PERÚ | Ministerio del Ambiente | Instituto Geofísico del Perú

*Ciencia para protegernos*
*Ciencia para avanzar*

# Climate research at IGP
## e.g. El Niño and the mangrove ecosystem in northern Peru

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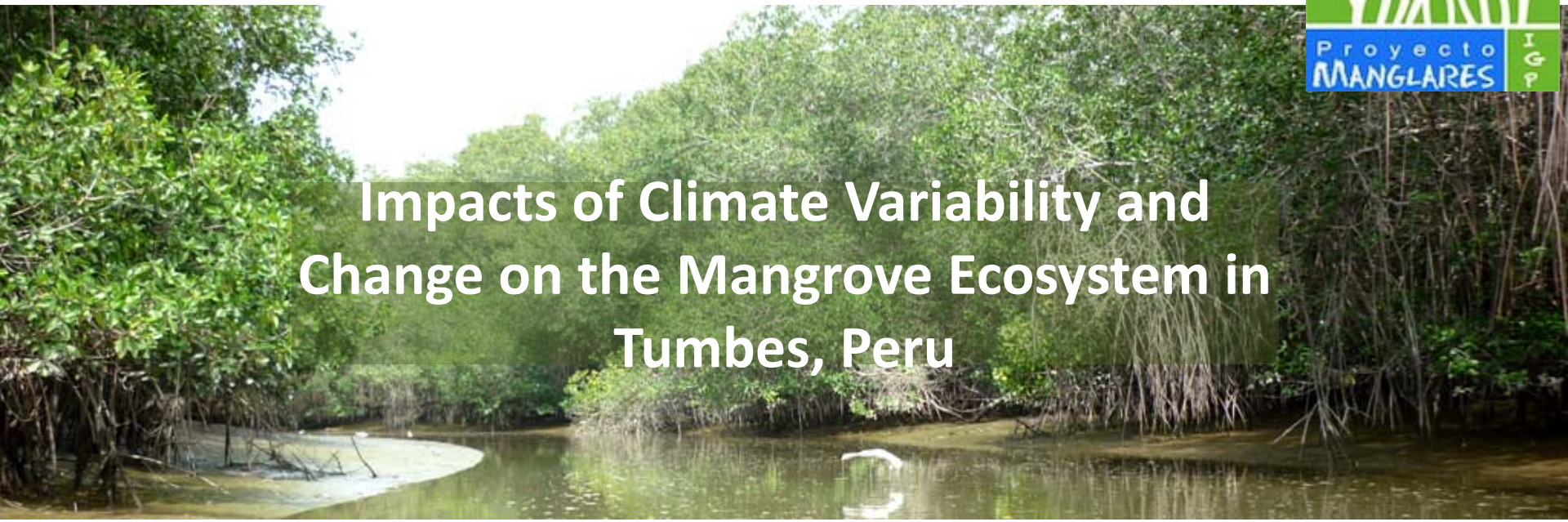
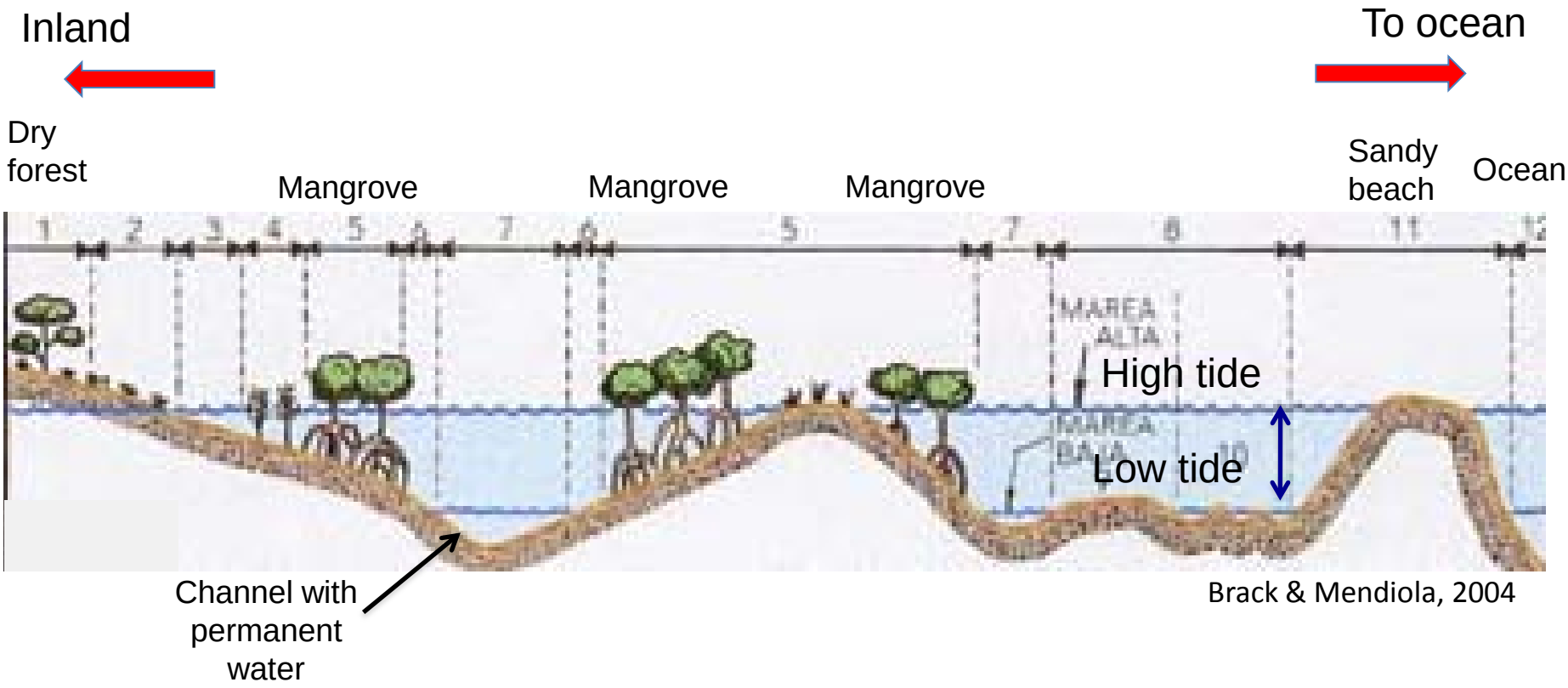
# Impacts of Climate Variability and Change on the Mangrove Ecosystem in Tumbes, Peru



