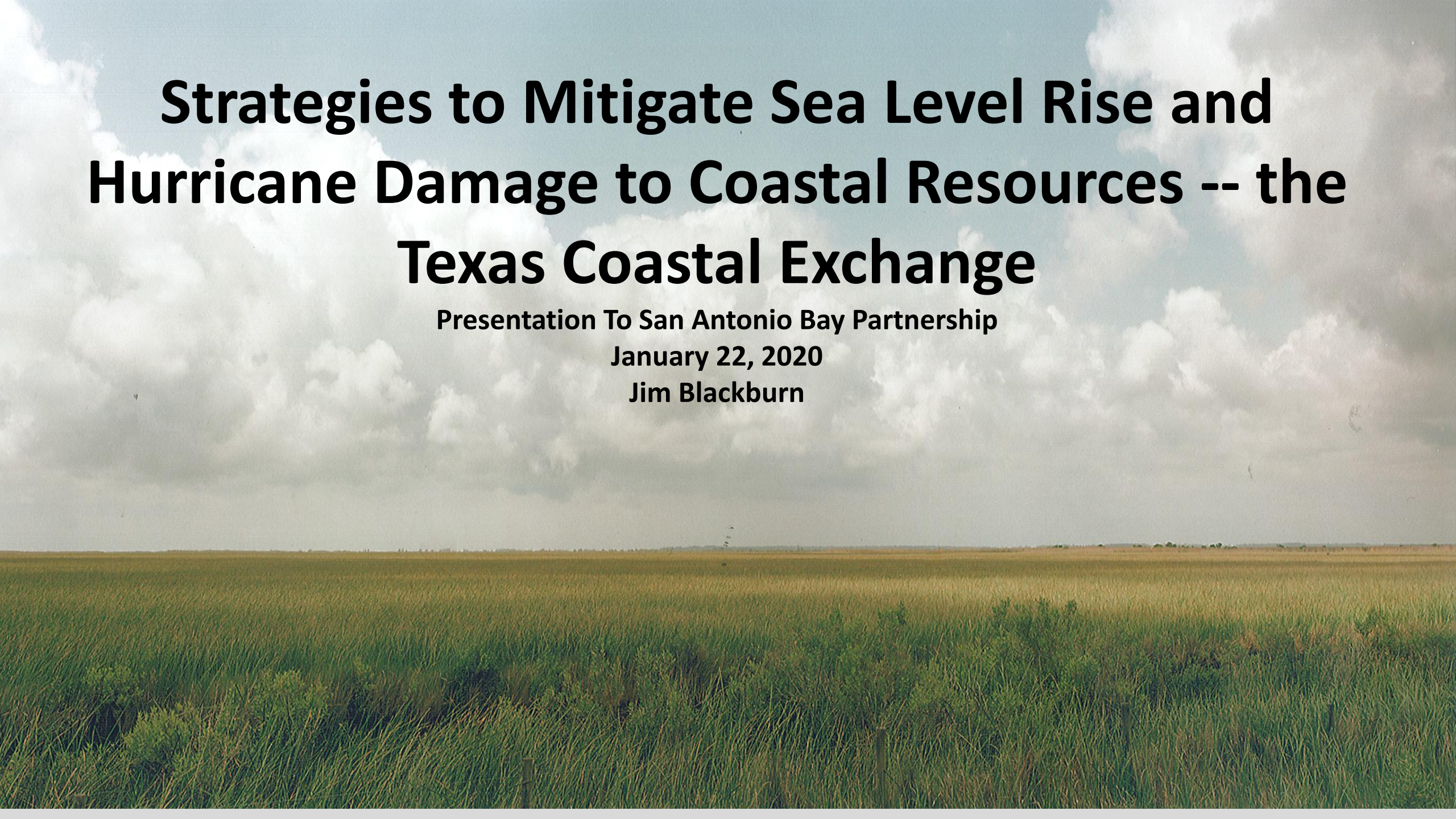


Strategies to Mitigate Sea Level Rise and Hurricane Damage to Coastal Resources -- the Texas Coastal Exchange

