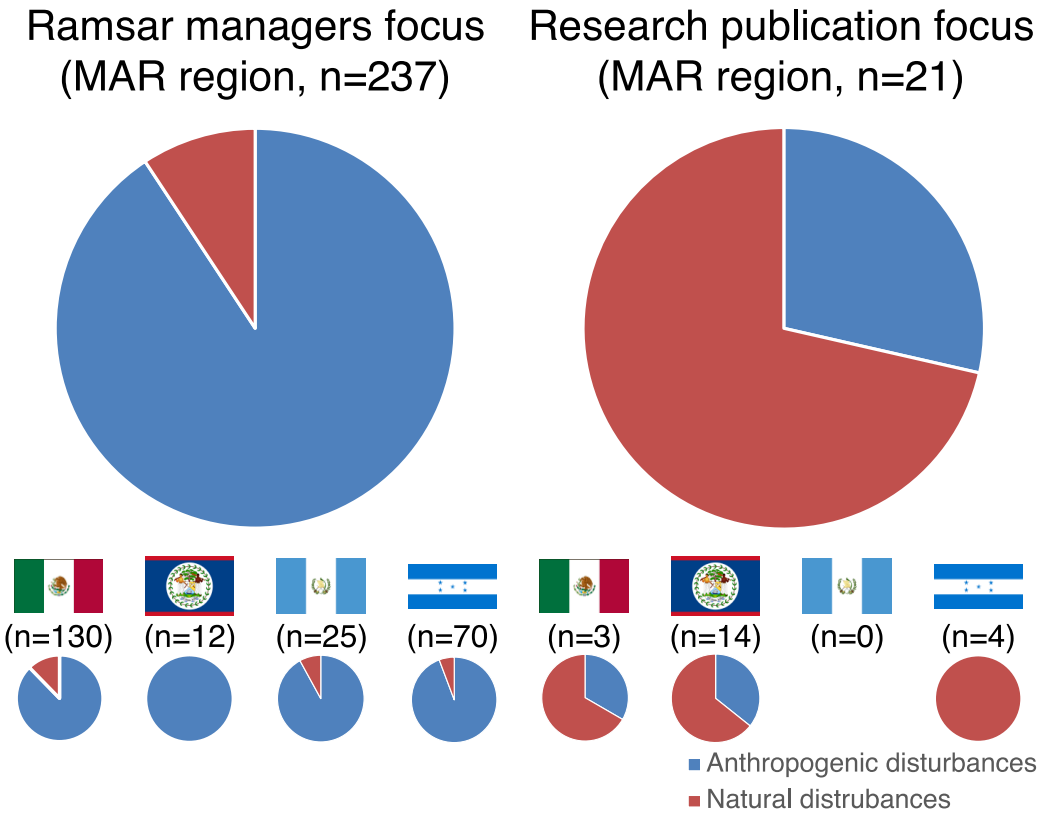
Researchers



(Canty *et al.,* 2018)

Stakeholder disconnect

- Differences in perceptions and focus of key threats to mangroves
  - Managers – localized anthropogenic disturbances
  - Researchers – global climate change
- How do we ensure science-based management?



