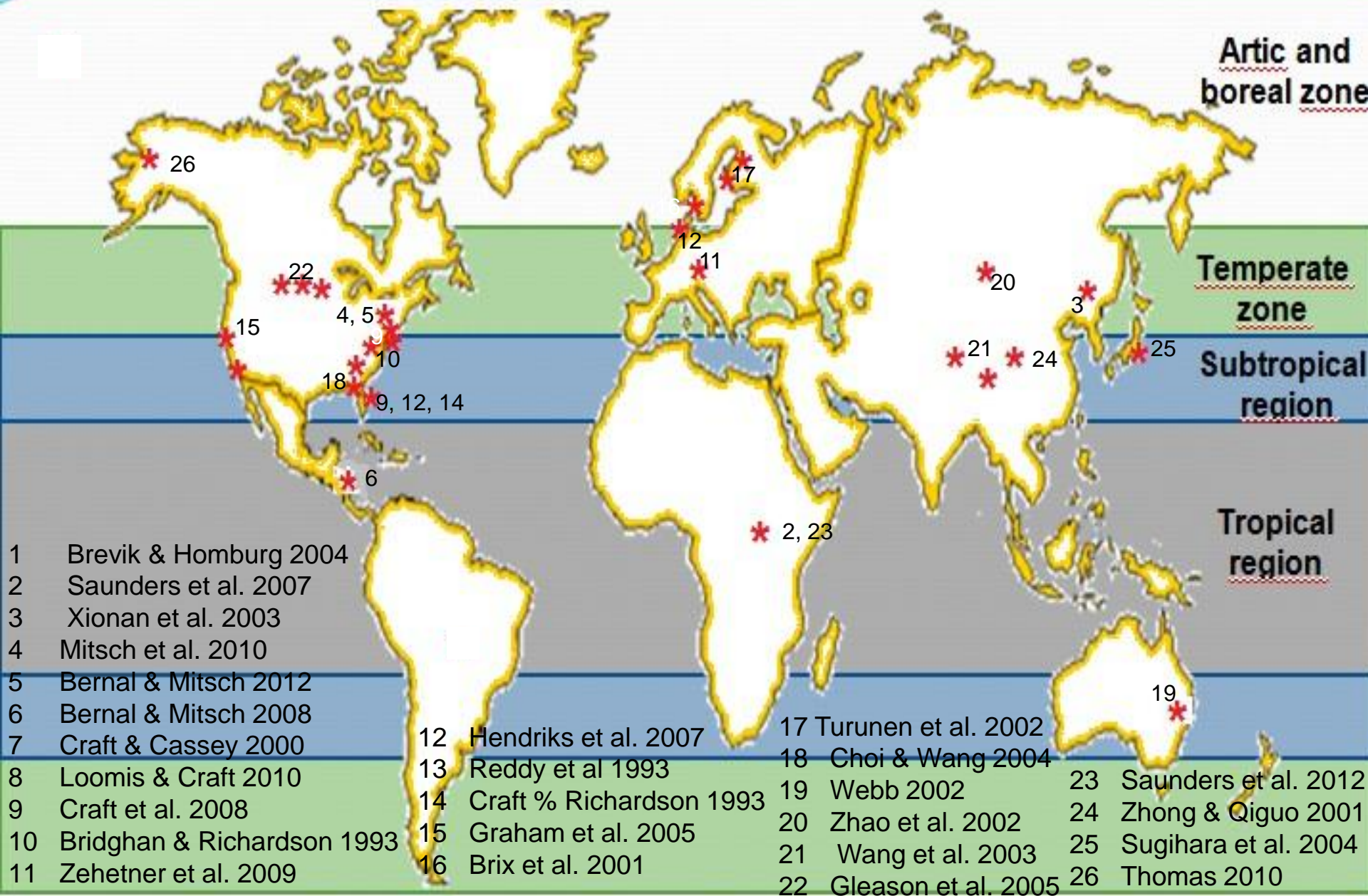


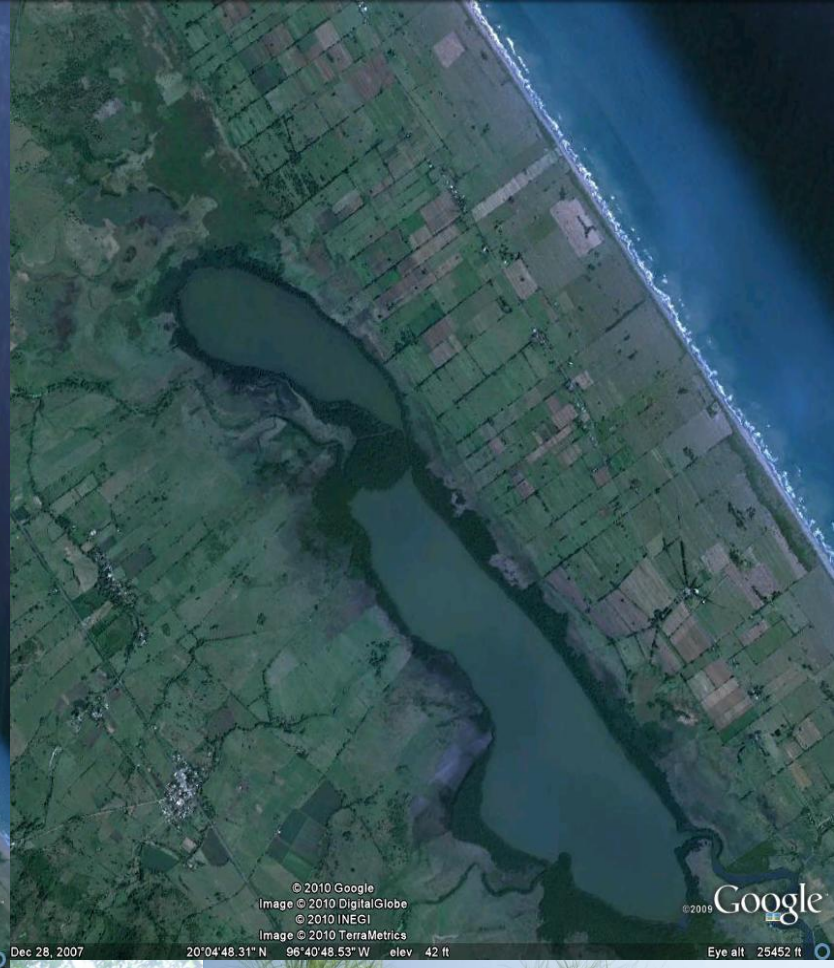
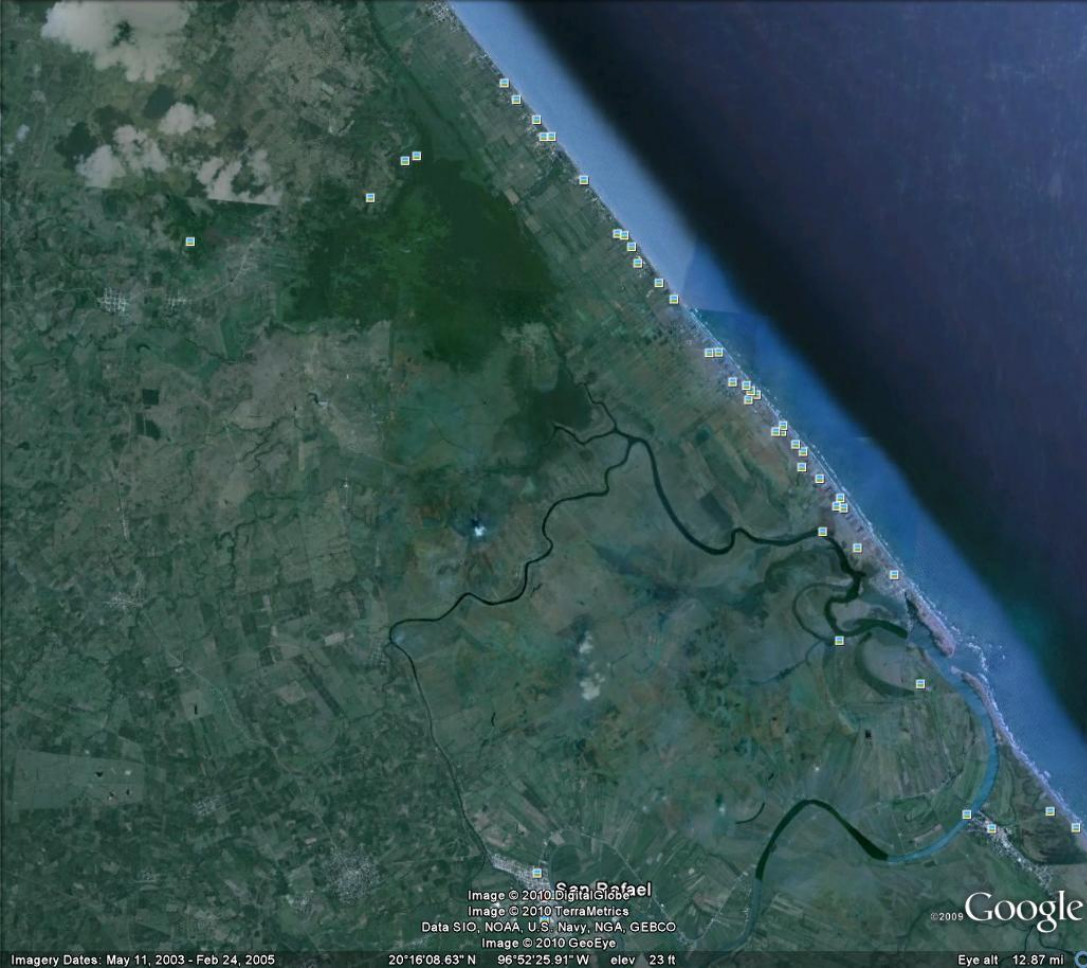
# Carbon sequestration in coastal freshwater wetland soils in Veracruz Mexico

Hernández M.E., Marín-Muñiz, J.L and Moreno-Casasola P.



