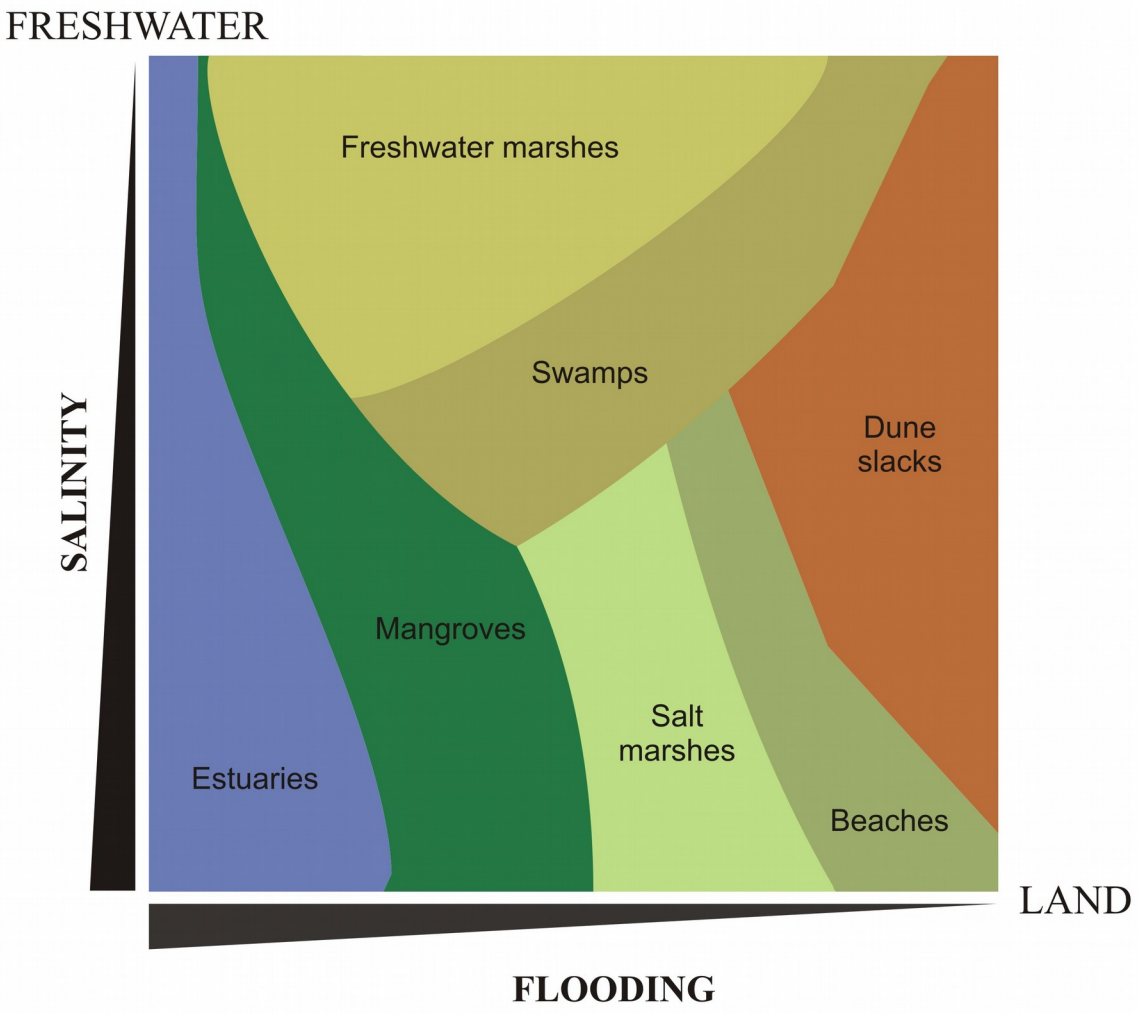
MANGROVES AND FRESHWATER FLOODED FORESTS, THEIR VALUE TO SOCIETY

Patricia Moreno-Casasola,

C. Vázquez González. M.E. Hernández, A. Campos C., R. Monroy

INECOL
INSTITUTO DE ECOLOGÍA, A.C.

Coastal wetland gradients



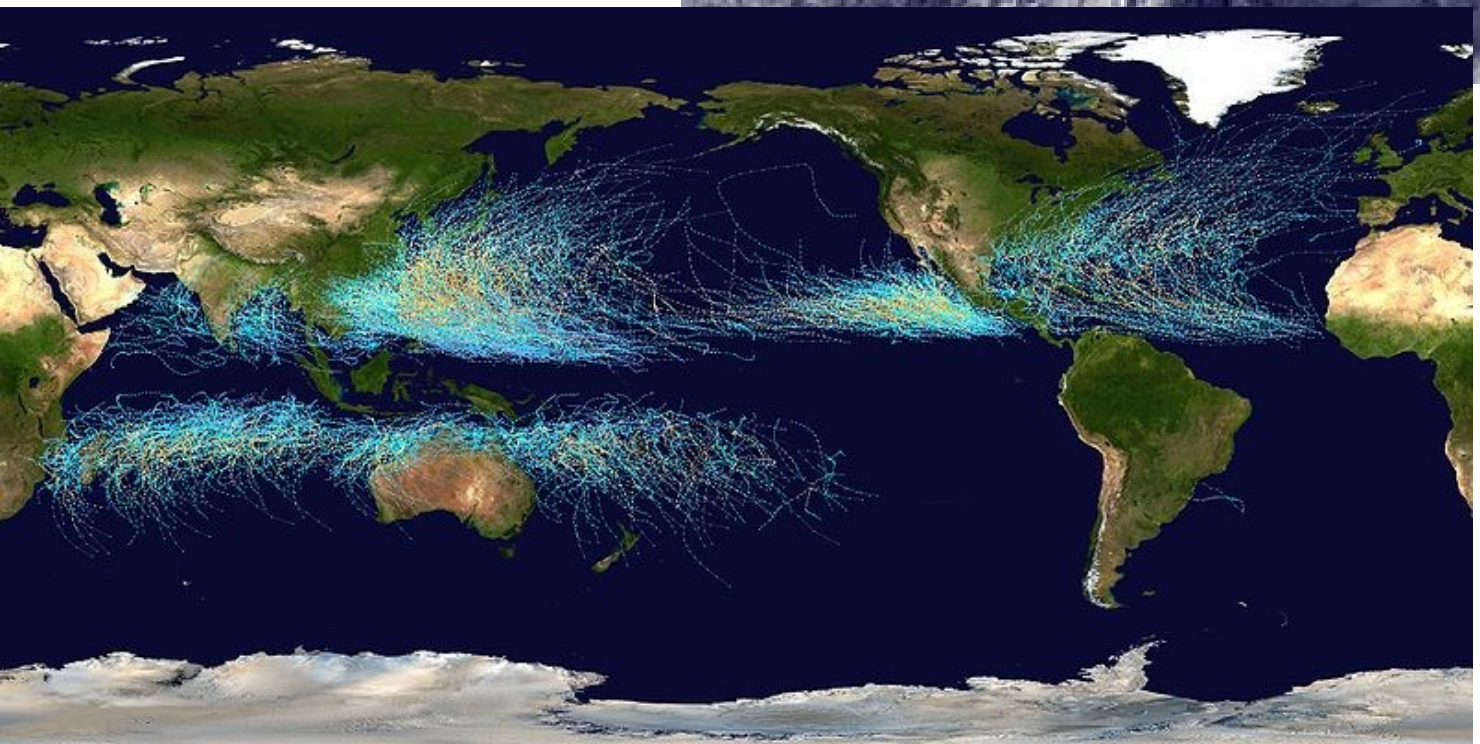
Coastal ecosystems are side by side and interact along flooding and salinity gradients.