Presentation To San Antonio Bay Partnership

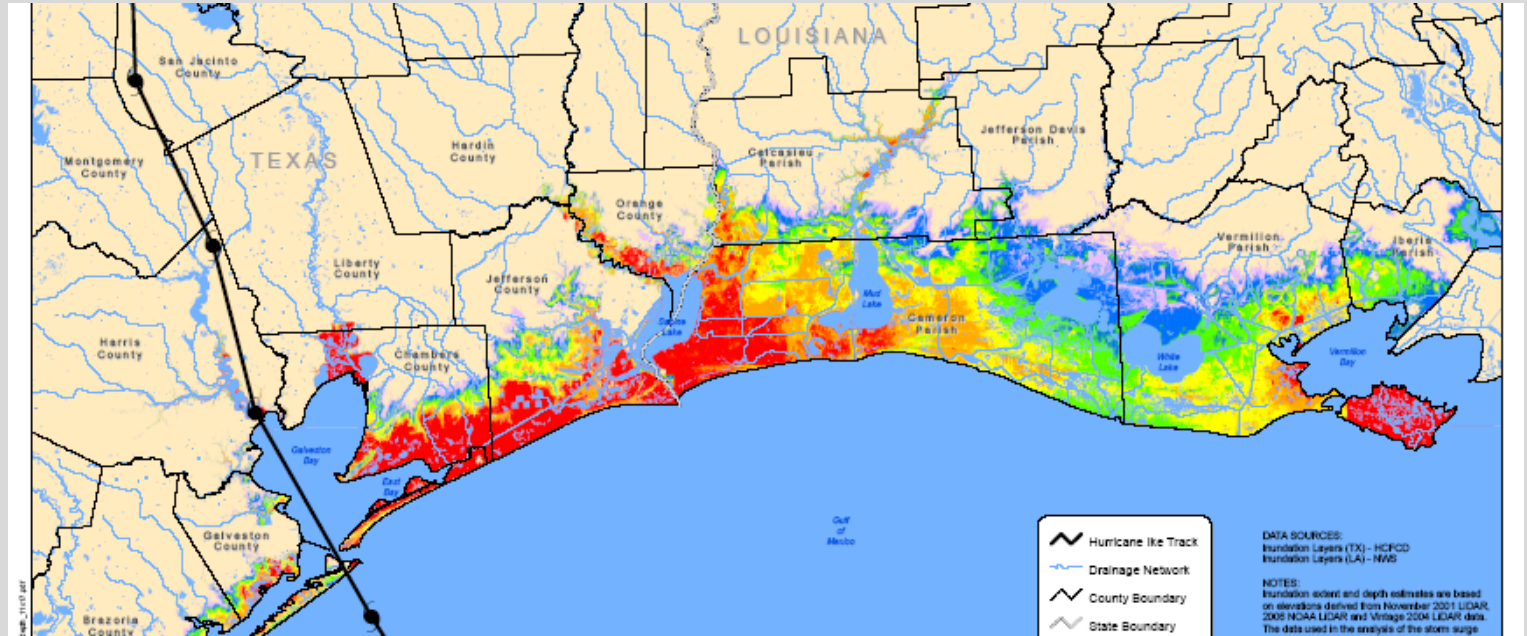
January 22, 2020

Jim Blackburn



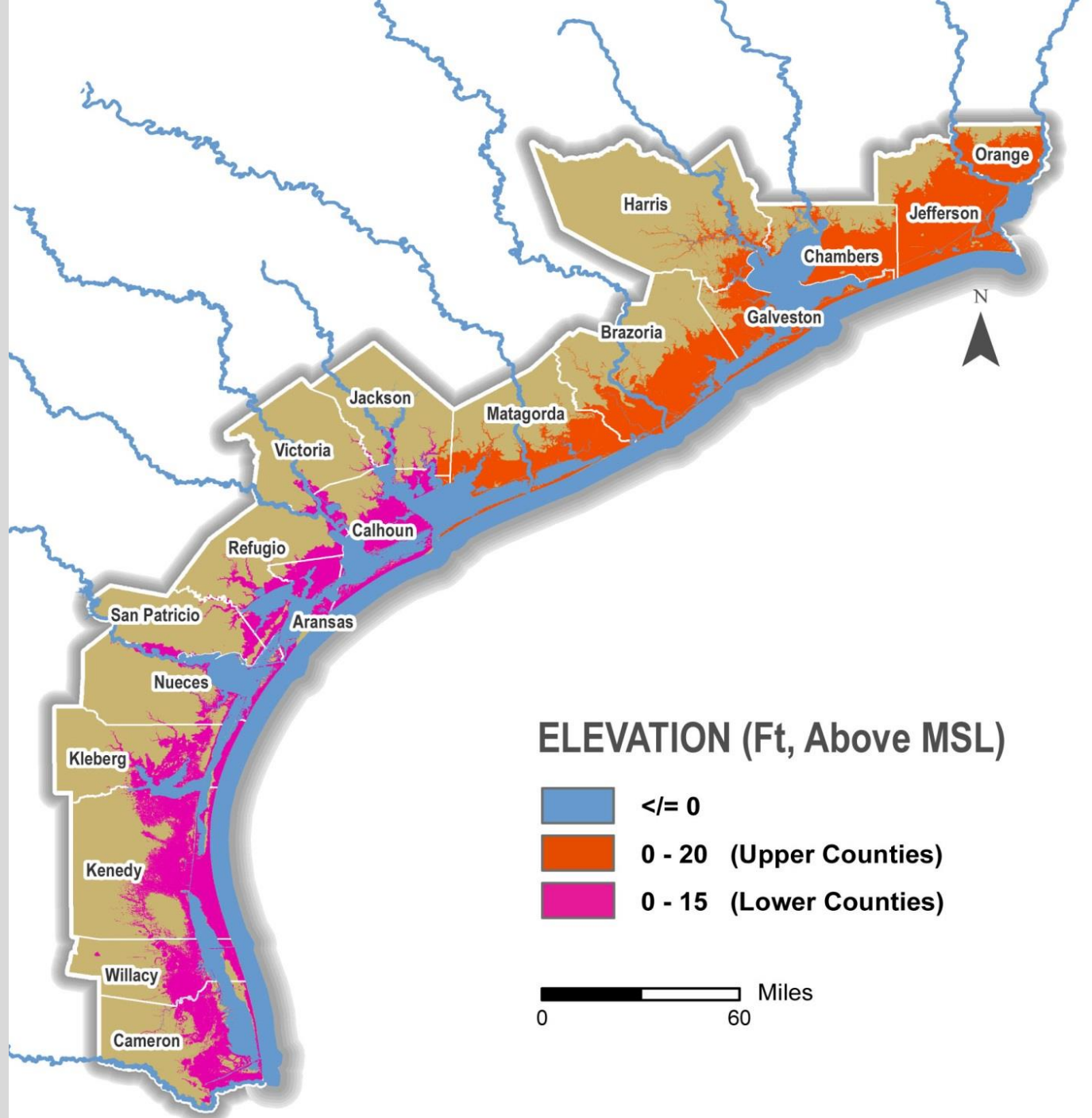


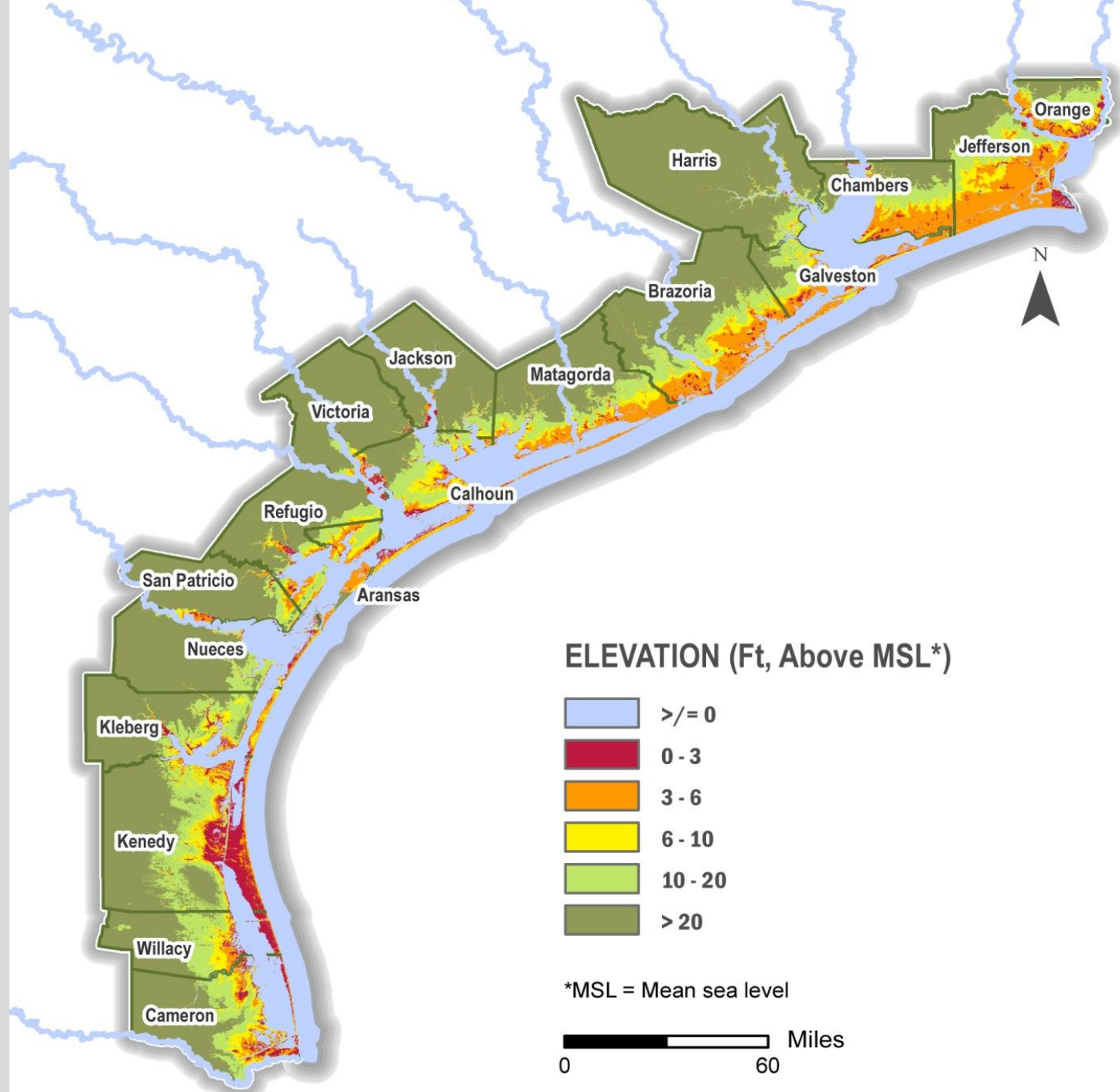
Let's Have A Conversation
About Sea Level Rise,
Hurricanes, Ecology and
Farming and Ranching and
Even Climate Change



POST IKE RESEARCH AT RICE UNIVERSITY'S SSPEED CENTER

**How Do We Protect 6
Million High Risk
Coastal Acres With
Majority in Private
Ownership?**







The value of the world's ecosystem services and natural capital

Robert Costanza^{*,†}, Ralph d'Arge[‡], Rudolf de Groot[§], Stephen Farber^{||}, Monica Grasso[†], Bruce Hannon[†], Karin Limburg[¶], Shahid Naeem^{}, Robert V. O'Neill^{††}, Jose Paruelo^{‡‡}, Robert G. Raskin^{§§}, Paul Sutton^{|||} & Marjan van den Belt^{¶¶}**

^{*} Center for Environmental and Estuarine Studies, Zoology Department, and [†] Institute for Ecological Economics, University of Maryland, Box 38, Solomons, Maryland 20688, USA

[‡] Economics Department (emerita), University of Wyoming, Laramie, Wyoming 82070, USA

[§] Center for Environment and Climate Studies, Wageningen Agricultural University, PO Box 9101, 6700 HB Wageningen, The Netherlands

^{||} Graduate School of Public and International Affairs, University of Pittsburgh, Pittsburgh, Pennsylvania 15260, USA

[¶] Geography Department and NCSA, University of Illinois, Urbana, Illinois 61801, USA

^{¶¶} Institute of Ecosystem Studies, Millbrook, New York, USA

^{**} Department of Ecology, Evolution and Behavior, University of Minnesota, St Paul, Minnesota 55108, USA

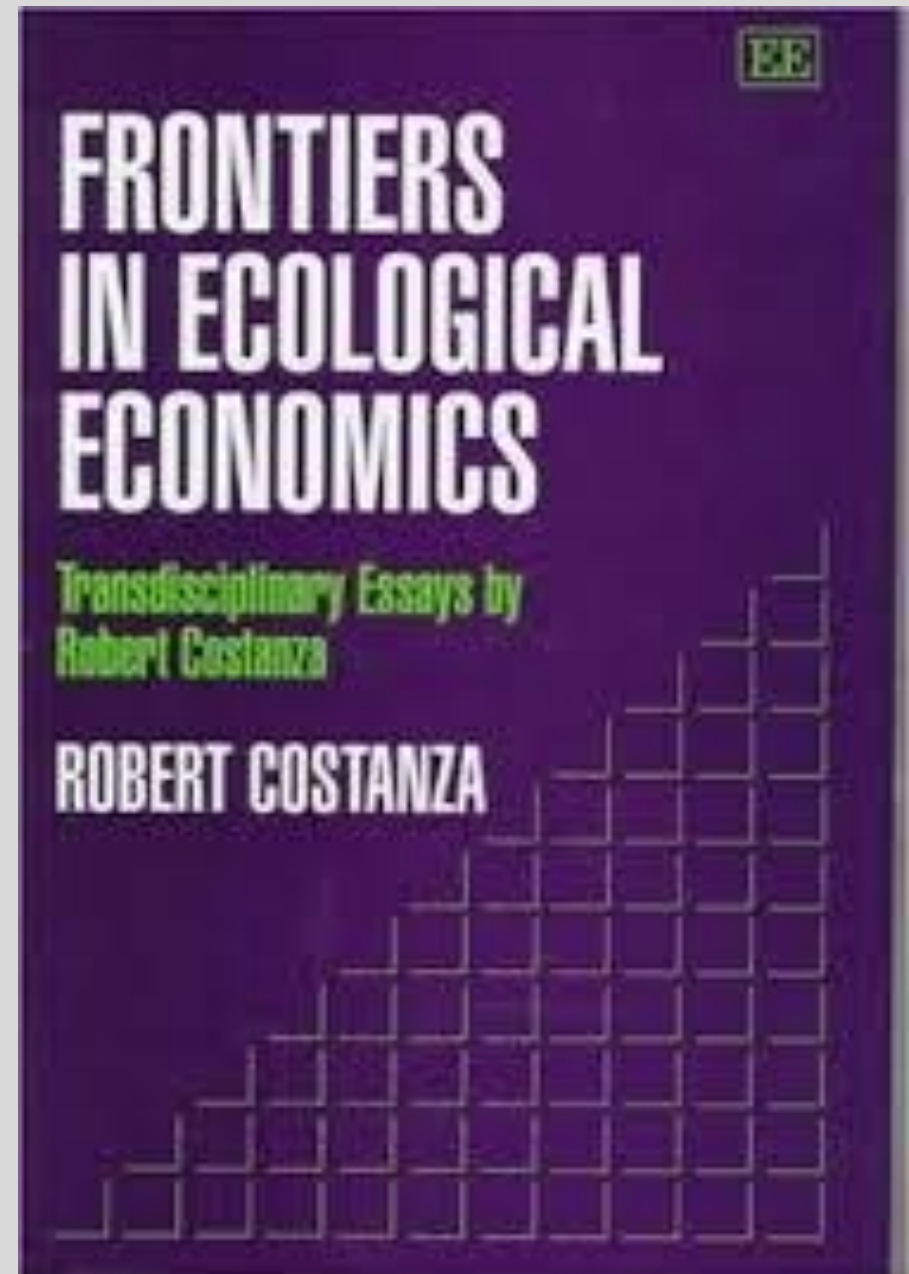
^{††} Environmental Sciences Division, Oak Ridge National Laboratory, Oak Ridge, Tennessee 37831, USA

^{‡‡} Department of Ecology, Faculty of Agronomy, University of Buenos Aires, Av. San Martin 4453, 1417 Buenos Aires, Argentina

^{§§} Jet Propulsion Laboratory, Pasadena, California 91109, USA

^{|||} National Center for Geographic Information and Analysis, Department of Geography, University of California at Santa Barbara, Santa Barbara, California 93106, USA