# Studies of carbon sequestration in freshwater wetlands

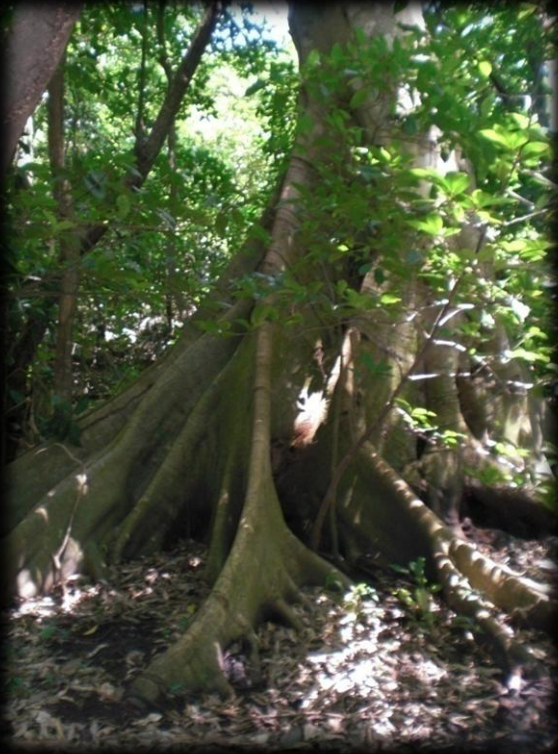




# LAND USE CHANGE

## SWAMPS

What happen with the carbon stored in the soils when land use change ?

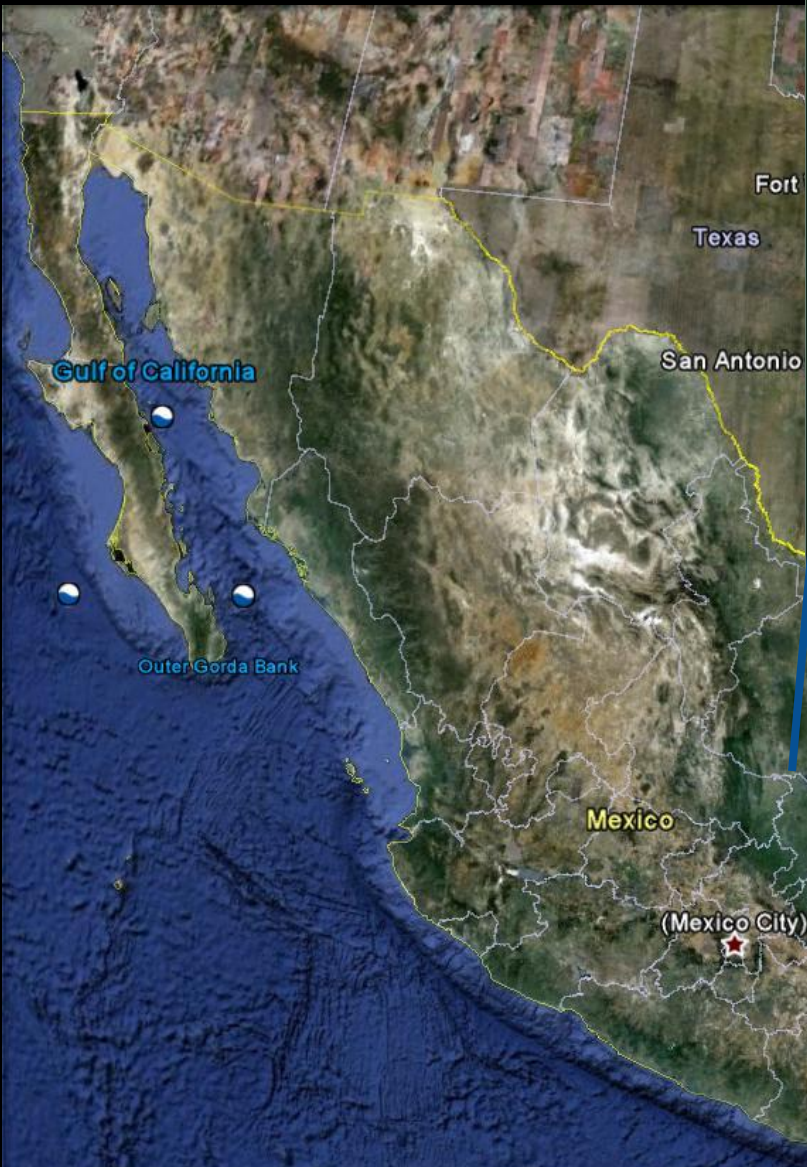


## FLOODED GRAZING LANDS

# Objectives

- To compare soil carbon sequestration in freshwater wetlands with different plant community (swamps vs. marshes) in the coastal plain of Veracruz, Mexico.
- To investigate the lost of soil carbon when freshwater swamps are changed to flooded grasslands