Estuaries are flooded permanently nad salinity is high; in manglroves and salt marshes flooding is more temporal and salinity is lower. Freshwater marshes reamin flooded longer than swamps, the latter tolerates more salinity.

Study site

The coast of Mexico

- Hurricanes
- Plate tectonics
- Low lying, sandy, numerous rivers



Red mangrove -*Rhizophora mangle*

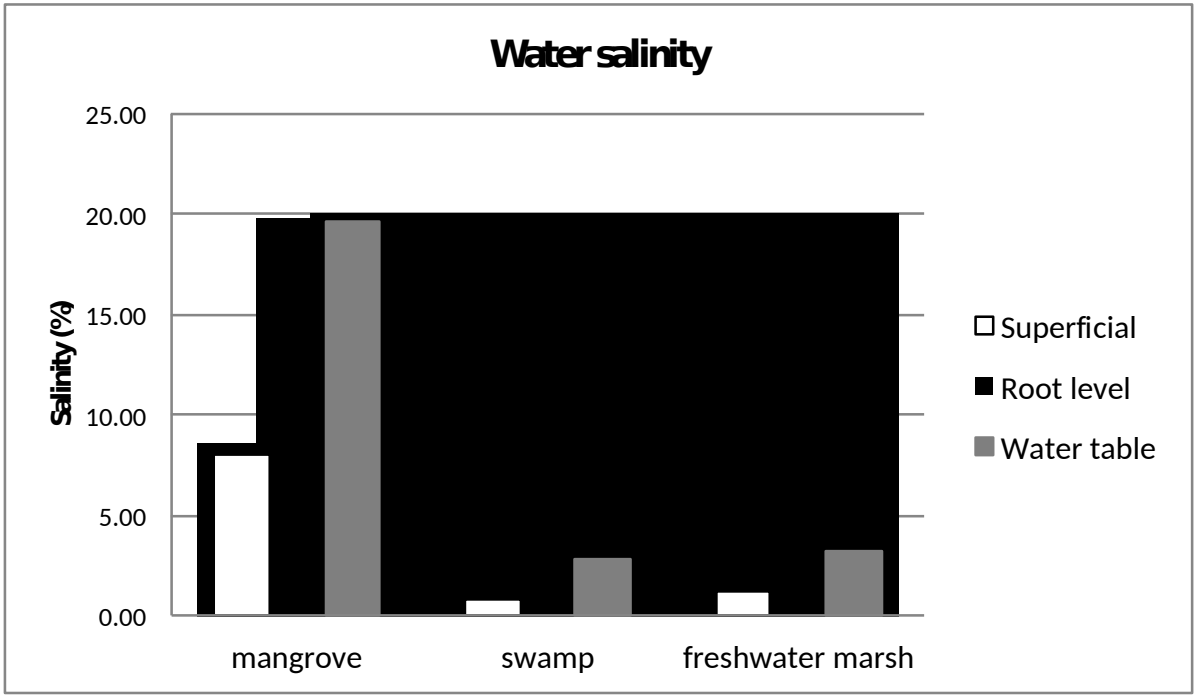
Black mangrove -*Avicennia germinans*

“Zapote reventador” swamp (*Pachira aquatica*)

“Corcho” swamp (*Annona glabra)*

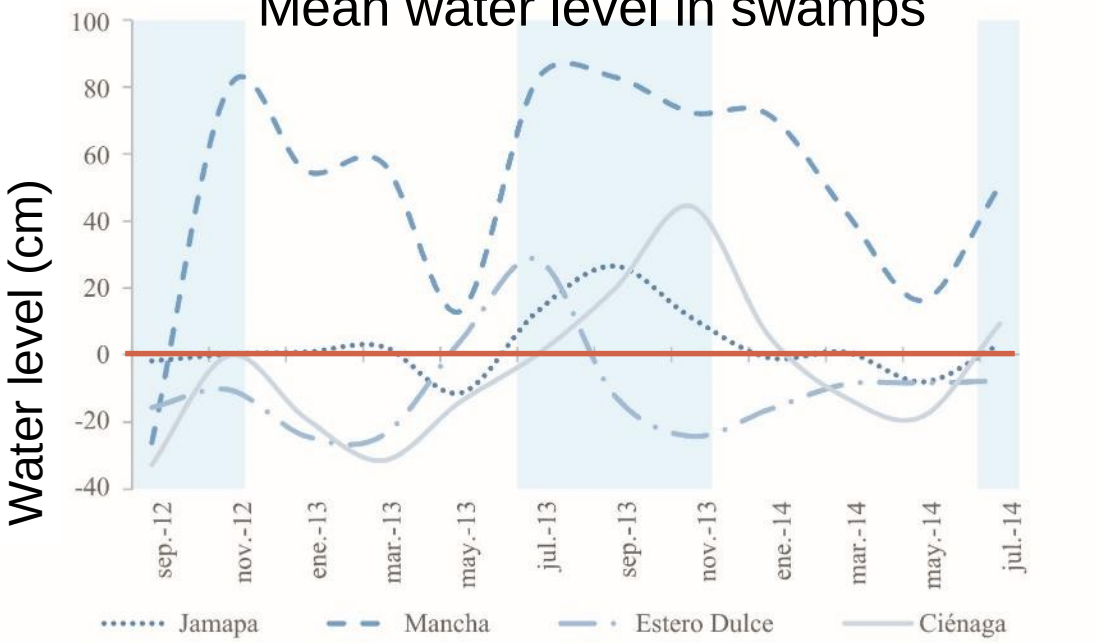
"Fig" swamp (*Ficus* spp.)