Santuario Nacional Los Manglares de Tumbes

Funding: IDRC CRDI

# MANGROVES PROJECT
## Typical mangrove configuration in Peru



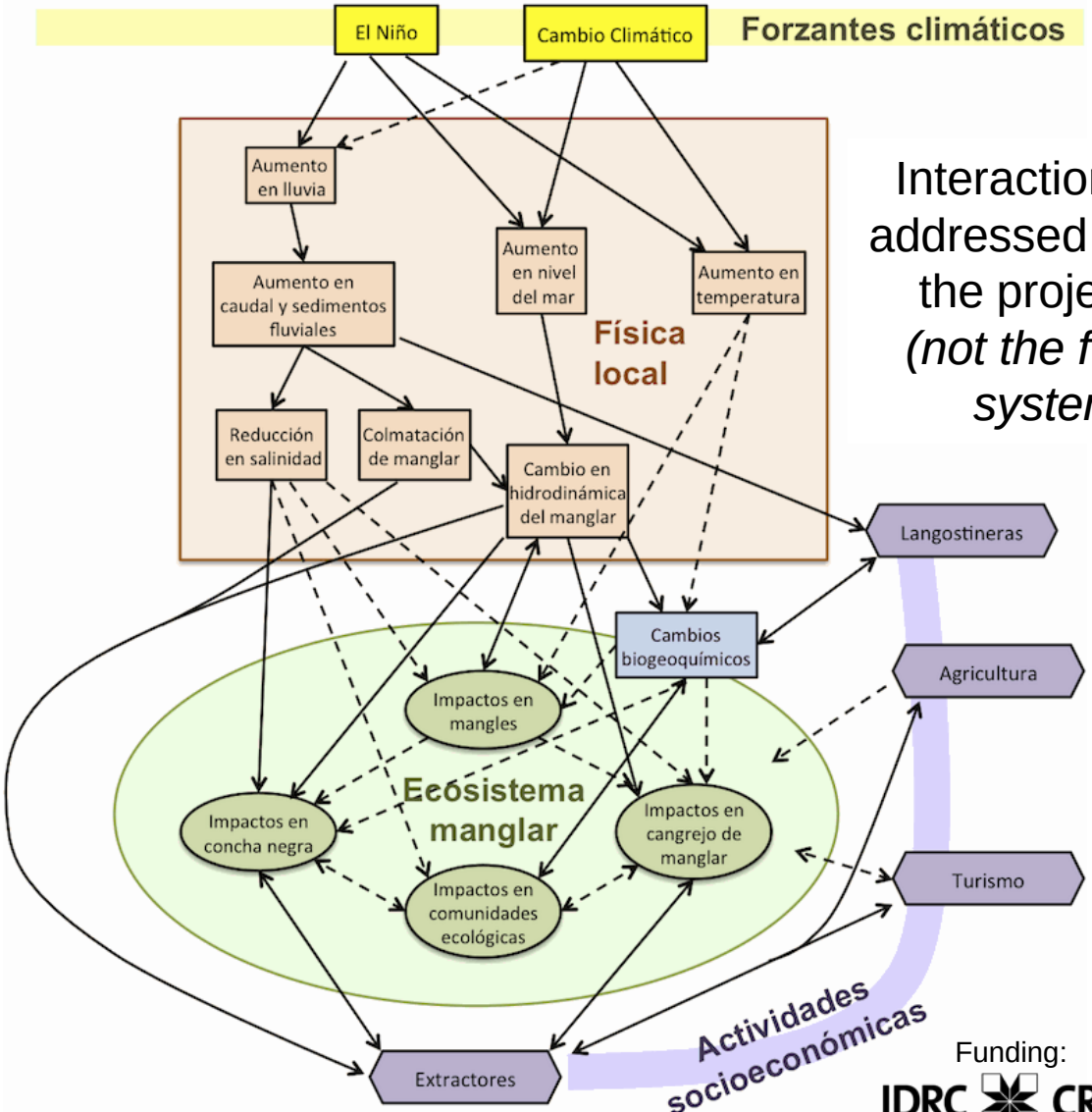

Mangrove ecosystems are located where rivers meet the sea. Tidal dynamics and river variability are key components of the environment.

# MANGROVES PROJECT
# Multidisciplinary study

**Project "Impact of Climate Variability and Change in the Mangrove Ecosystem of Tumbes" (2012-14)**

PI: K. Takahashi

**Main objective:**
Strengthen the capacity for adaptation to climate variability and change in the mangrove ecosystem in Tumbes, northern Peru