# STUDY SITES



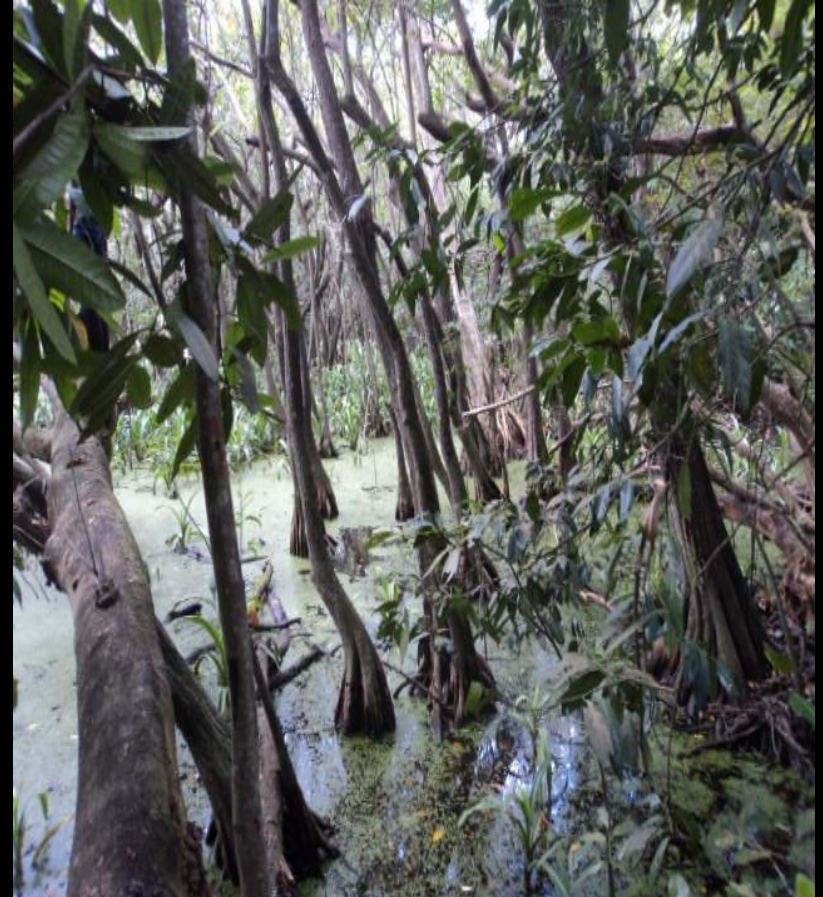
# La Mancha (LM)

Municipality: Actopan, Ver

19°35'45''N 96°23'05''W



*Typha domingensis*



*Anona glabra*



*Ficus sp*

## Boquilla de Oro (BO)

Municipality: Alto Lucero, Ver.

Location: 19°49'47"N,  
96°26'59"W



*Cyperus sp*



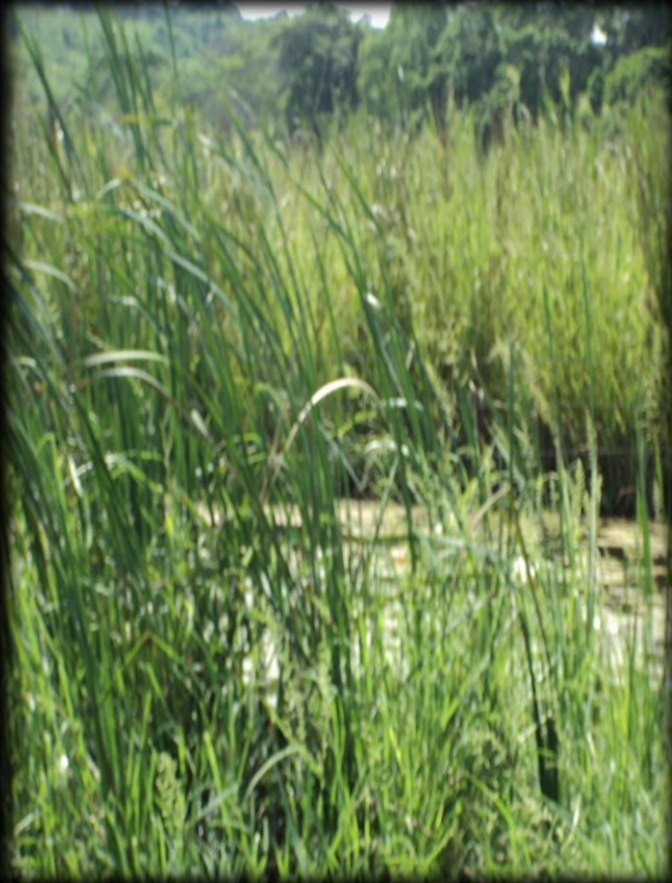
*Pontederia sagitatta*



# Santander (ST)

Municipality- Alto Lucero, Ver.

19°91'25"N 96°52'77"W



*Typha domingensis*



*Ficus insipida*



## Laguna Chica (LCH)

Municipality- Vega de Alatorre.

Location: 20°05'47.8" N

96°41'23.8" W

*Pachira aquatica*   *Hippocratea celastroides*



*Typha domingensis*



*Cyperus giganteus*



*Pachira aquatica*

## Estero Dulce (ED)

Municipality- Tecolutla, Ver.