Salinity and flooding

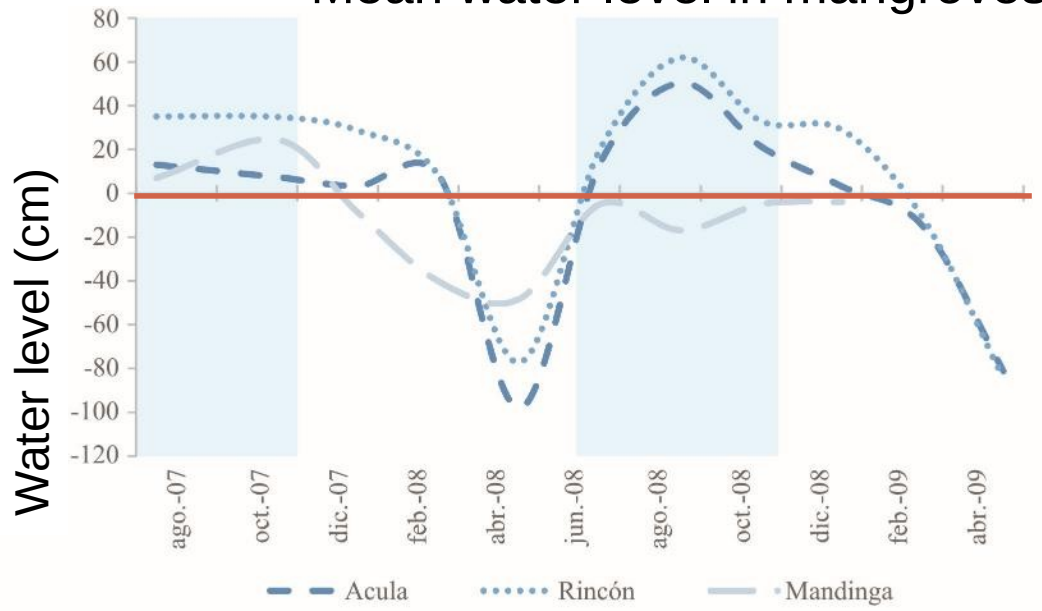


Water level hydroperiod

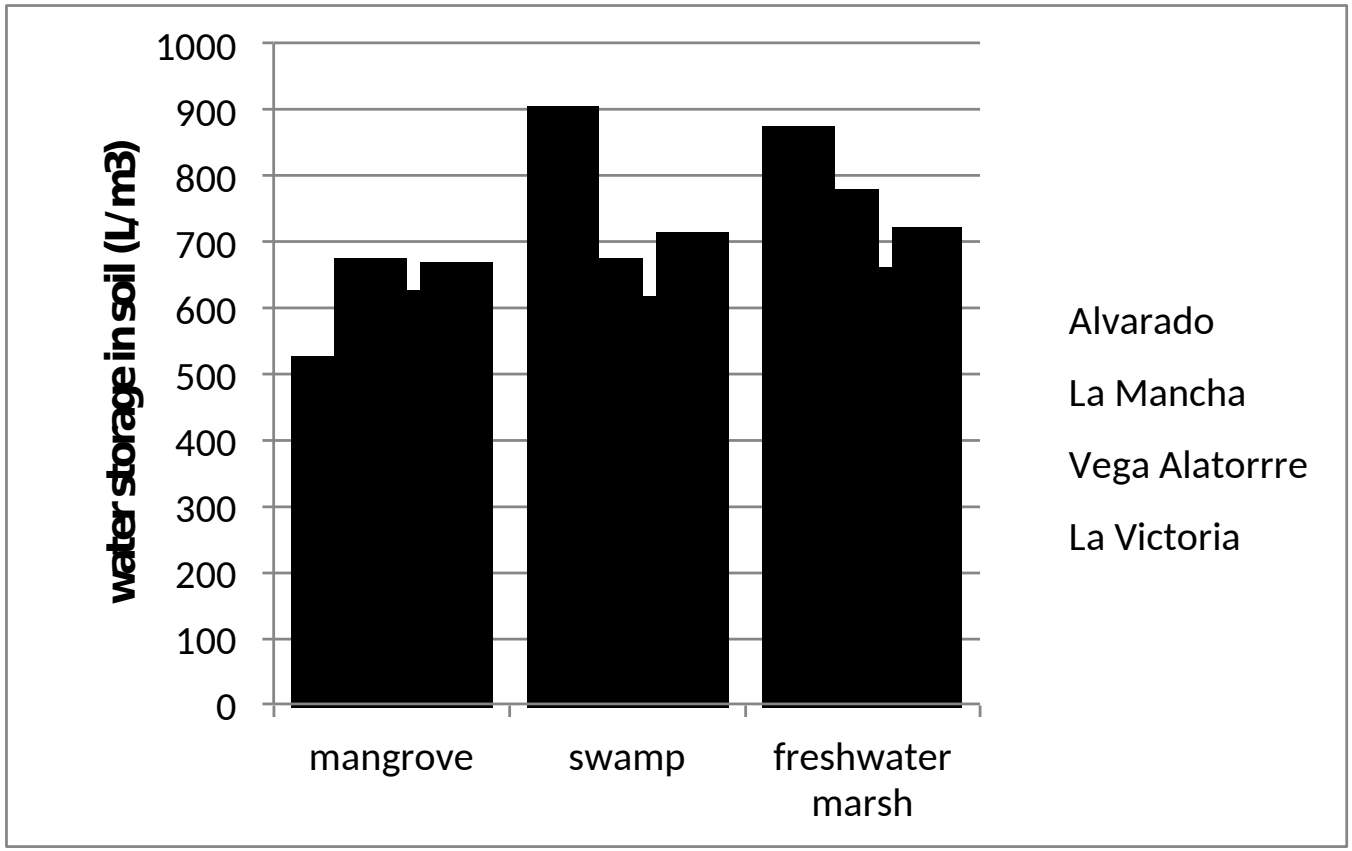
Mean water level in swamps



Mean water level in mangroves

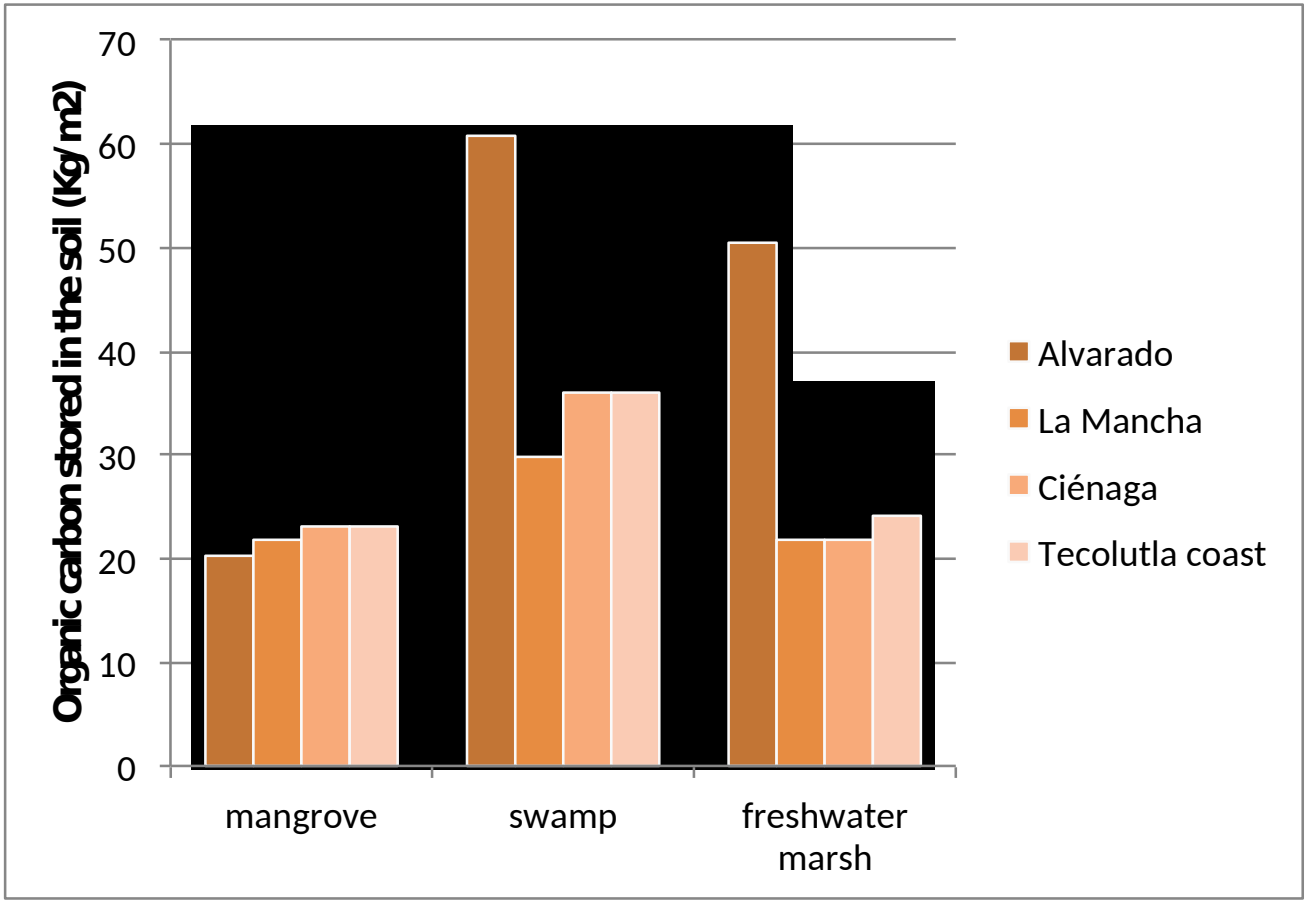


Soil water storage capacity



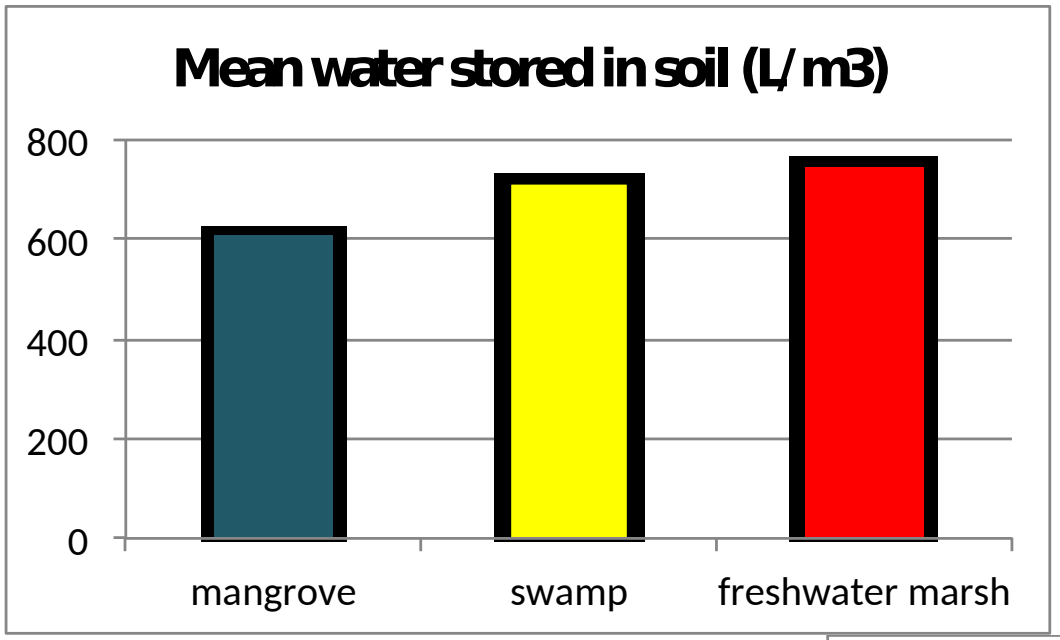
Water storage capacity was calculated to a depth of one meter. Soils stored seven to eight times their own weight in water: mangroves stored between 463 and 725 L/m^3 and swamps between 556 and 889. Marshes showed higher values than mangroves. **Data: Campos et al., 2011 & 2017.**