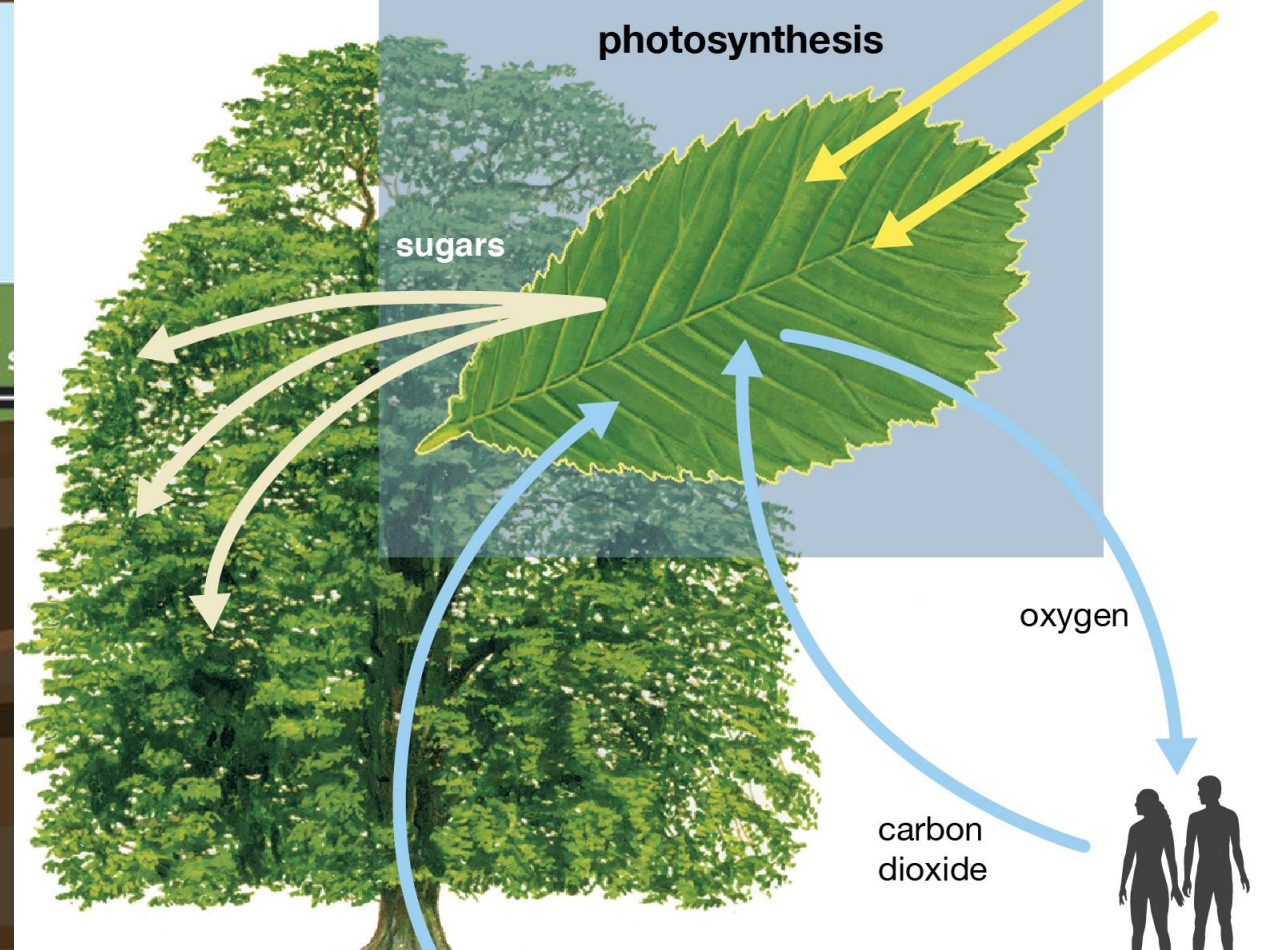
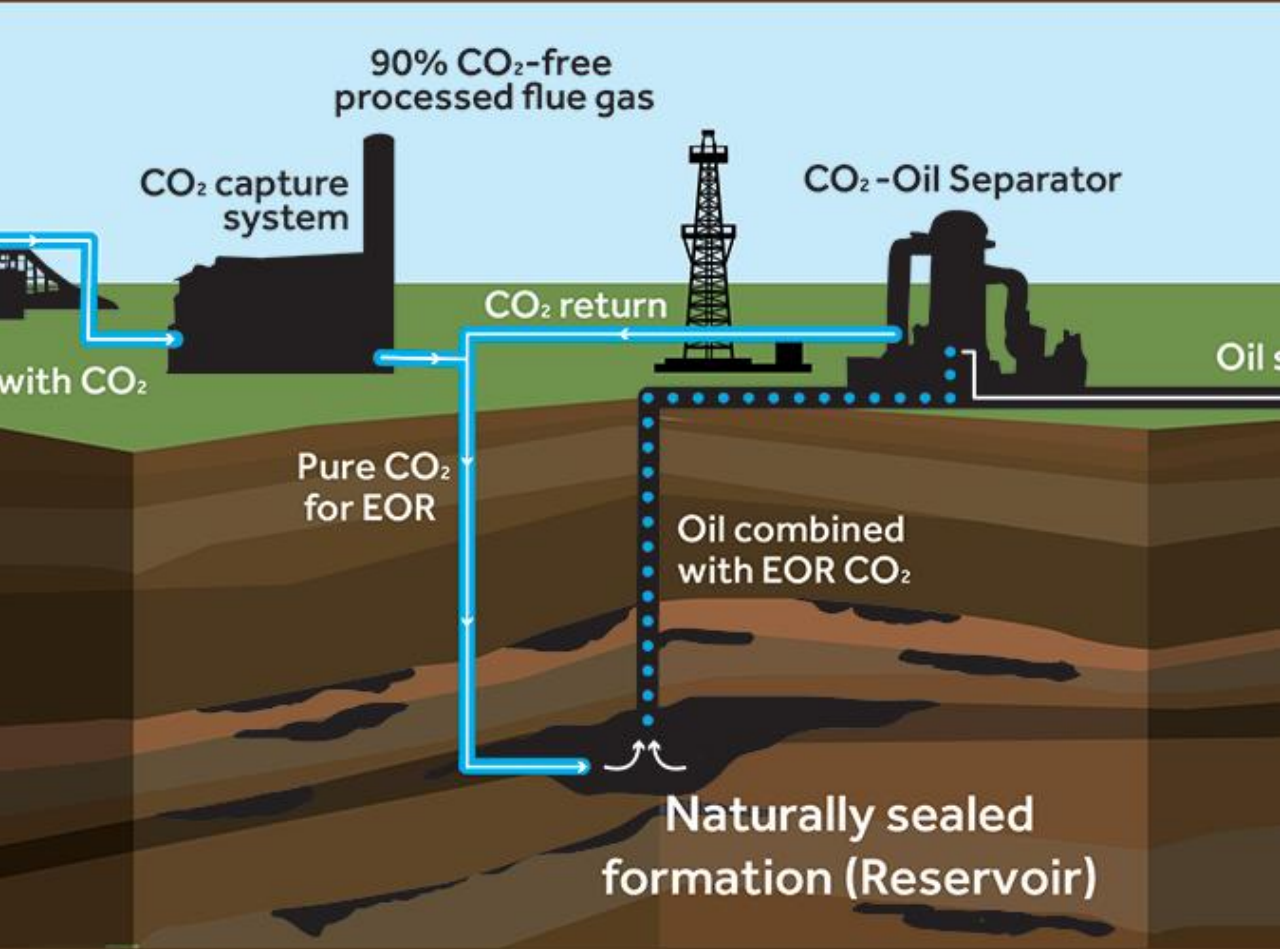
^{¶¶} Ecological Economics Research and Applications Inc., PO Box 1589, Solomons, Maryland 20688, USA





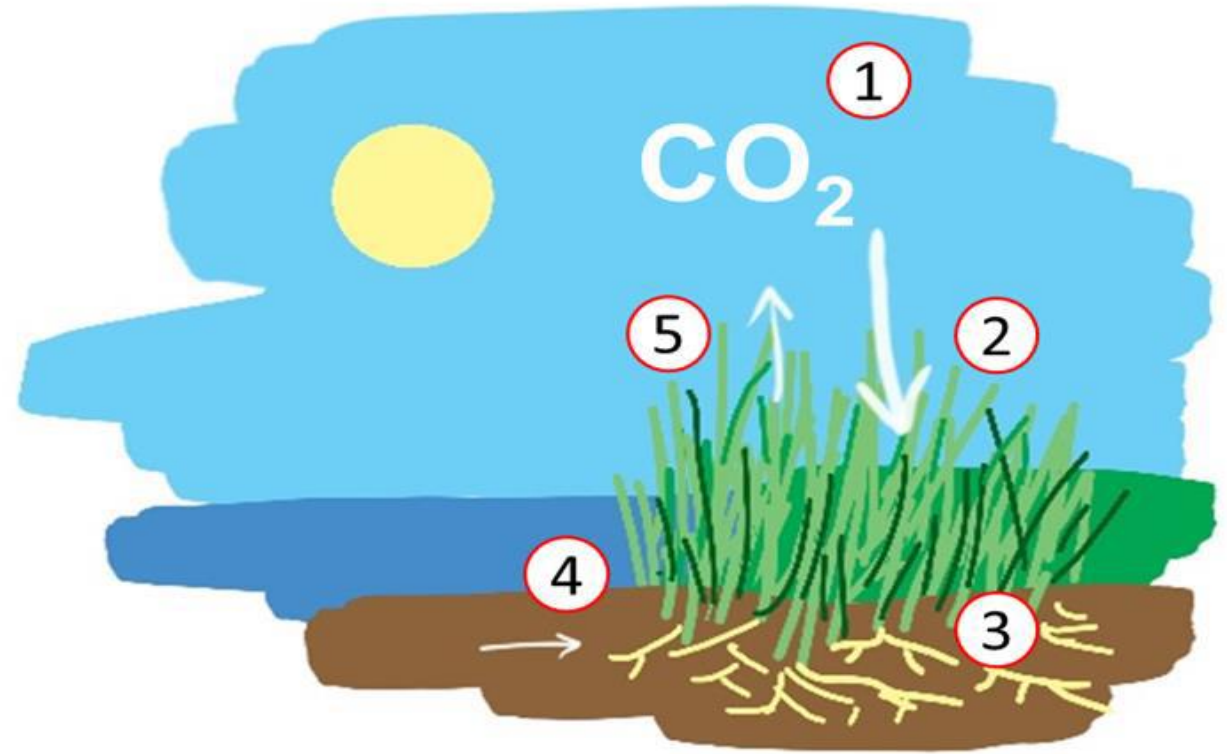
Ecosystem benefits provided by natural coastal lands