Location 20°17'53" N

96°52'19" W



*Thalia geniculata*



*Cyperus giganteus*

# METHODS

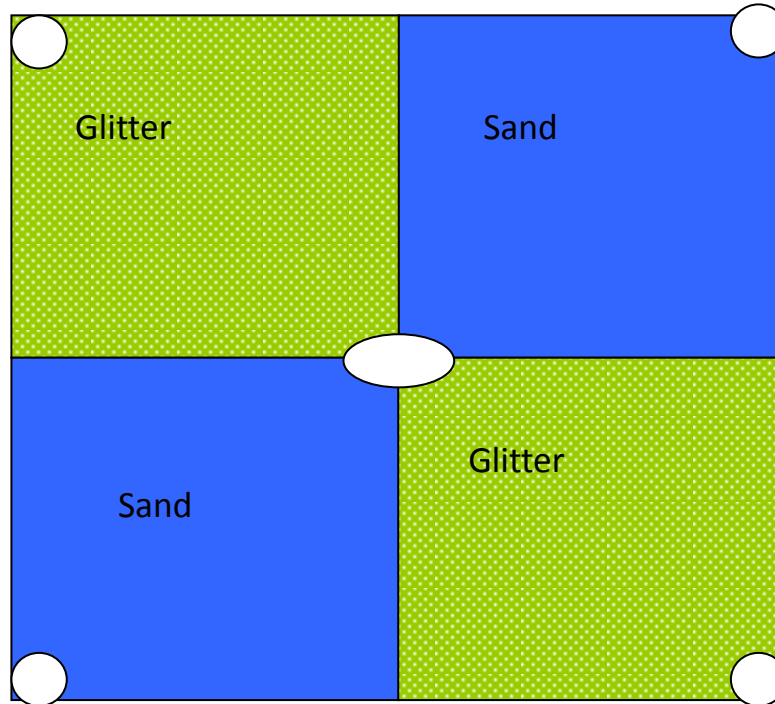


- ✓ Soil cores 0-90 cm (approximately)
- ✓ 18 cores in each site ( 9 swamps, 19 marshes)
- ✓ 3 composite soil samples in 1m<sup>2</sup>
- ✓ Cut in layers of 2 cm
- ✓ % of organic matter (LOI)
- ✓ Bulk density



# Short-term vertical accretion rate

Accretion plots (0.25 m<sup>2</sup>)