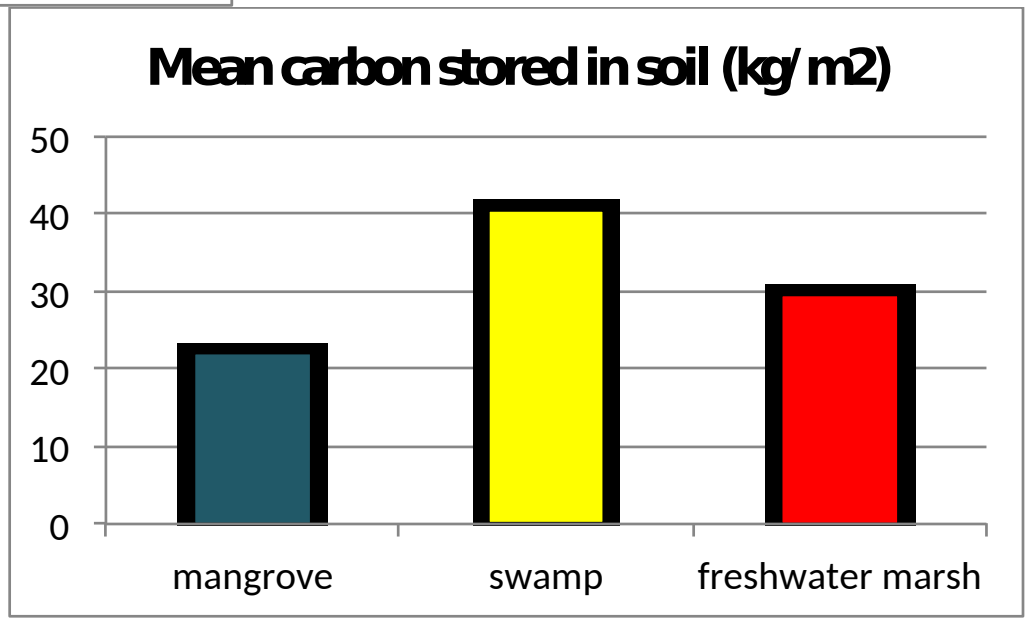
Soil carbon storage capacity



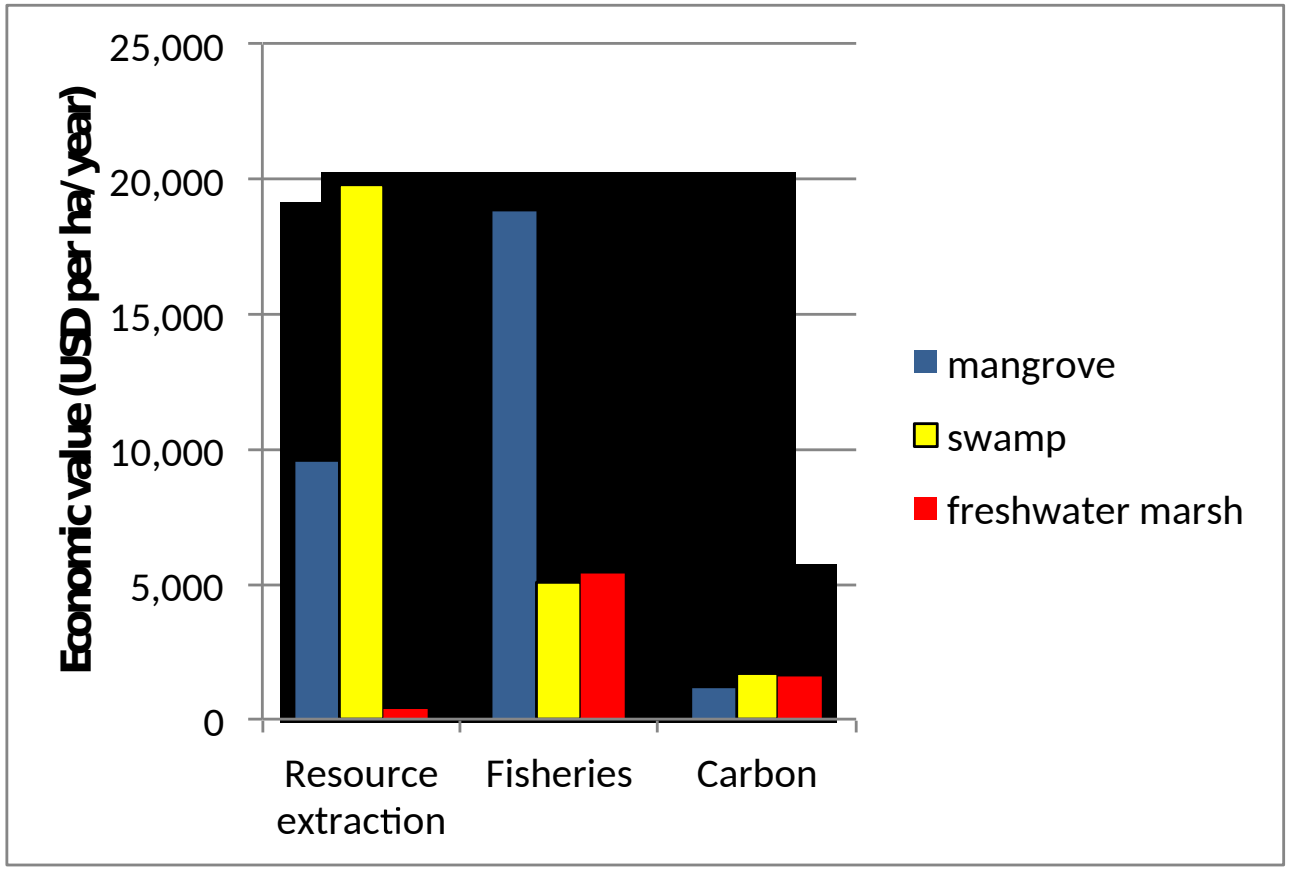
Organic carbon storage capacity was calculated to a depth of one meter. On average, the mangroves store between 20 and 25 kg/m^2 organic carbon in the soil and the flooded freshwater forests 20 to 60 kg/m^2. **Data: Hernández et al., 2015, 2016 & 2017.**