- Storm surge protection
- Flood storage
- **Carbon sequestration**
- Water supply enhancement
- Fishery productivity
- Endangered species habitat
- Neo-tropical migrant bird habitat
- Waterfowl habitat



TWO CONCEPTS OF CARBON CAPTURE AND STORAGE

Carbon Dioxide Removal and the Coastal Marsh



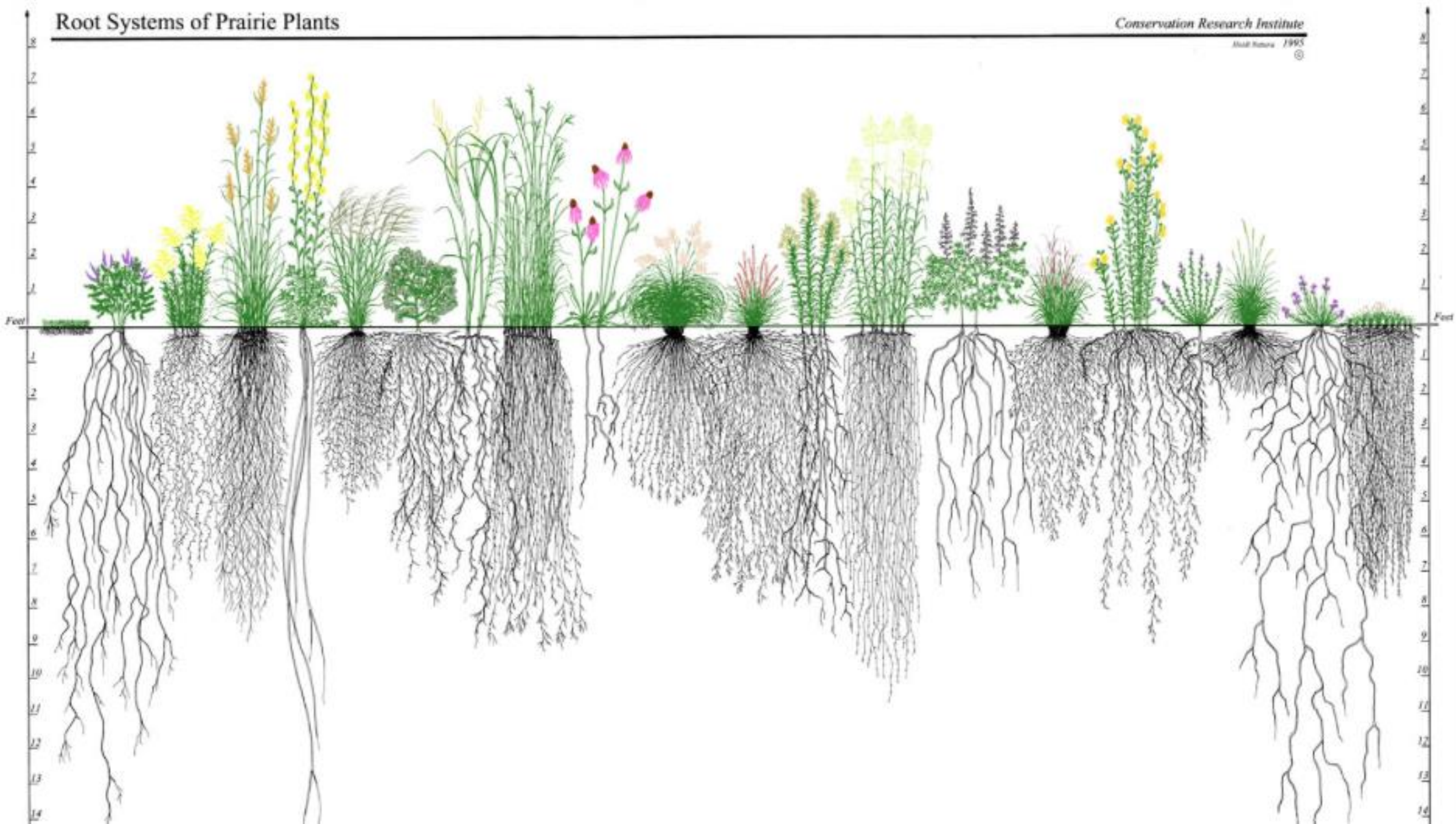
1. CO₂ In Atmosphere
2. Photosynthesis in Marsh Plant
3. Carbohydrate deposited in plant and roots
4. Carbohydrate becomes carbon in soil
5. Some CO₂ back to the atmosphere