3 plots in each type of wetland

# 1. Russian peat borer



# 2. Freezing profiles

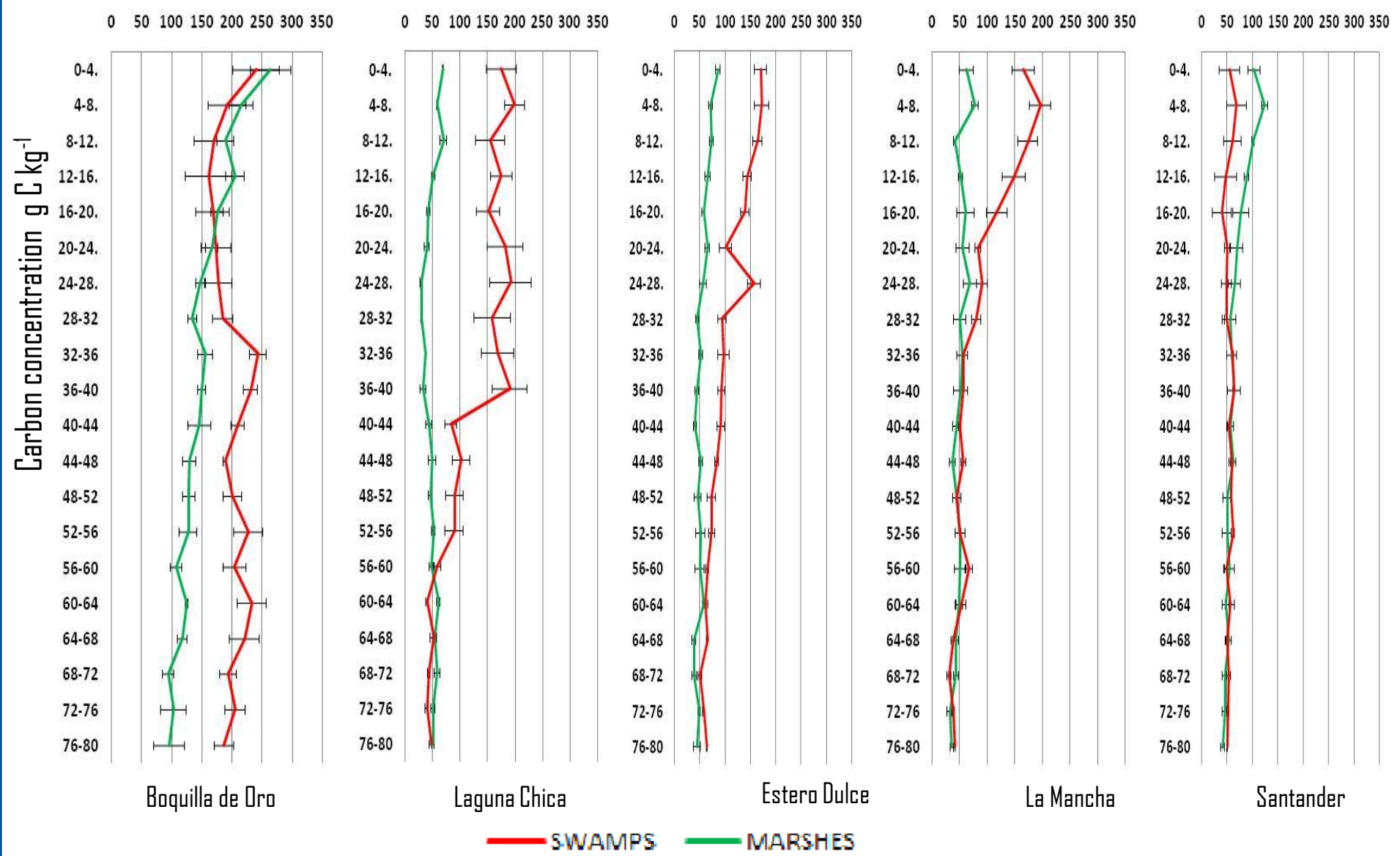


# 3. Cryogenization