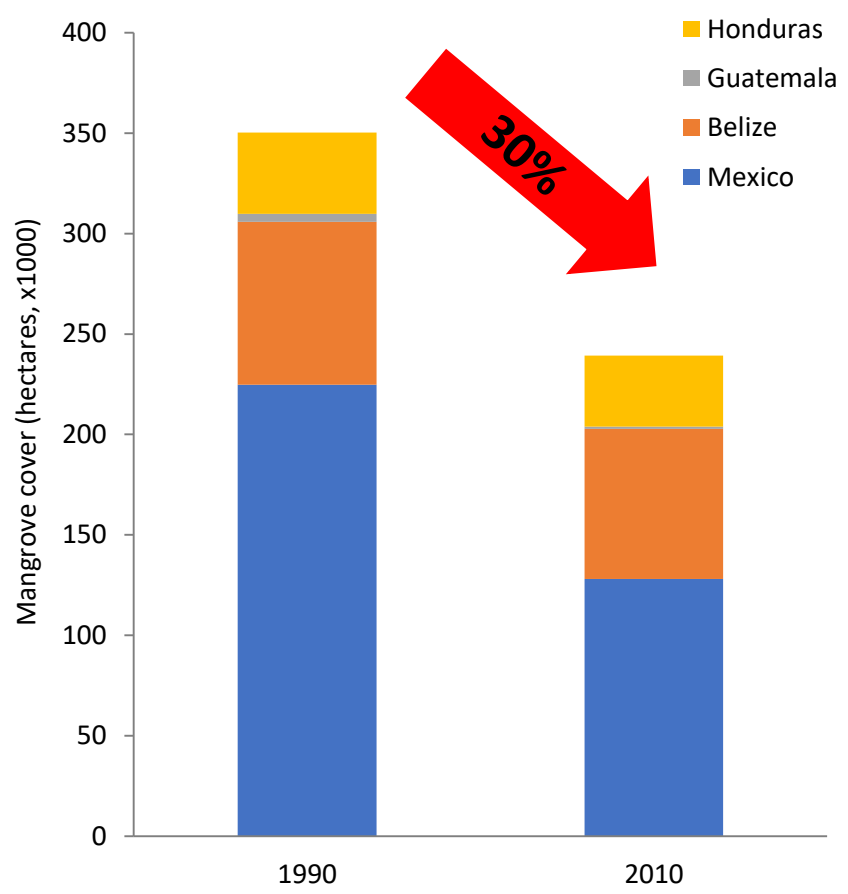
(Canty *et al.,* 2018)

Status of MAR mangroves

- 30% loss in cover regionally from 1990 to 2010
- Regional mean loss rate:

  5,292 hectares per year

- Why do we want to address this decline?

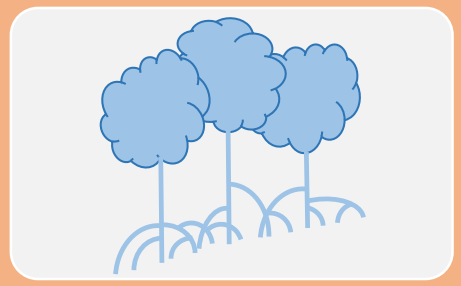


(Canty *et al.,* 2018)

Mangrove importance

Biodiversity – mangrove ecosystem complex

- Canopy
- Benthos
- Root system
- Tidal waters
- Connectivity with other ecosystems
- Genetic diversity



Ecosystem services

- Supporting
- Provisioning
- Regulatory
- Cultural

Human well-being – high quality of life

- Health
- Food security
- Security
- Economic base

Biodiversity

- **Canopy**
  - e.g. Birds, reptiles, insects, mammals
- **Benthos**
  - e.g. Crabs, molluscs, gastropods
- **Root systems**
  - e.g. Algae, corals, tunicates, molluscs
- **Tidal waters**
  - e.g. Fin fish, crustaceans, marine mammals
- **Connectivity to other ecosystems**
  - e.g. Coral reefs and seagrasses, terrestrial forests
- **Genetic diversity**