Root Systems of Prairie Plants

Conservation Research Institute

April Number 1995

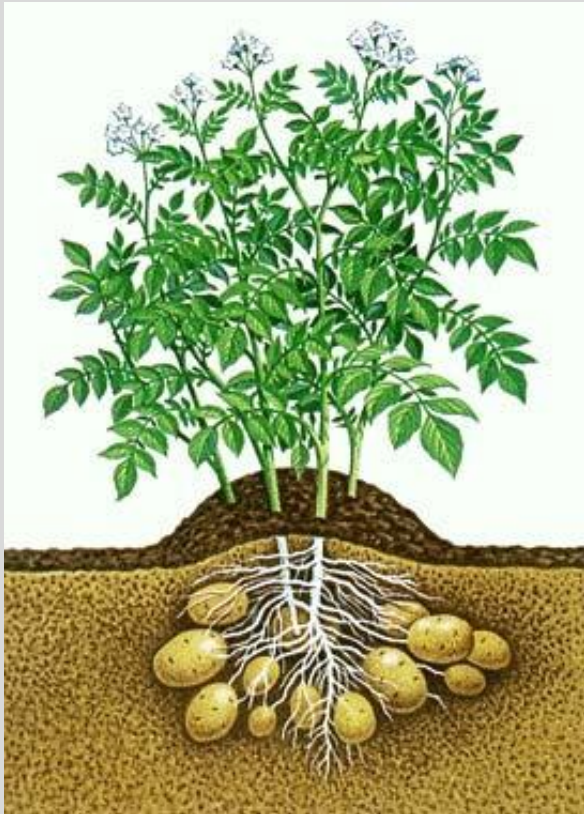
⑤



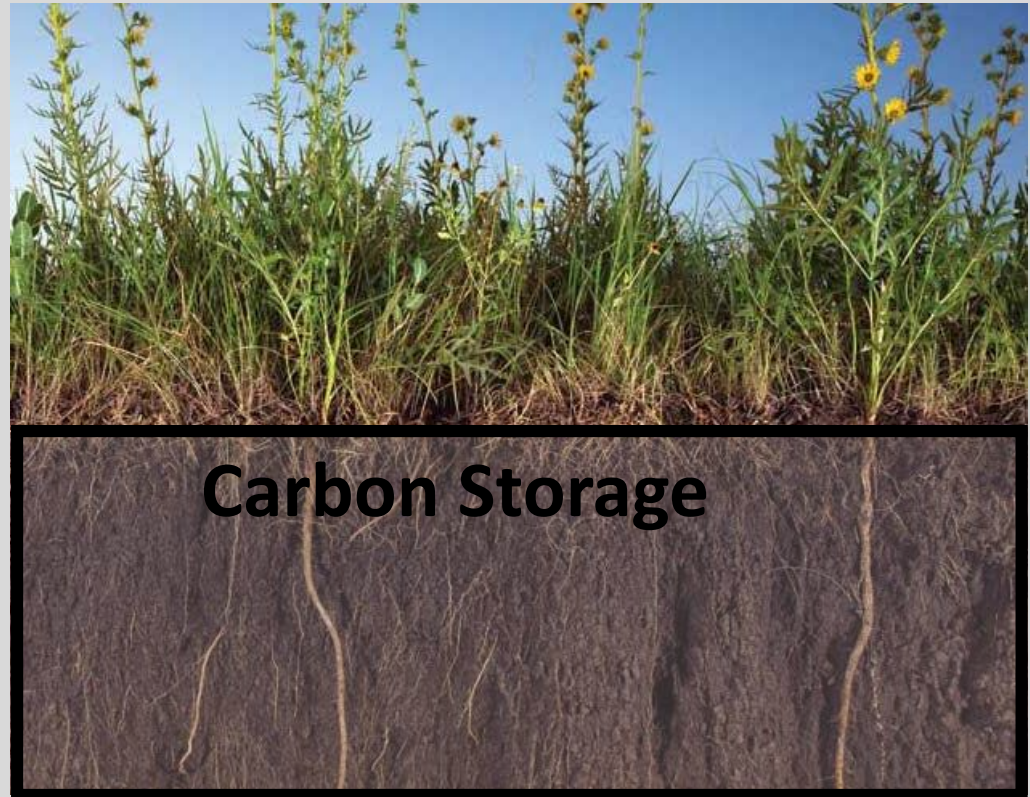
Basic Concept

If You Grow It You Can Sell It

Growing Potatoes



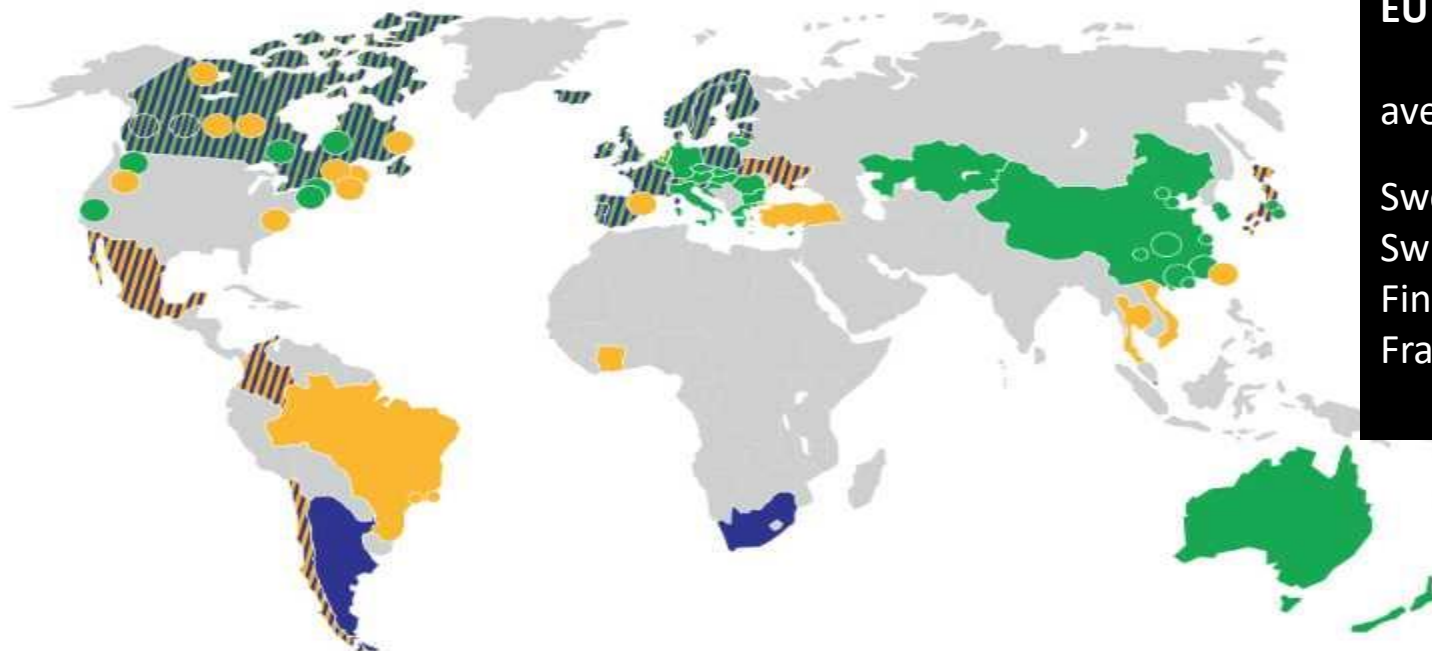
Creating Carbon Storage



CARBON PRICING DASHBOARD

<https://carbonpricingdashboard.worldbank.org/>

California
\$15/ tCO₂
British Columbia
\$ 35/ tCO₂



EU CO2 prices are increasing

average is above \$ 22 / tCO₂

Sweden: \$ 135 / tCO₂

Switzerland: \$ 100 / tCO₂

Finland: \$ 75 / tCO₂

France: \$ 50 / tCO₂

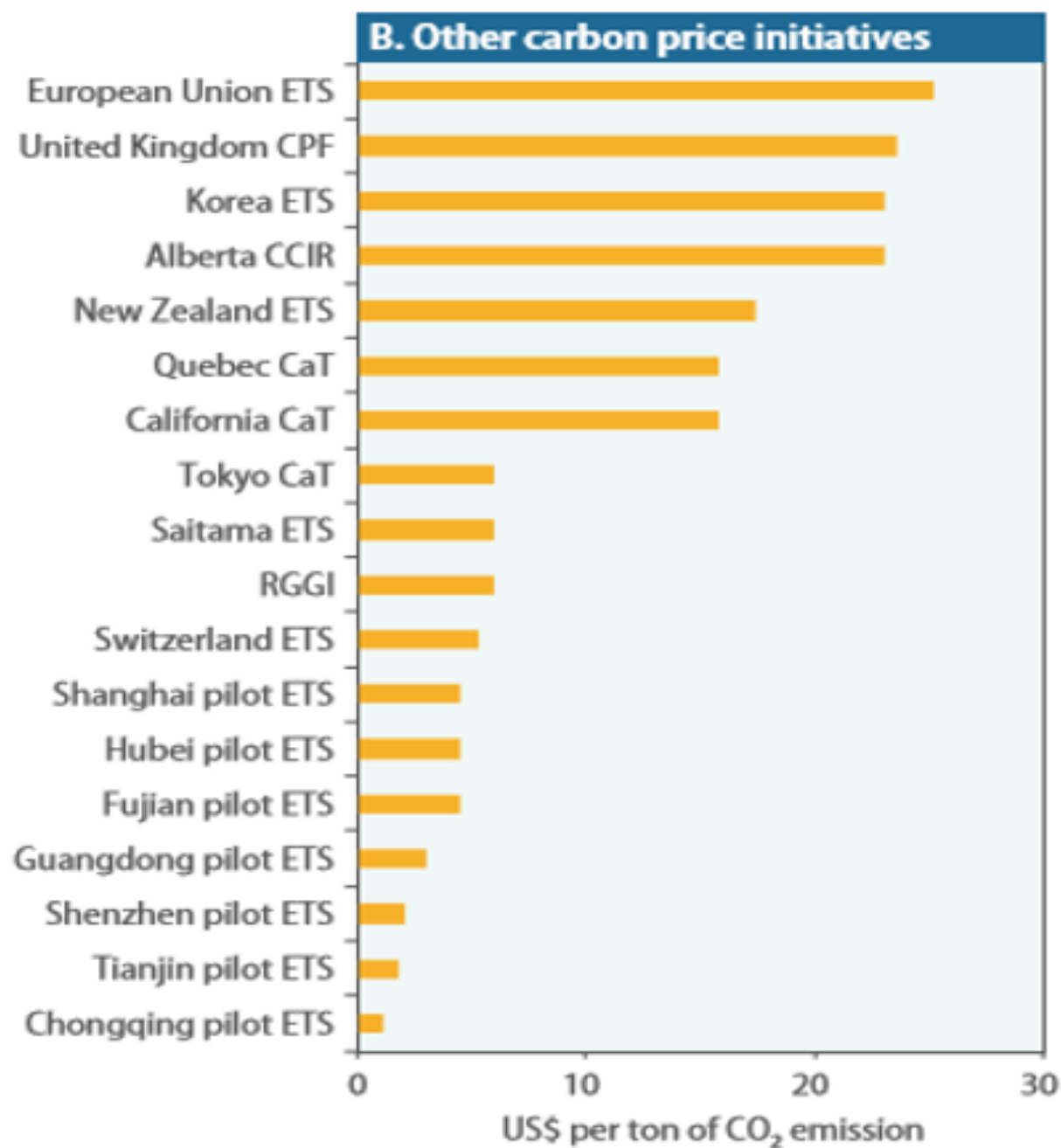
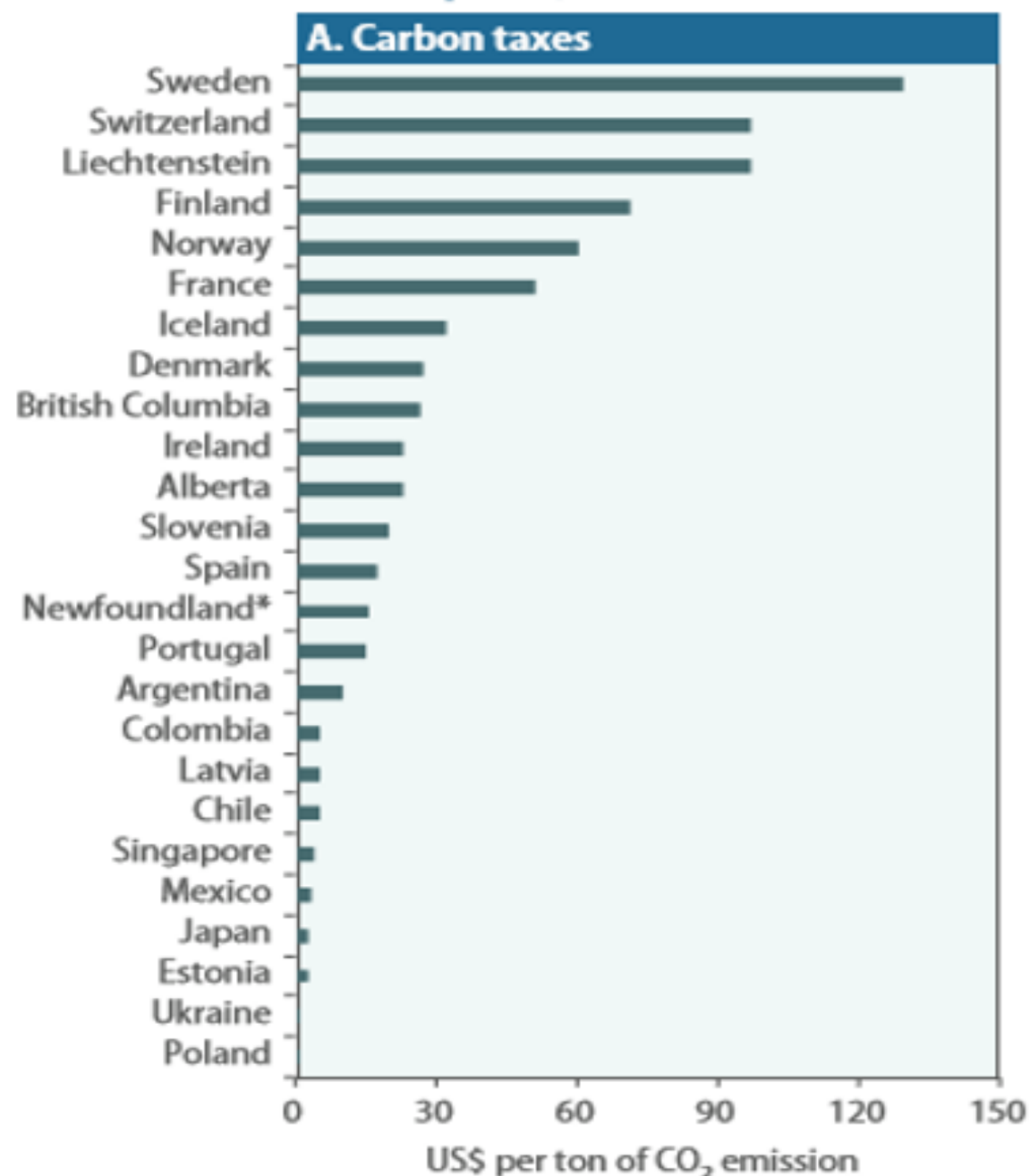
- ETS implemented or scheduled for implementation
- Carbon tax implemented or scheduled for implementation
- ETS or carbon tax under consideration
- ETS and carbon tax implemented or scheduled
- Carbon tax implemented or scheduled, ETS under consideration
- ETS implemented or scheduled, carbon tax under consideration



The Carbon Pricing Dashboard builds on the data and analyses of the annual State and Trends of Carbon Pricing report. Check it out!