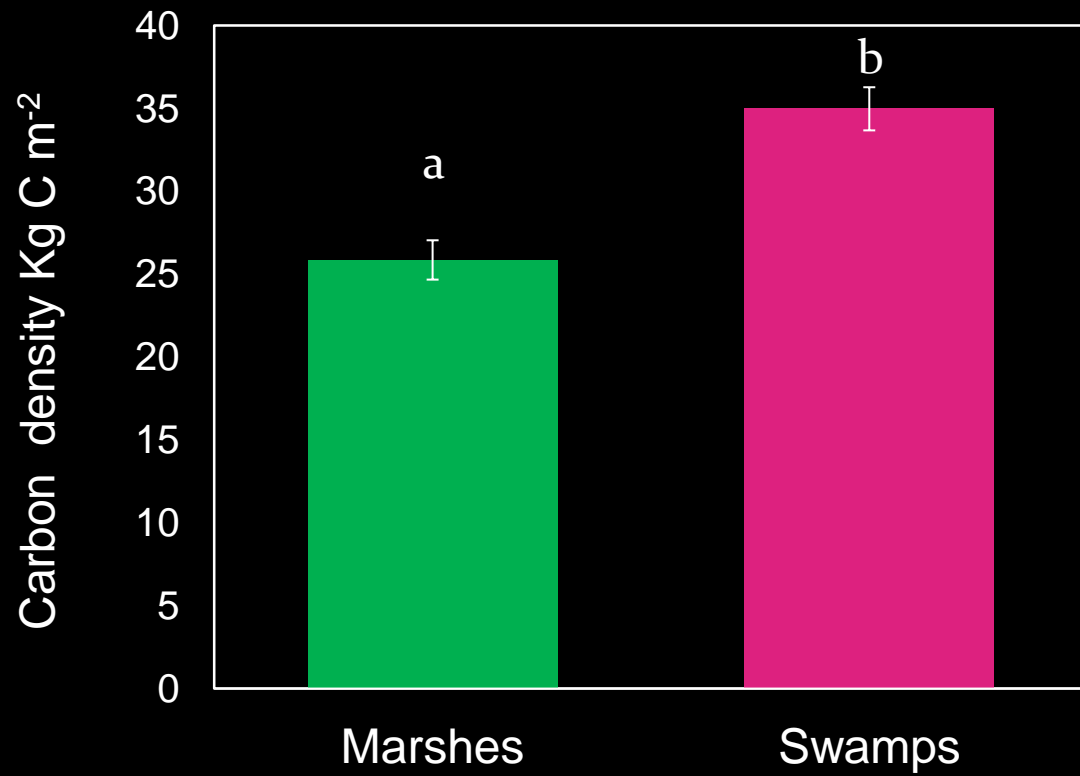


# RESULTS

## Soil depth cm





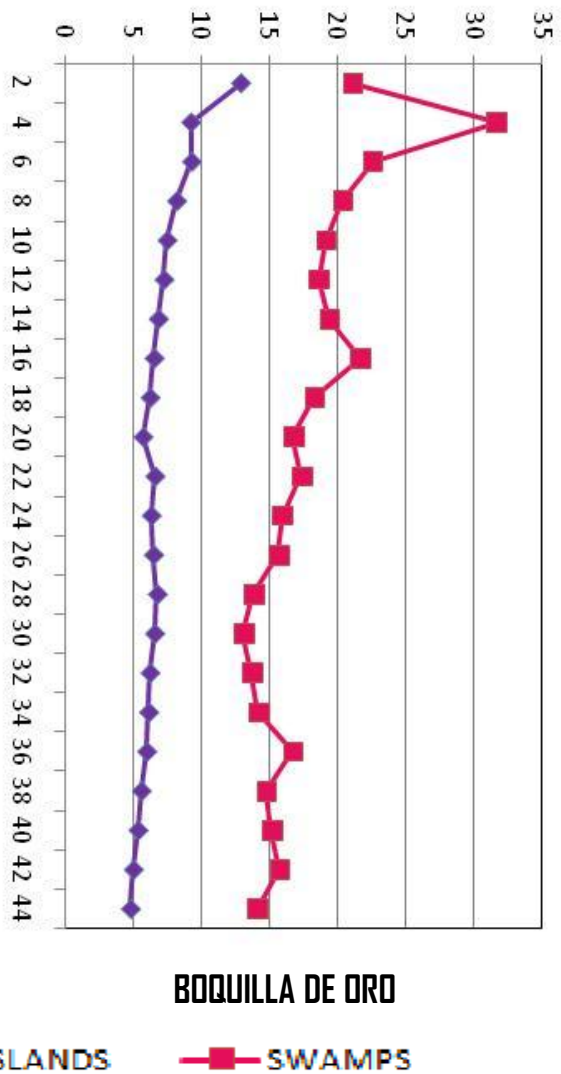
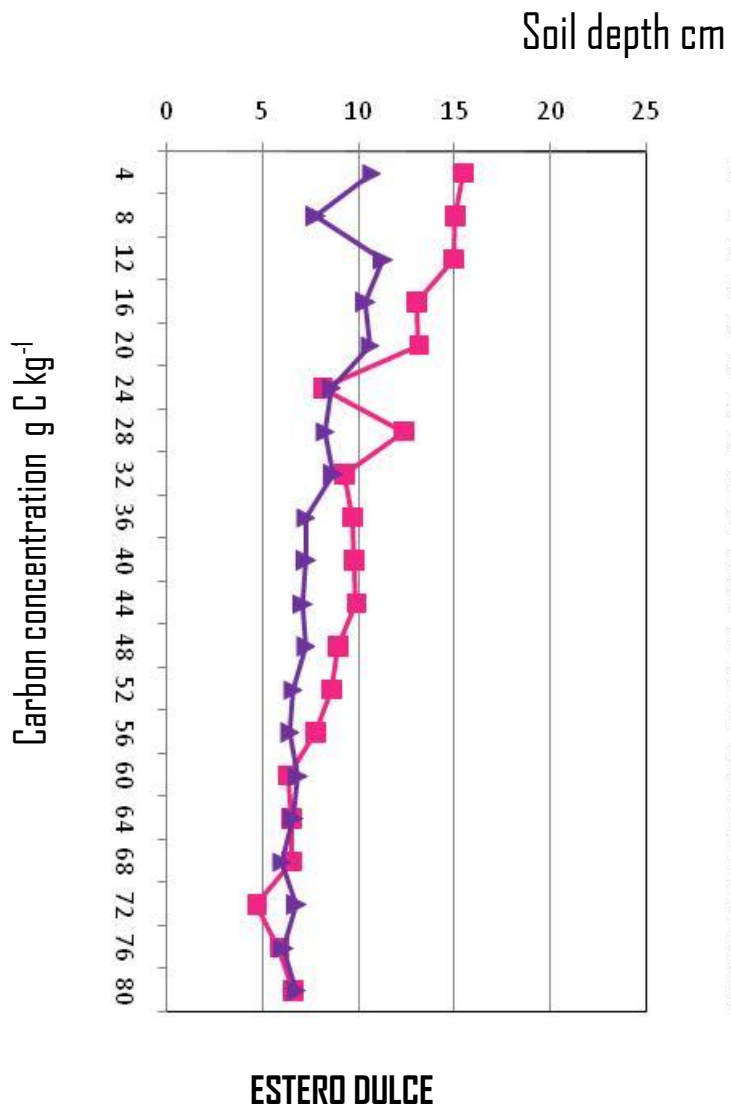