All of these fish species spend part of their lifecycle within a mangrove forest

Biodiversity

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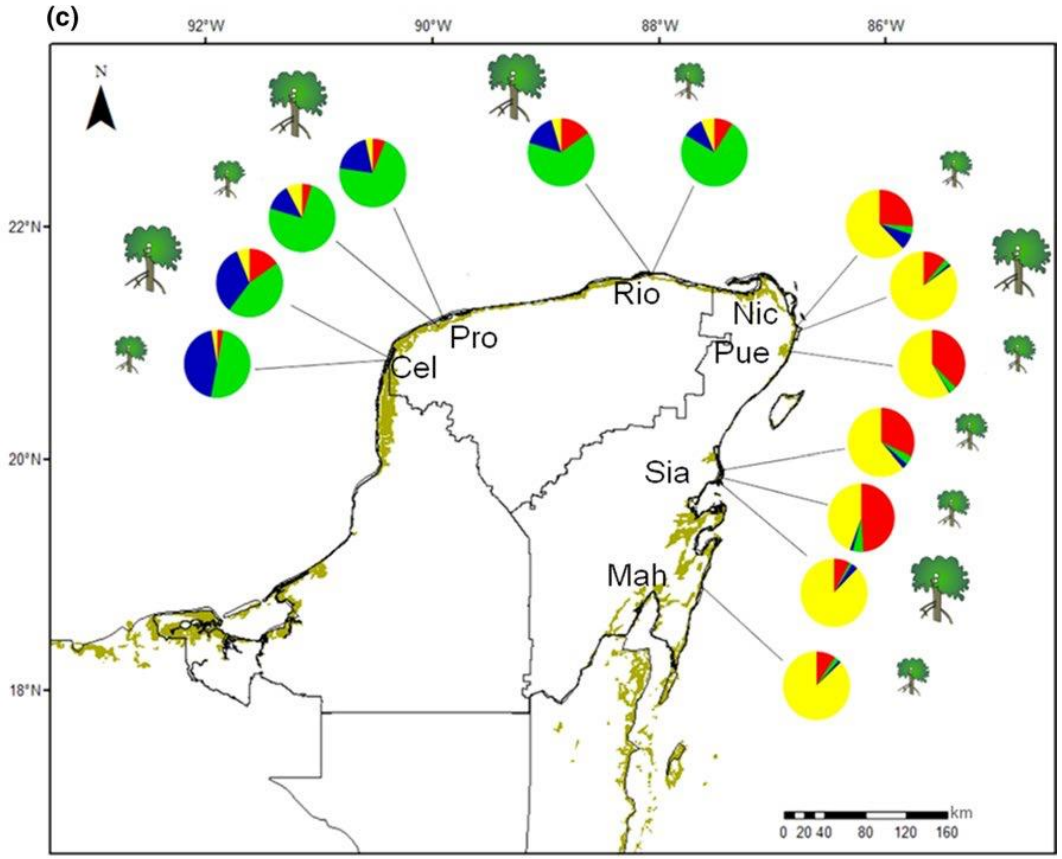
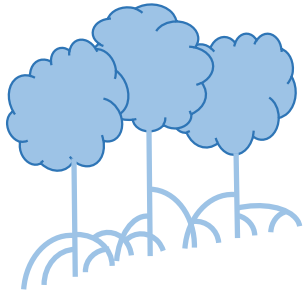
Mangrove connectivity

- How genetically diverse are the mangroves in the MAR?
  - Have results from Mexico (Cisneros-de la Cruz *et al.,* 2018)
  - Regional study in progress (Canty *et al.,*)
- Spatial scales for management
  - Do ecological and management units match?



(Cisneros-de la Cruz *et al.,* 2018)