Comparing wetlands



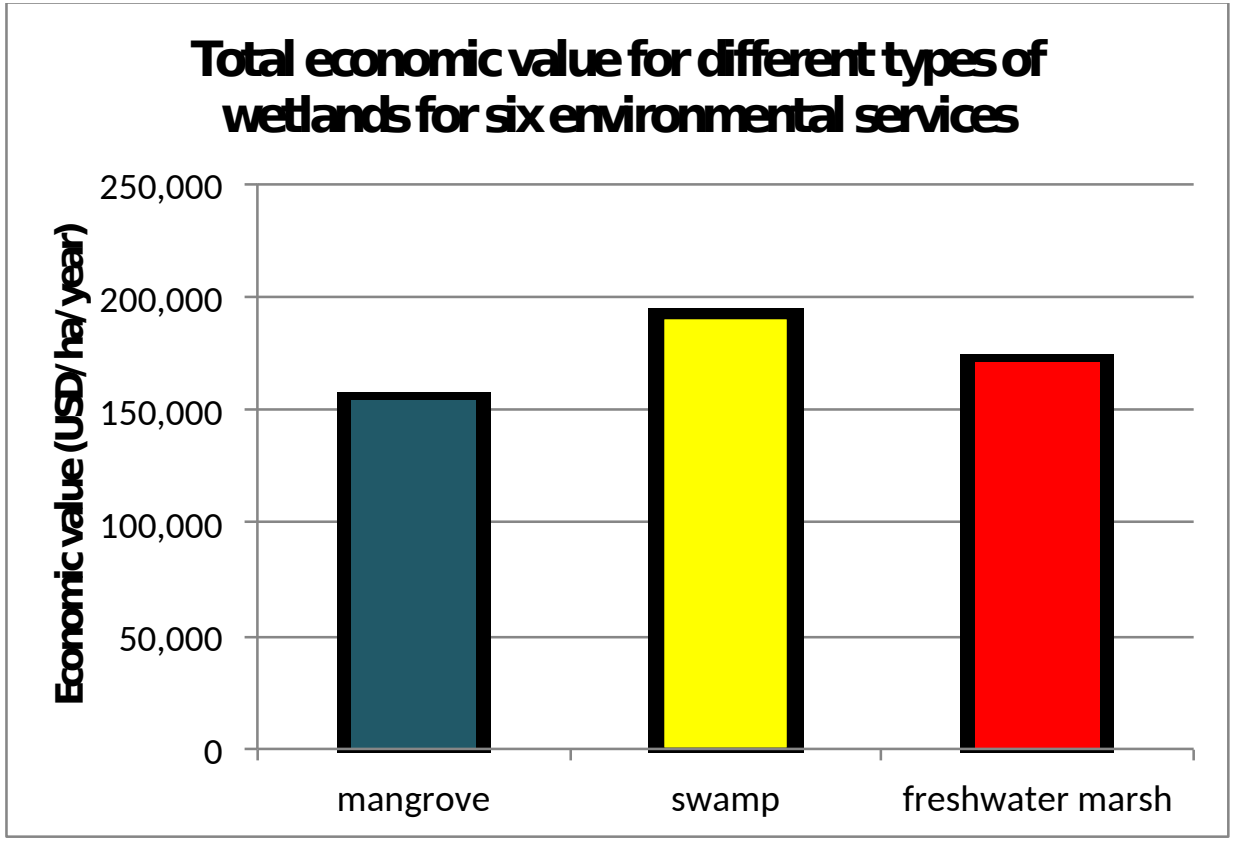


Economic benefits



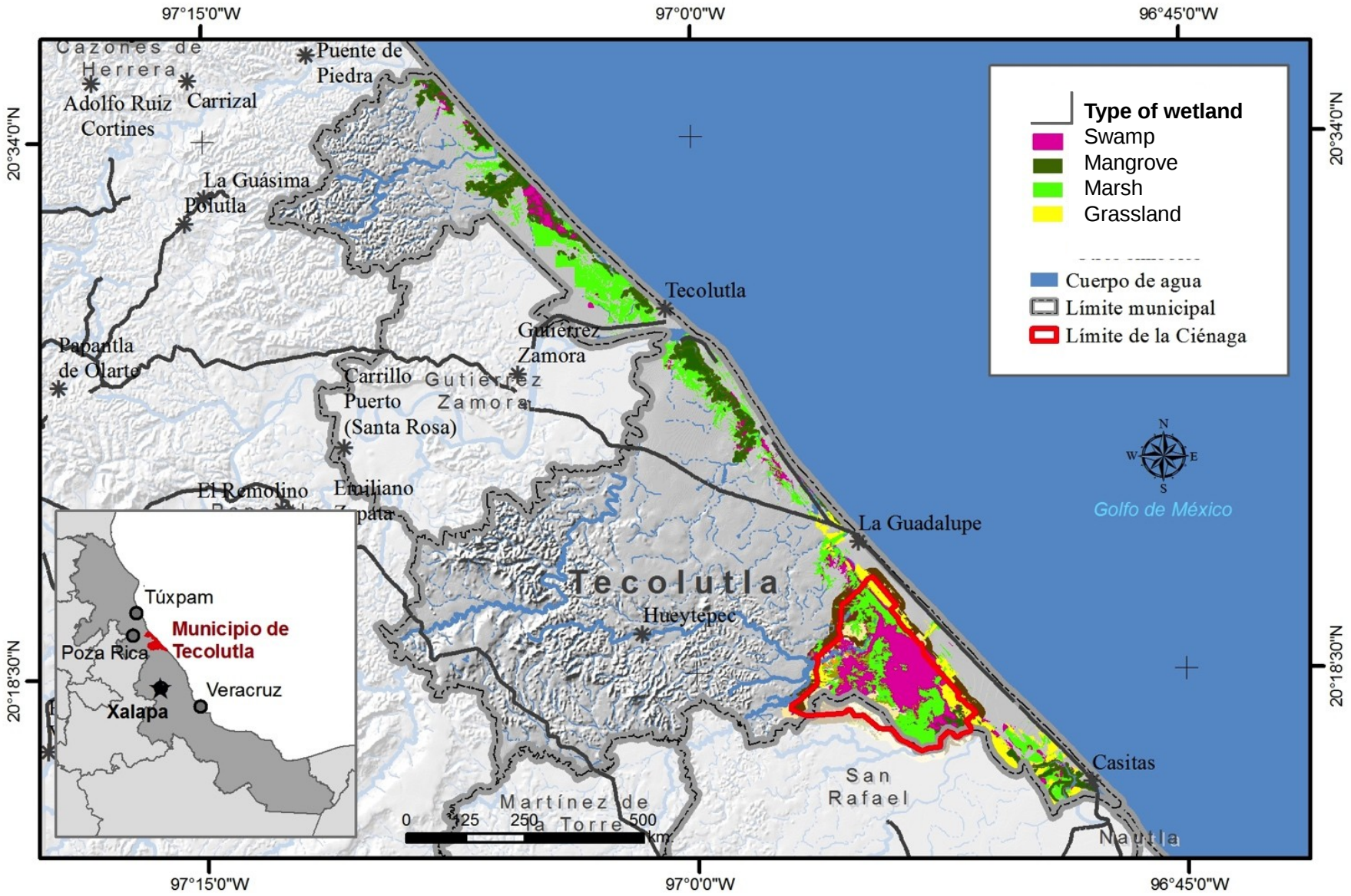
For each hectare that is lost, there is a decrease of US $9,551 in resource extraction and US $18,849 in fisheries per year respectively. Mangroves contribute more in fisheries and swamps in resource extraction. Carbon has much less value in the market. **Data: Vázquez-González et al., 2015, 2016 & 2017.**