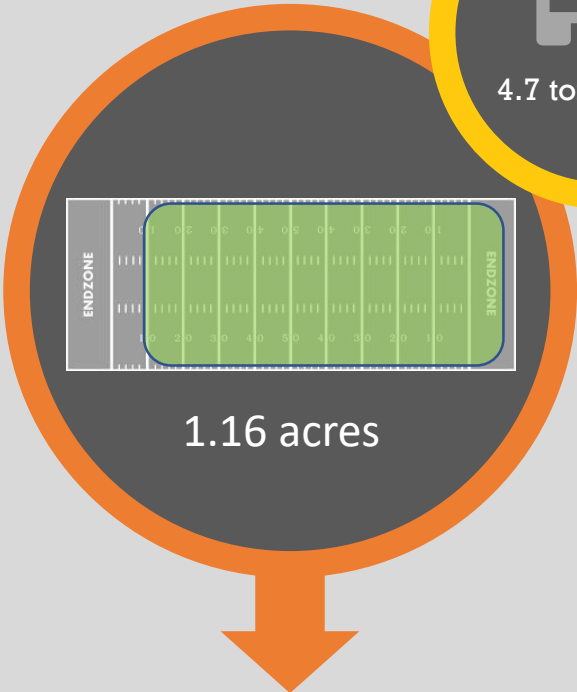
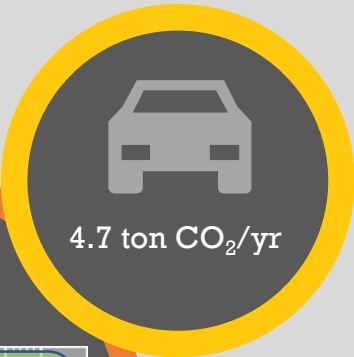


Carbon prices, 2019



Marketing opportunities – CO₂ neutral driving

1 Car's Emission
527 Gal Gasoline/yr



**88%
of a Football Field**

\$ 20/tCO₂ ~\$ 0.20 / Gal → \$ 100 /yr

Market CO₂
neutral gasoline
Restoring land &
support our
ranchers



Increase market share
or sell premium product

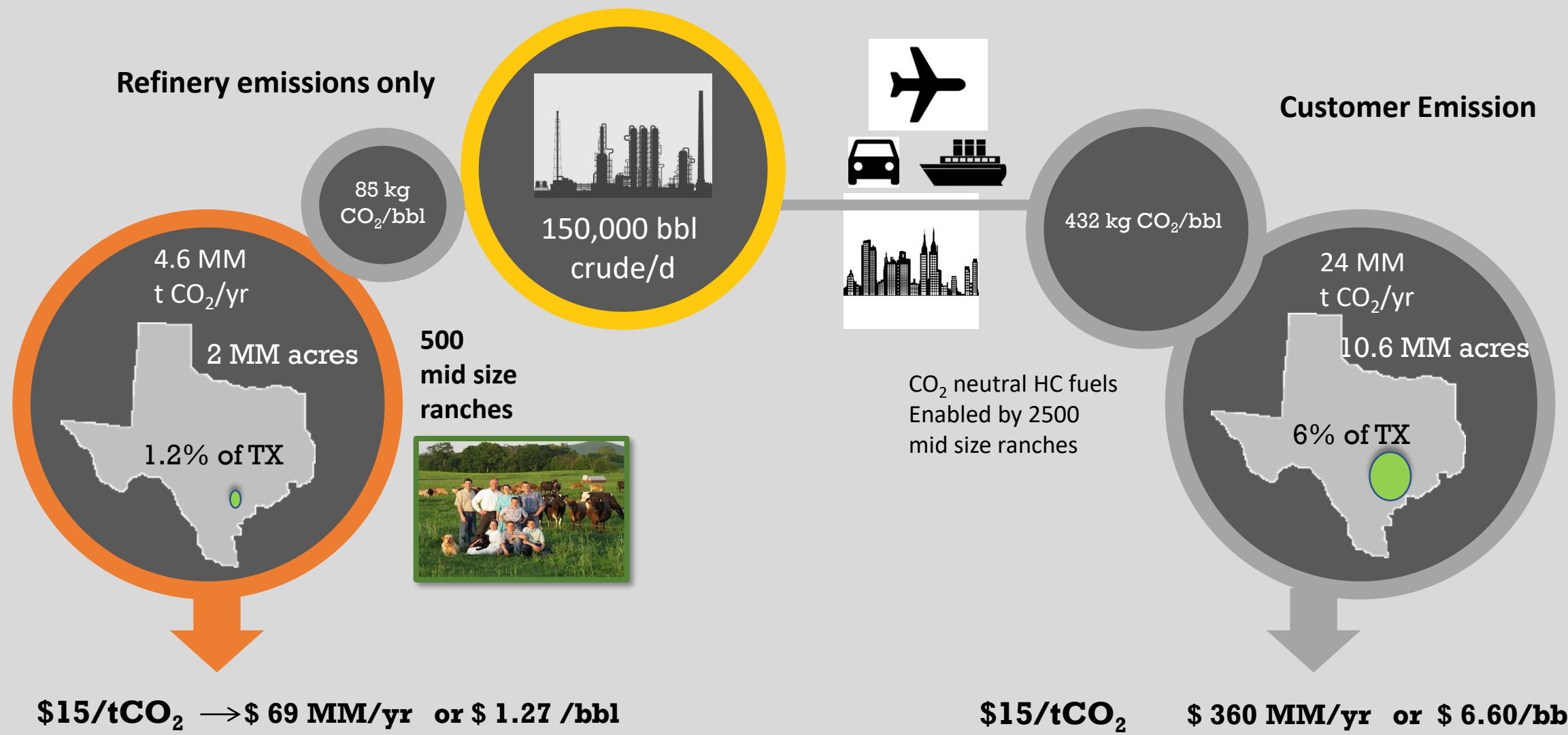
Market CO₂
neutral cars
Restoring land &
support our
ranchers



10 yr CO₂
emissions
stored at car
purchase

Increase market share
or sell premium product

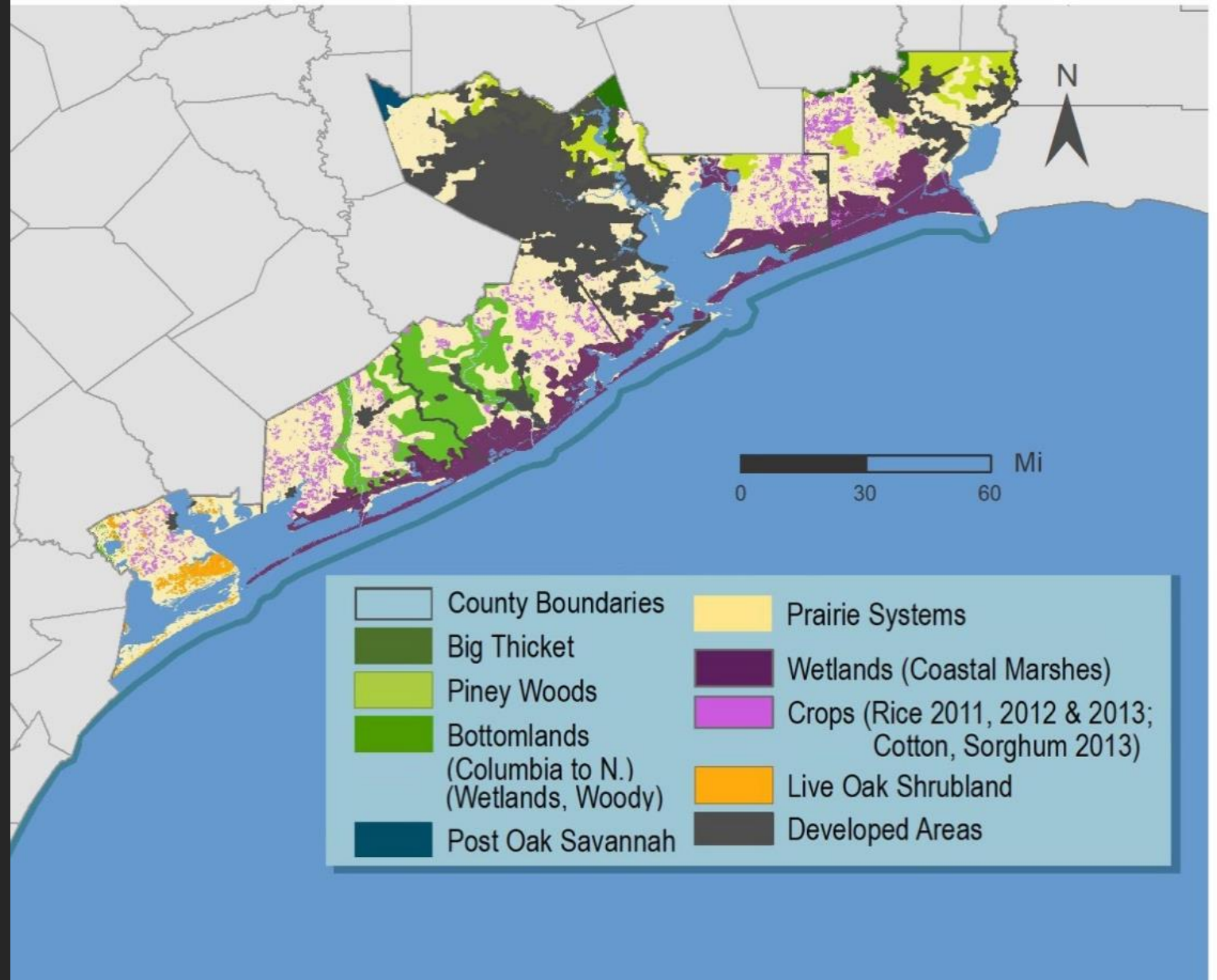
Value opportunities – CO₂ neutral oil refining



Texas Coastal Exchange (TCX)



ECOLOGICAL COVERAGE OF THE TEXAS COASTAL EXCHANGE



Major Beneficiary – The American Rancher and Farmer

CDC: Farmers are committing suicide at 5 times the rate of the rest of the population

The Guardian, Dec 6, 2017

Why are America's farmers killing themselves in record numbers?