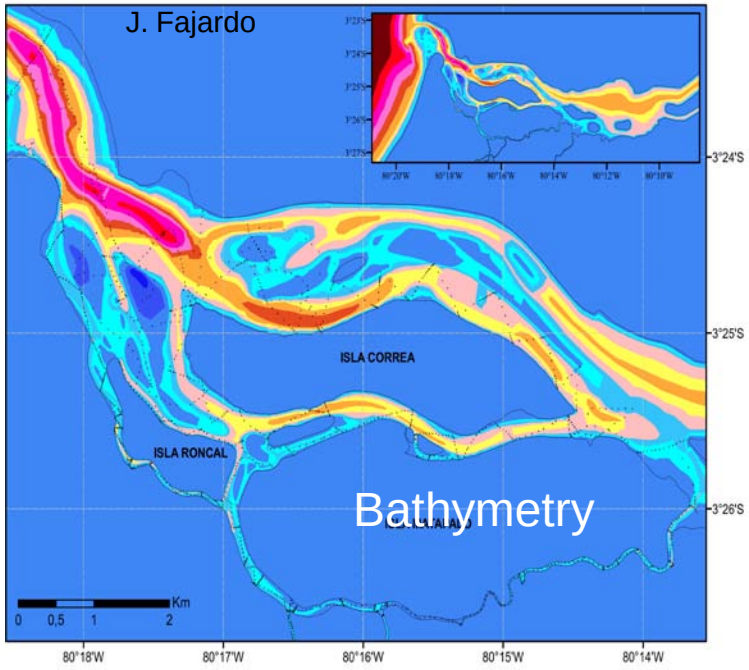


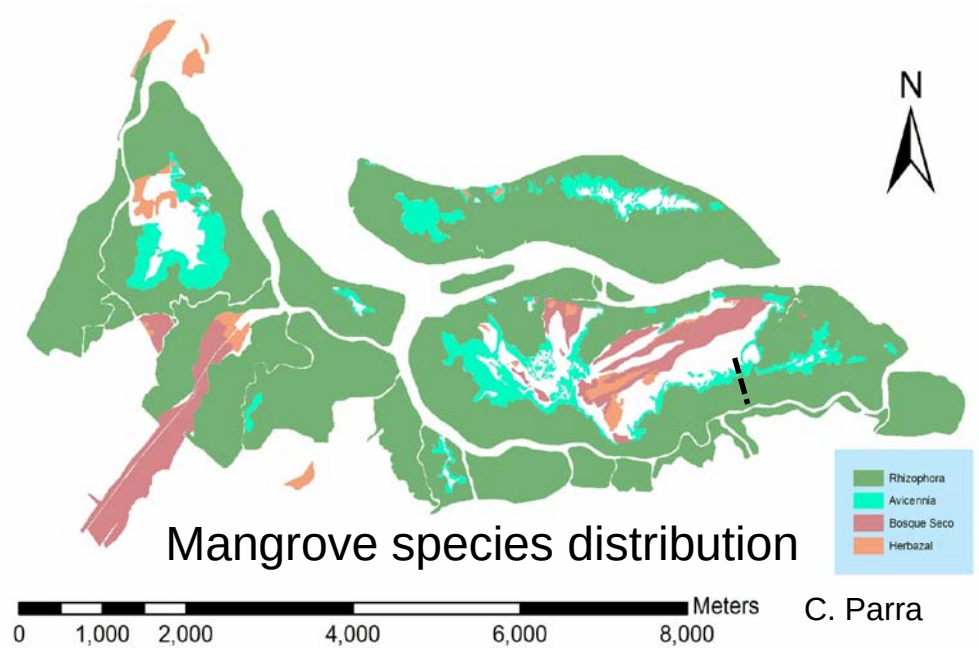

Interactions addressed in the project *(not the full system)*

Funding:
IDRC CRDI

# MANGROVES PROJECT
# Some examples of the physical studies

# MANGROVES PROJECT
## Flooding and forest

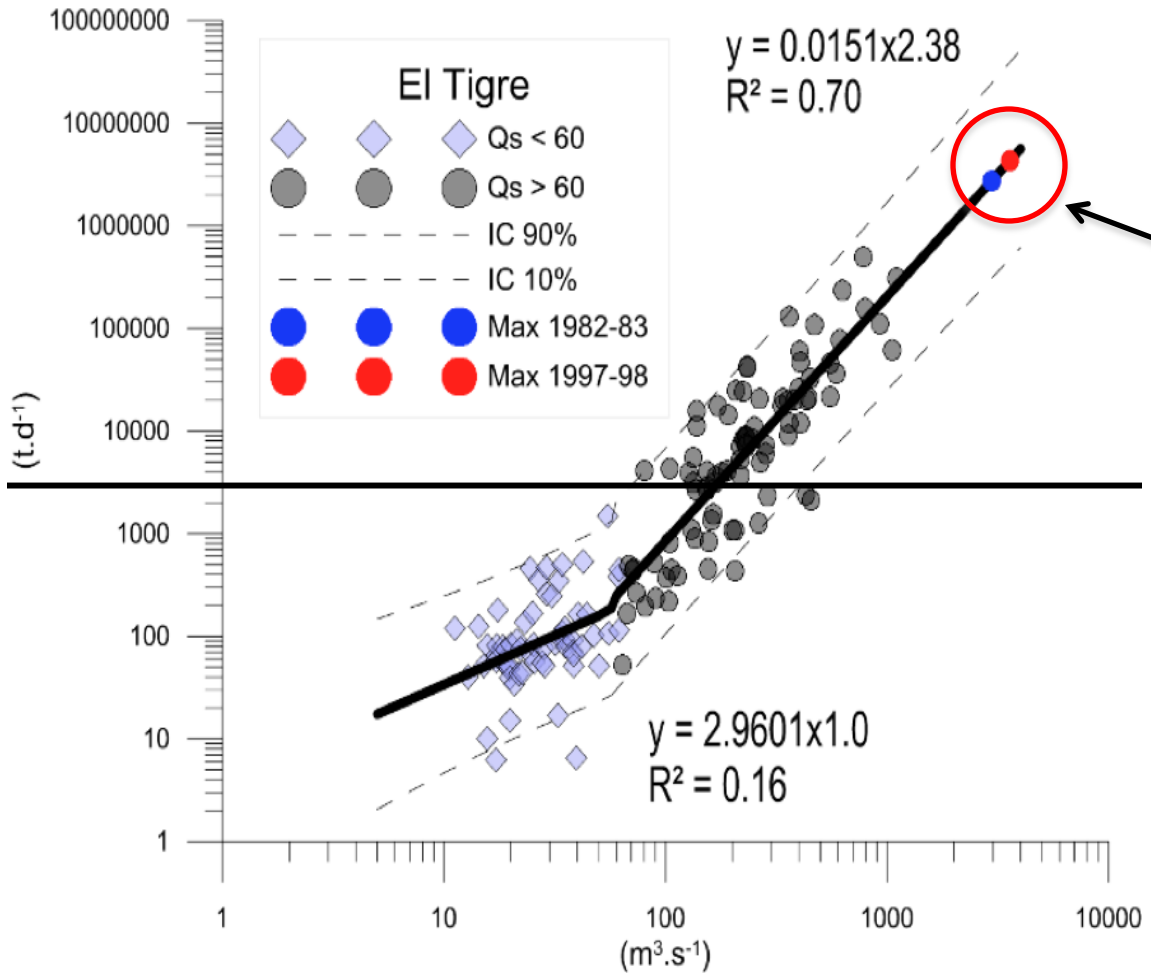



Hydrodynamical modeling will help to assess possible changes in the flooding patterns in the future.

Topography (proxy for tidal flooding frequency) is a first order determinant of distribution of species.

# MANGROVES PROJECT
# River sediment transport in Tumbes




Preliminary estimates indicate that the sediment transport during the 82-83 and 97-98 El Niño events was equivalent to 16 and 29 “normal” years, respectively.

Morera et al., in preparation

Data: IGP, ORE HYBAM, SENAMHI

# MANGROVES PROJECT
## Biogeochemistry and hydrobiological resources

Basic research, particularly related to environmental effects, is being carried out in collaboration with IMARPE and universities.





E. Fernandez

Population structure and dynamics of mangrove crab (*U. occidentalis*)

J. Vitor

Communities and energy fluxes in sediment meiobenthos

A. Perez

# MANGROVES PROJECT
# Some examples of the socioeconomic studies

# MANGROVES PROJECT

## Main economic activities

Conch, crab and fish extraction

Agriculture

Tourism

Shrimp Farming


Extracting black conch
(*Anadara tuberculosa)*

# MANGROVES PROJECT
# Socioeconomical aspects

- Working with SERNANP to prepare new management plans (incorporating climate change) and establishing the new monitoring procedures
- Analyzing the socioeconomical dynamics of the conch and crab extractors to better manage the ecosystem.
- Studying the potential and limitations of tourist activities
- Assess the evolution of the relation between shrimp farming and the mangroves
- Analyzing the impacts (+ or -) of agriculture in the buffer zone


Workshop with crab extractors


Interviews in the field

# MANGROVES PROJECT
## Some outstanding questions

- What can we say about future hydrology under climate change (Y. Ramos thesis) and plans for large hydraulic projects?

- What will be the recurrence period of extreme El Niño events with climate change?

- What are the key sensitivities and interactions of the ecosystem to environmental changes?

- How will climate variability and change interact with other stressors (e.g. overexploitation, pollution)?

- Is it possible to modify the practices and institutionality (e.g. extractor associations) in order to preserve the ecosystem while allowing the population to improve their standard of living?

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