Ecosystem services

Supporting

Nutrient cycling
Sediment accretion
Primary production

Provisioning

Fisheries
Honey
Medicines

Regulating

Coastal protection
Carbon sequestration
Water purification

Cultural

Sacred sites
Recreation
Inspiration

Biodiversity plays an important role in the function of ecosystem services

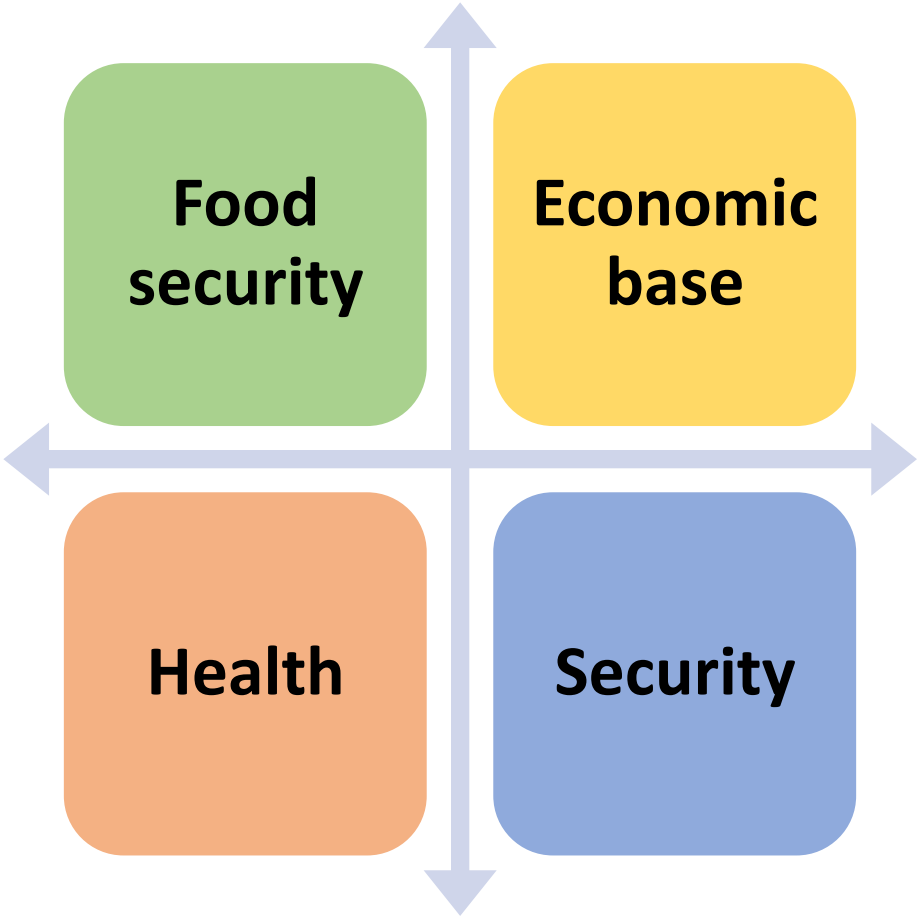
Valued at ***US$ 193,843*** per hectare per year (Constanza *et al.*, 2014)

Not all mangroves are equal

- Dwarf mangroves are prevalent within the region

Human well-being

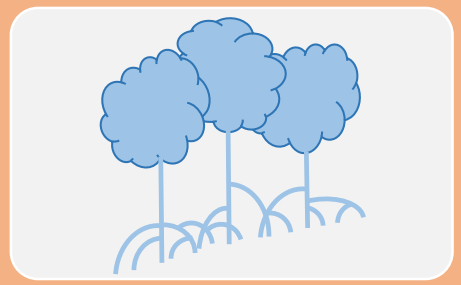
- Extractive activities appear dominant in promoting human well-being
  - e.g. fishing, lumber
- Non-extractive benefits are critical but more difficult to quantify
  - e.g. hurricane and storm protection, coastal protection
- Highly dependent upon biodiversity and functioning of ecosystem services



Mangrove importance

Biodiversity

- Complex food webs and trophic interactions
- Regulation of ecosystem processes and function
- Genetic diversity an important factor



Ecosystem services

- Important in resilience and adaptation to climate change
- Direct and in-direct benefits – attempts to value all services
- Local and global scales

- **DEPENDENT ON BIODIVERSITY, BUT NOT ALL MANGROVES ARE EQUAL**

Human well-being

- Extractive and non-extractive benefits are equally important
- Difficult to quantify and identify with intangible benefits

- **DEPENDENT ON BIODIVERSITY AND ECOSYSTEM SERVICES**

Thank you

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