The suicide rate for farmers is more than double that of veterans



Healthy Land Management Practices Support Multiple Goals



Water
resilience



Carbon
resilience



Ecological
resilience

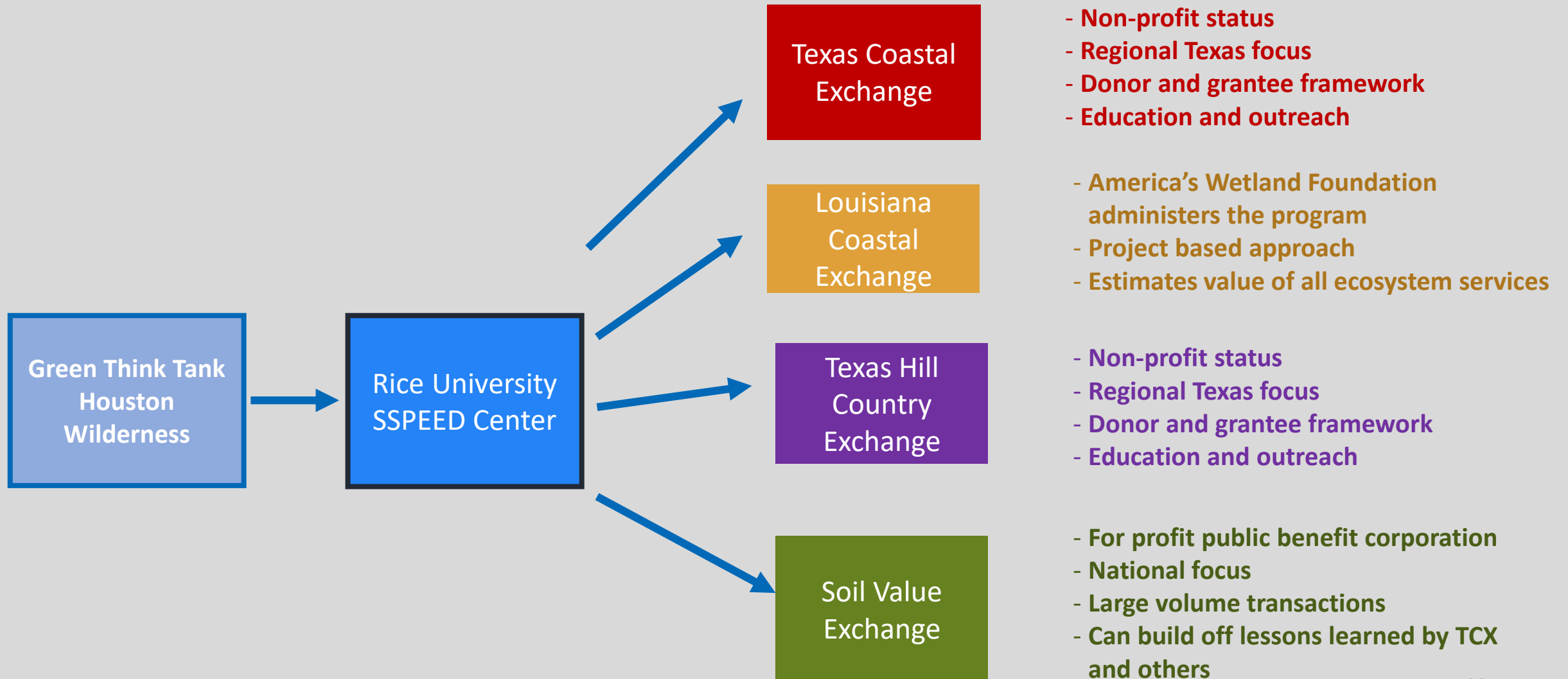


Economic
resilience



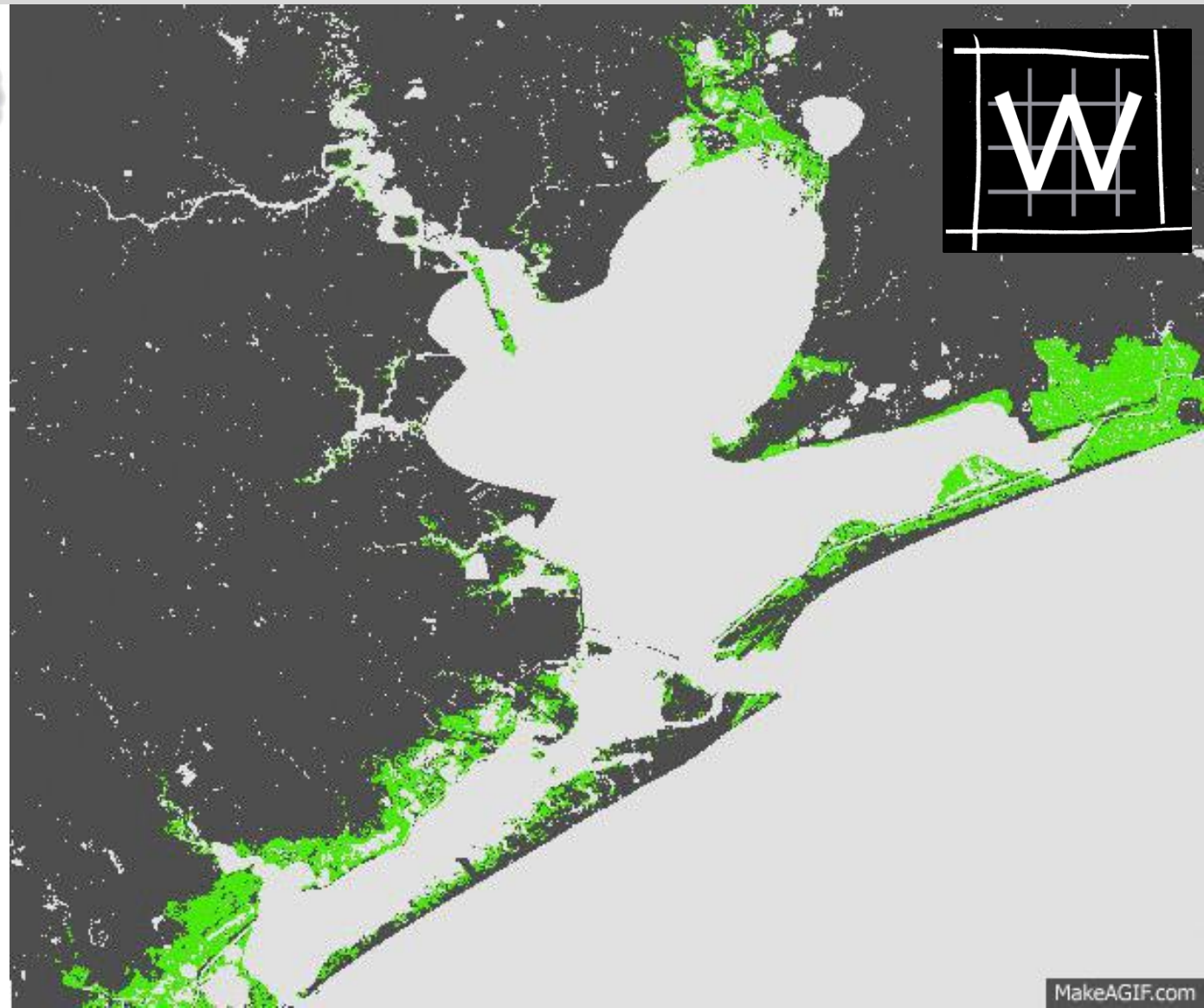
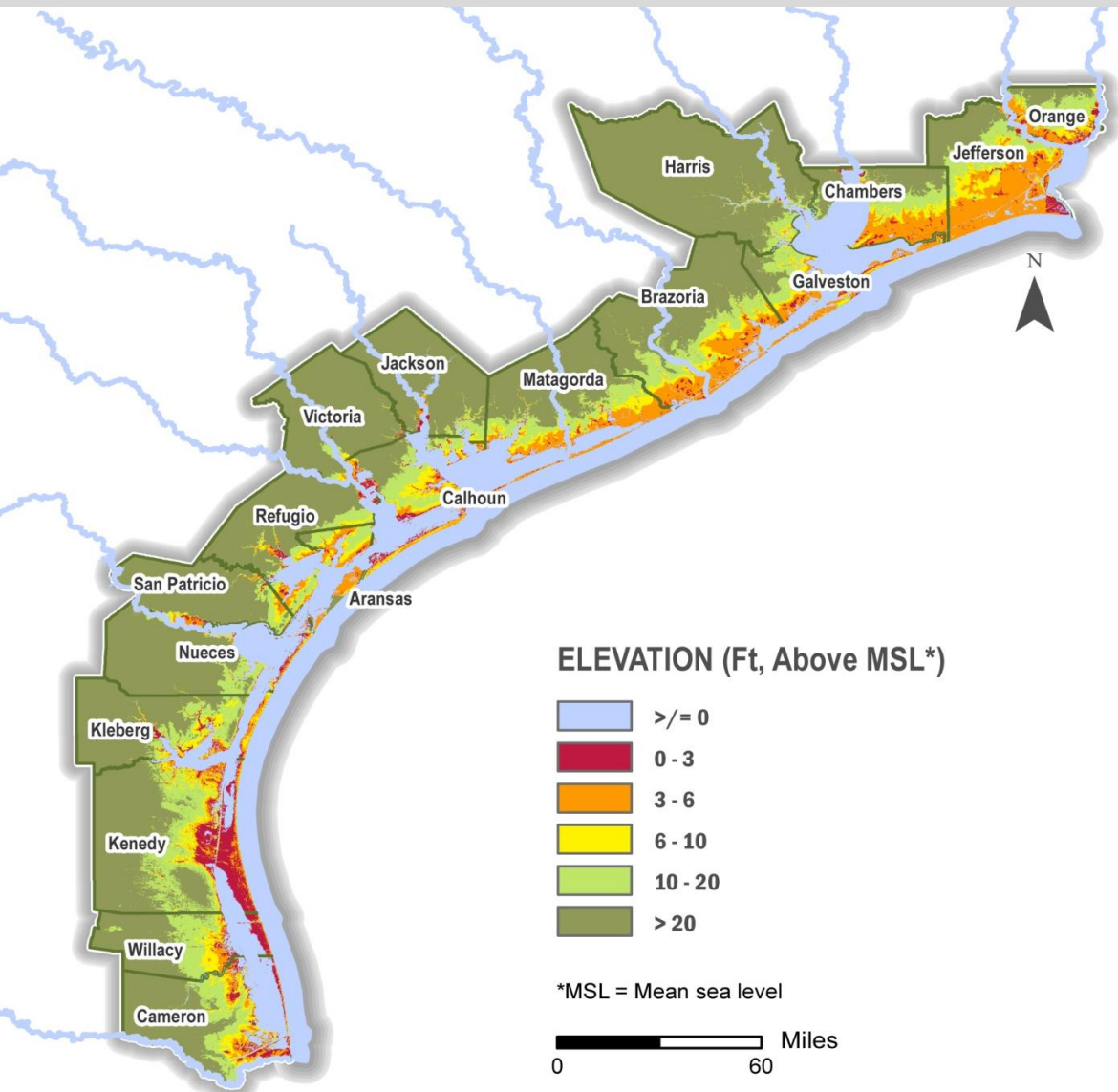
**It is all
about
the soil**