Comparing economic value of wetlands

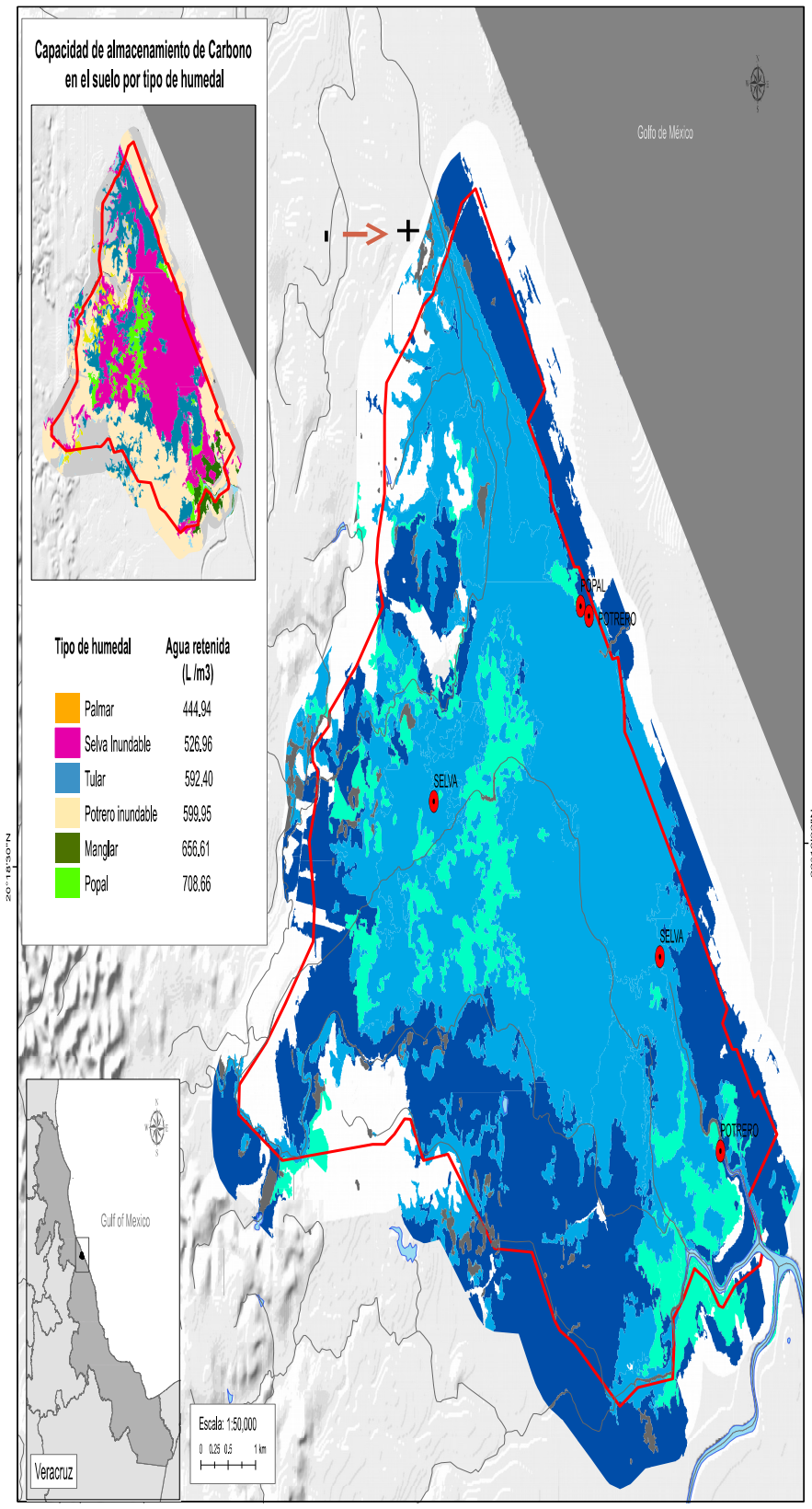


	Mangrove	Swamp	Freshwater marsh
Resource extraction	9,551	19,824	
Cattle ranching	345	345	345
Carbon emissions reduction	1,149	1,651	1,570
Flood control in urban areas	119,109	155,438	155,629
Control of salinization	5,208	8,222	7,948
Coastal fisheries	18,849	5,066	5,394
Total value	**154,211**	**190,546**	**170,886**

Vegetation map of Tecolutla



Soil water storage



Servicio ecosistémico de acumulación de agua en los suelos de humedales a un metro de profundidad en Ciénaga del Fuerte

Leyenda

Sitio de muestreo

Volumen total de agua acumulada en el suelo de los humedales a 1 m de profundidad (millones de litros)

- menor a 5,000
- entre 5,000 y 10,000
- mayor a 10,000

Otros símbolos

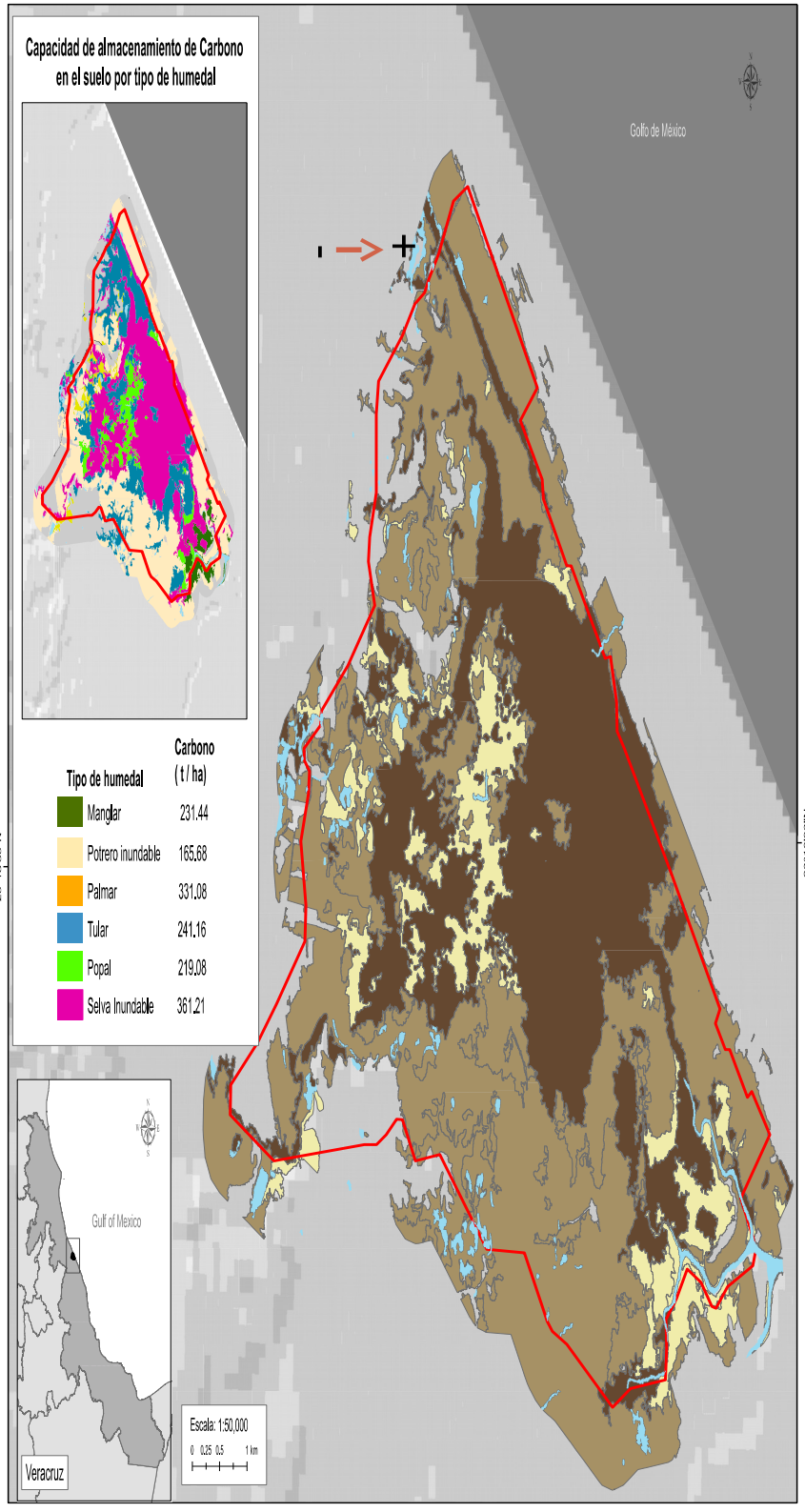
- Cuerpo de agua
- Límite del ANP Ciénaga del Fuerte