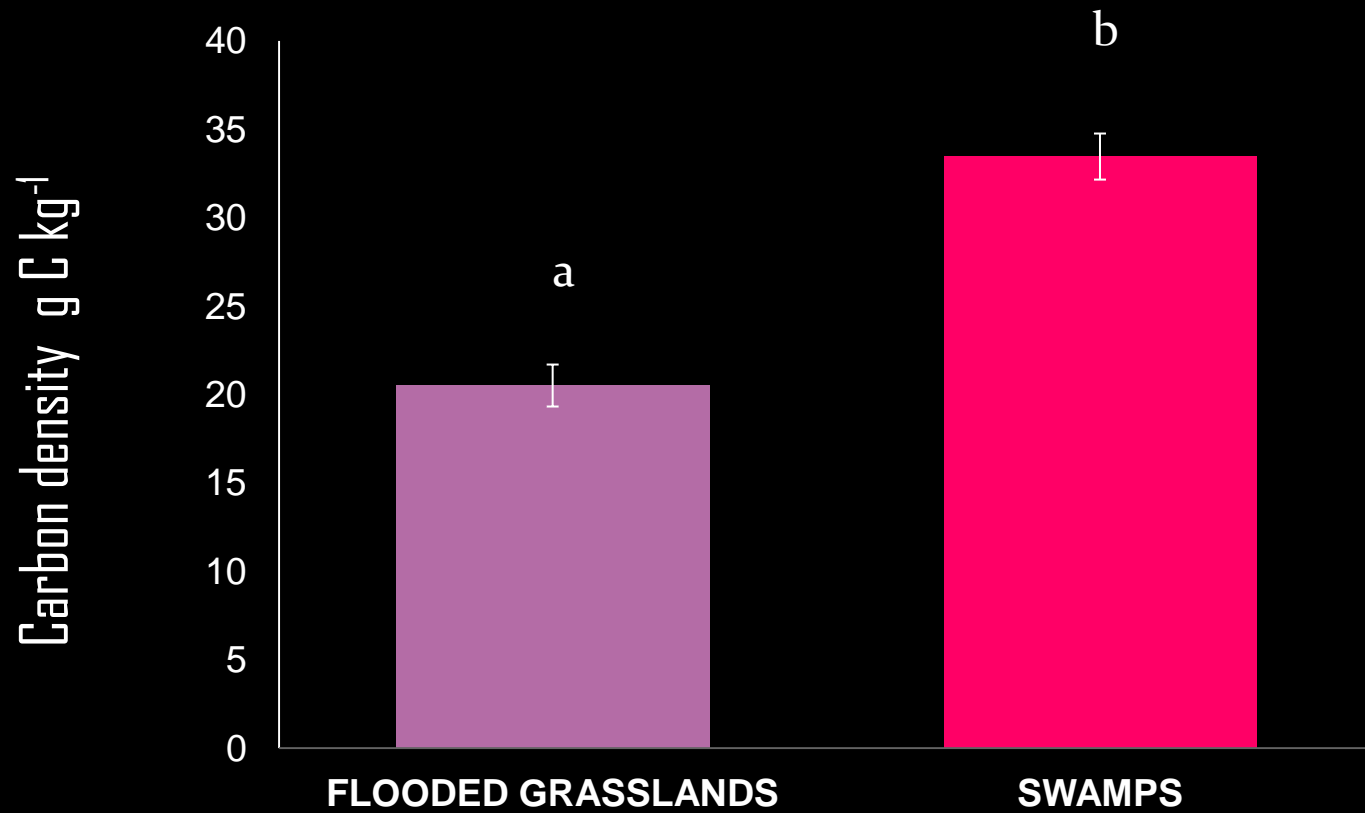
## Carbon density in different wetlands

Study site	Wetland type	Carbon density (kgC m <sup>-2</sup> )	Reference
USA.	Marshes	13-29	Yonghoon <i>et al.</i> (2001)
Mexico.	Mangrove swamps	47.2-82.2	Moreno <i>et al.</i> (2002)
Japan	Mangrove swamps	5.73	Khan <i>et al.</i> (2007)
USA.	Marshes and swamps	17.6	Bernal & Mitsch (2008)
Costa Rica.	Marshes and swamps	9.7	Bernal & Mitsch (2008)
Australia	Mangrove swamps	9.42	Howe <i>et al.</i> (2009)
Mexico.	Mangrove swamps	23.16	Moreno-May <i>et al.</i> (2010)
Mexico.	Mangrove swamps	23.08	Moreno-May <i>et al.</i> (2010)
Mexico.	Mangrove swamps	1.2-22.2	Cerón-Bretón <i>et al.</i> (2011)
Coastal plain of the Gulf of Mexico.	Swamps	34.96	This study
	Marshes	25.85	This study

## Soil carbon sequestration in different wetlands

Wetland site	Carbon sequestration rate (kgC m <sup>-2</sup> yr <sup>-1</sup> )	Wetland type	Reference
California, USA	0.033	Marshes	Brevik & Homburg (2004)
Africa	0.48	Marshes	Saunders <i>et al.</i> (2007)
China	0.028-0.44	Swamps	Xiaonan <i>et al.</i> (2008)
Costa Rica	0.255	Swamp	Mitsch <i>et al.</i> (2010)
Ohio, USA.	0.16	Marshes	Mitsch <i>et al.</i> (2010)
Ohio, USA	0.47	Swamp	Bernal & Mitsch (2012)
Ohio, USA	0.21	Marshes	Bernal & Mitsch (2012)
Georgia USA.	0.107	Swamp	Craft & Casey (2000)
Florida, USA	0.056	Marshes	Craft & Casey (2000)
Georgia, USA.	0.124	Marshes	Loomis & Craft (2010)
Veracruz, Mexico	0.30	Marsh	This study
	0.66	Swamp	





# Conclusions

- In these tropical region, soil carbon sequestration was higher in swamps than marshes
- Soil carbon density found in these tropical freshwater wetlands, indicate that they are important carbon sinks in the planet
- Carbon density found in flooded grasslands was only 58% of the carbon density found in swamps, indicating that land use change of swamps decrease the environmental service of carbon sequestration.

**THANK YOU !!**

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Arizbeth Garduño