Tabla de datos

Tipo de humedal	Volumen de agua contenida en el suelo a 1m de profundidad (dm³)	Superficie del tipo de vegetación (hectárea)	Volumen de agua retenida en el suelo a un metro de profundidad (millones de litros)
Palmar	444.94	101.66	452.33
Manglar	656.61	130.37	856.00
Popal	708.66	284.46	2,015.88
Tular	592.40	864.88	5,123.52
Selva inundable	556.96	1,578.02	8,788.95
Potrero inundable	599.95	1,754.99	10,529.12
			27,765.80

Proyecto: RED-PD 045/11 Rev.2 (M)
Evaluación ambiental y valoración económica de los servicios ecosistémicos proporcionados por manglares, selvas inundables y selvas sobre dunas en la planicie costera de Veracruz, México

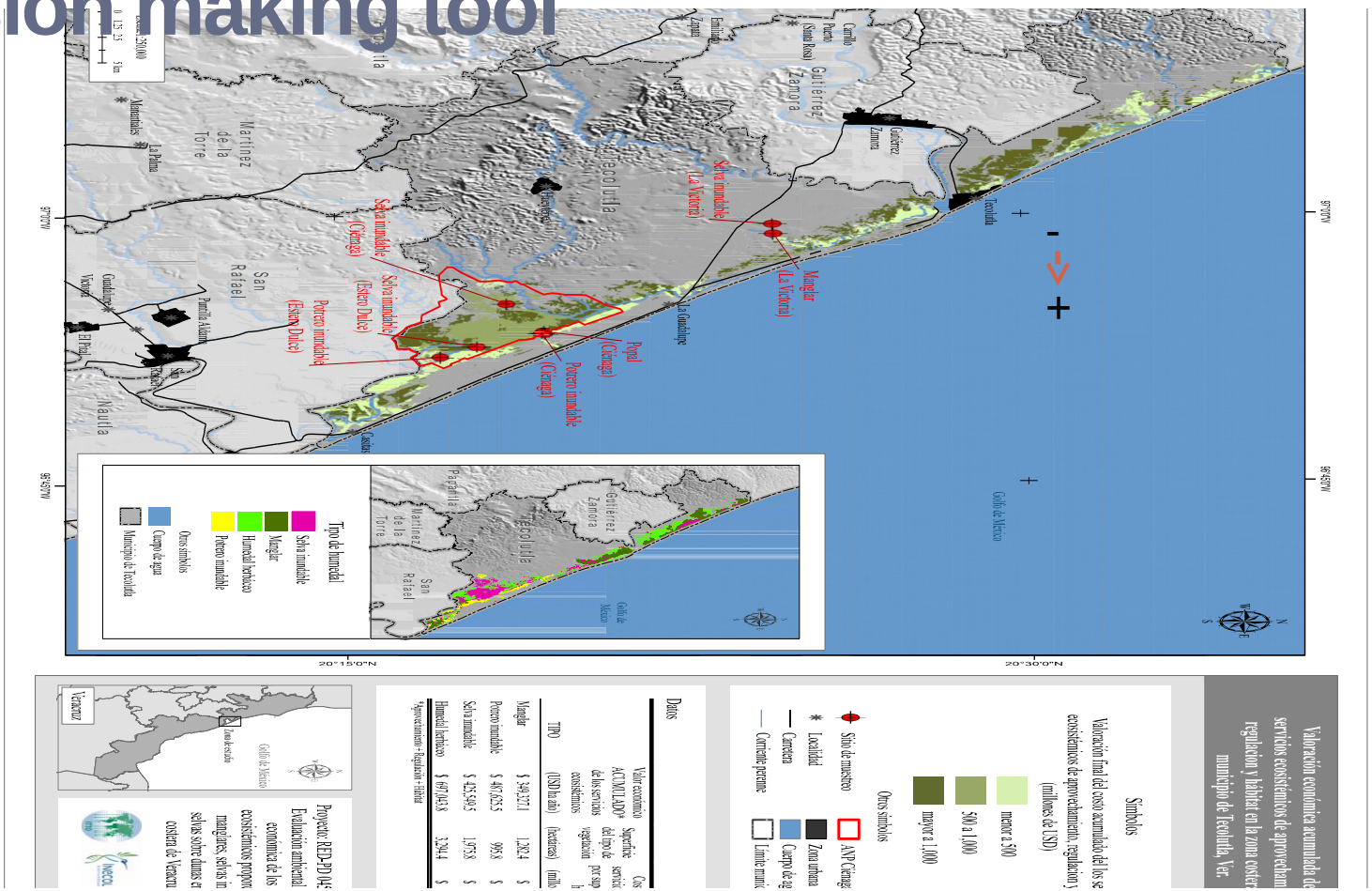
Soil carbon storage



Tipo de humedal	Carbono contenido en el suelo en una hectárea (t / ha)	Superficie del tipo de vegetación (ha)	Carbono total almacenado en el suelo por superficie de vegetación (t)
Manglar	231.44	130.37	30,172.19
Palmar	331.09	101.66	33,659.03
Popal	219.08	284.46	62,319.17
Tular	241.16	864.88	208,570.09
Potrero inundable	195.68	1,754.99	343,415.83
Selva inundable	361.21	1,578.02	569,993.81
			1,248,130.11

Proyecto: RED-PD 045/11 Rev.2 (M)
Evaluación ambiental y valoración económica de los servicios ecosistémicos proporcionados por manglares, selvas inundables y selvas sobre dunas en la planicie costera de Veracruz, México

Value of ecosystem services in Tecolutla: a decision making tool



Mapping of accumulated economic values of all ecosystem services analyzed (a) extraction, (b) habitat and (c) regulation (reduction of carbon emissions, storage and supply of water and water purification)- in millions of dollars of 2007), for the coastal wetlands of the municipality of Tecolutla.

Conclusions

The economic and social benefits of retaining mangroves and freshwater flooded forests are clear. We need local data on the environmental services that all wetland ecosystems provide.

These data should be converted into economic values as decision making tools. Market value of some ES such as carbon storage are extremely low. They do not incentivate wetland conservation. But this has to be demonstrated.

These types of estimates are not mere academic exercises but rather can help establish monetary values for PES that are based on local approximations, thus supporting factually informed decision making that is applicable at both the state and national level.

Thank you

http://www1.inecol.edu.mx/costasustentable/

patricia.moreno@inecol.mx