Rice-Derived Carbon Exchanges



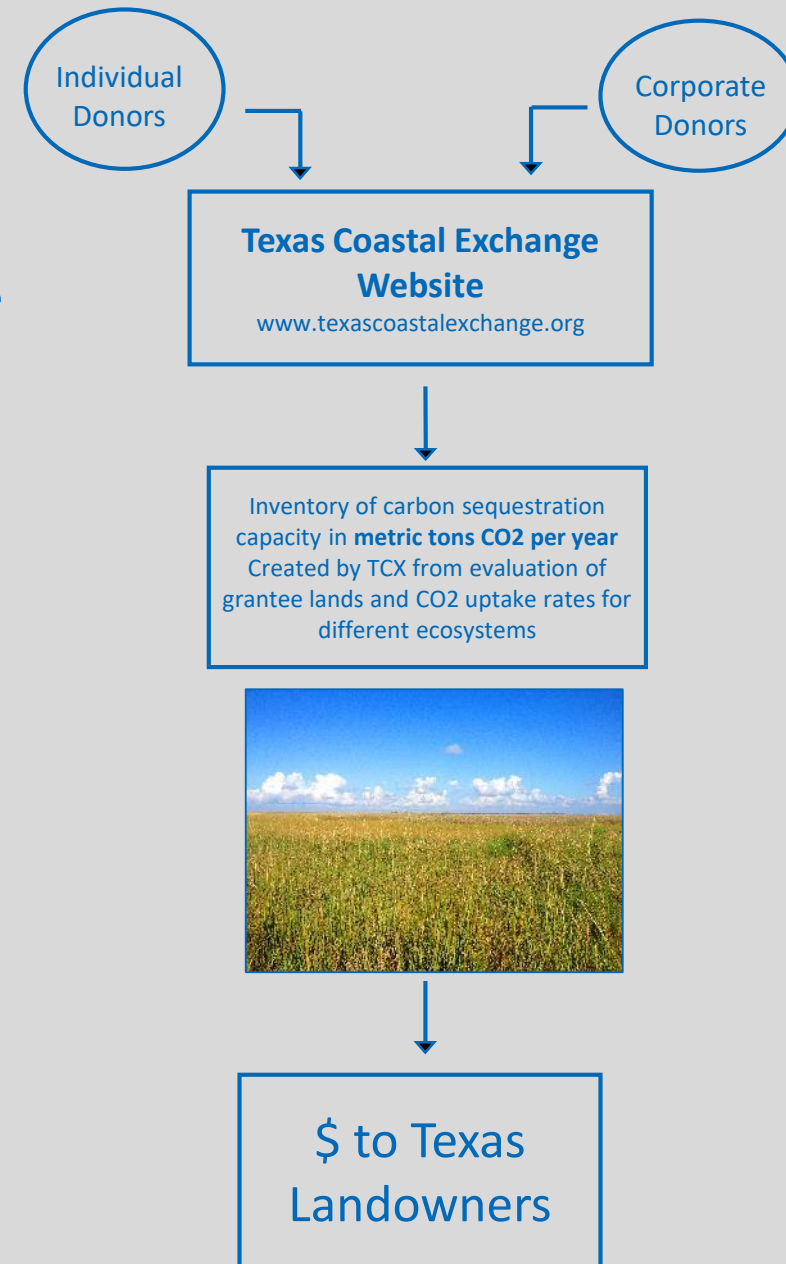


Sea Level Rise and the Needed Marsh Response



How does it work?

- Establish Inventory
 - We evaluate the C sequestration capacity of the grantees land
 - Wetland type
 - Hydroperiod
 - Soil characteristics
- Currently limited to coastal wetlands – Expanding Into Coastal Prairie and Bottomlands
- Donors contact us
 - Web app functional
 - Funds distributed equally to the grantees in the inventory
 - Corporations know about us
 - Calculate carbon footprint
- We arrange for distribution of fund to the landowners as grants



Pierce Marsh



**Establishing
Carbon
Inventory**

**Pierce Marsh
Owned By
Galveston Bay
Foundation**

2,242 acres

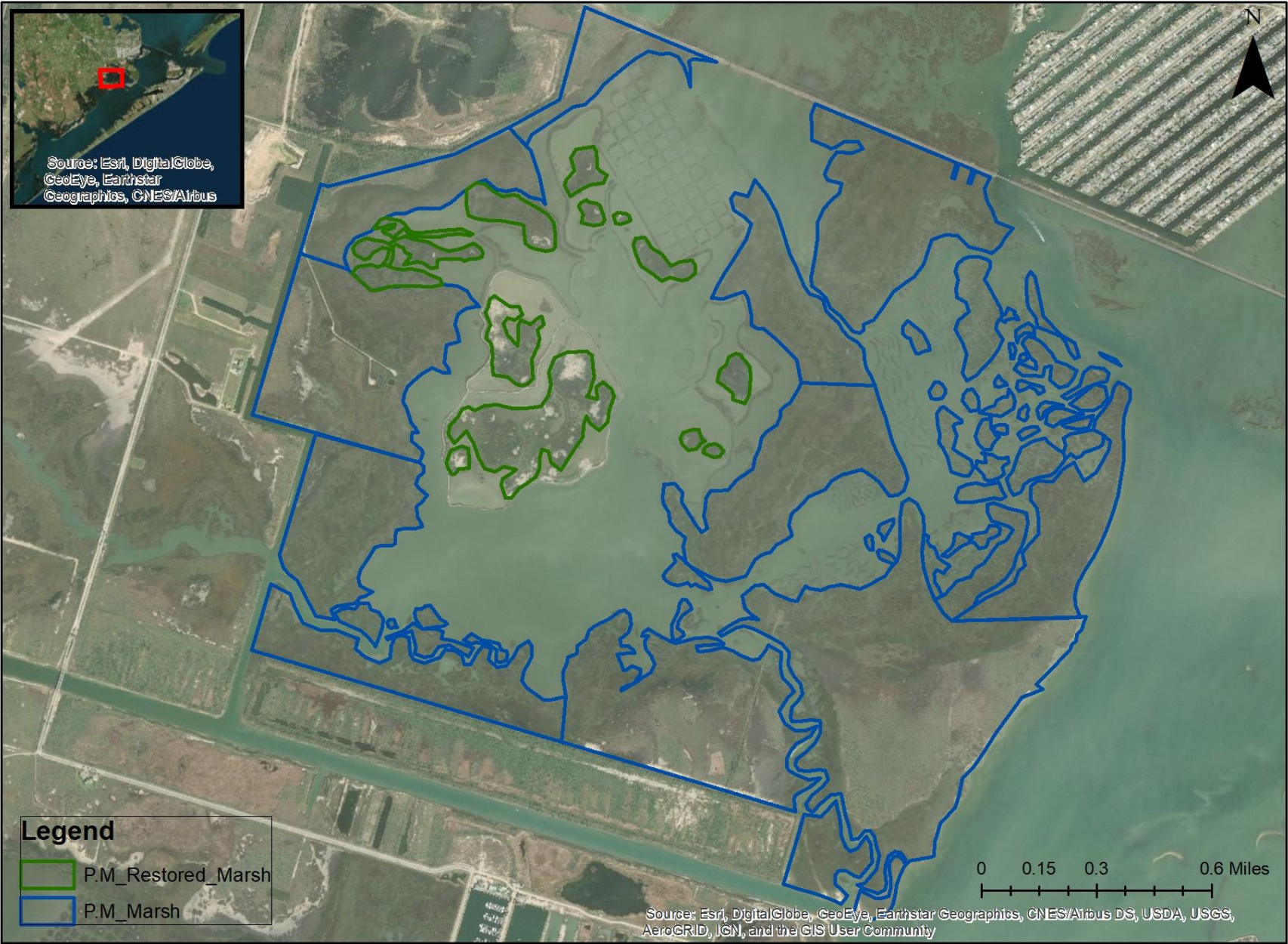
Pierce Marsh Land



**Saleable
Carbon Dioxide
Storage**

**Spartina
alterniflora
Marshland**

1,249 acres



Saleable Carbon
Dioxide Storage

Spartina
alterniflora
Marshland

Marsh - 1142
acres

Restored
Marsh - 111
acres

TCX Website

<https://www.texascoastalexchange.org/>



Inventory



Current CO₂ storage capacity:

13,121 metric tons of CO₂

Total land area available for carbon storage:

6,560.5 acres

Click the button below to support natural ecosystems on the Texas coast.

DONATE

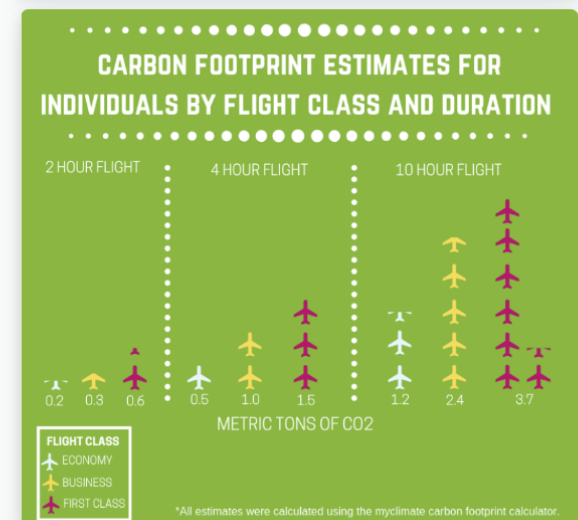
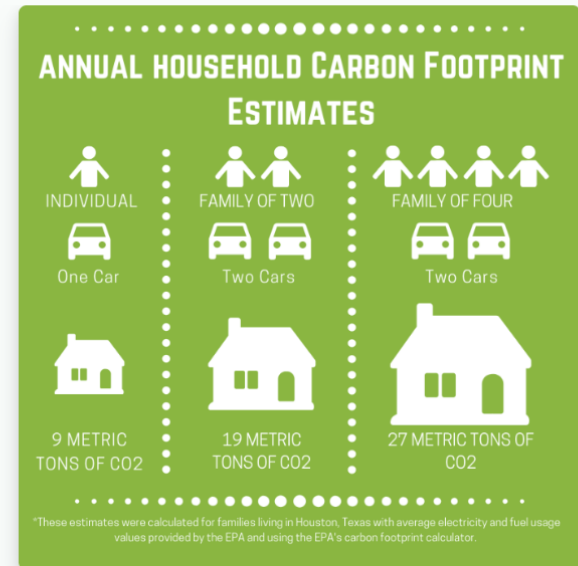
Footprint Calculation and Donation Page

What amount of CO2 storage in natural ecosystems would you like to support for the current year?

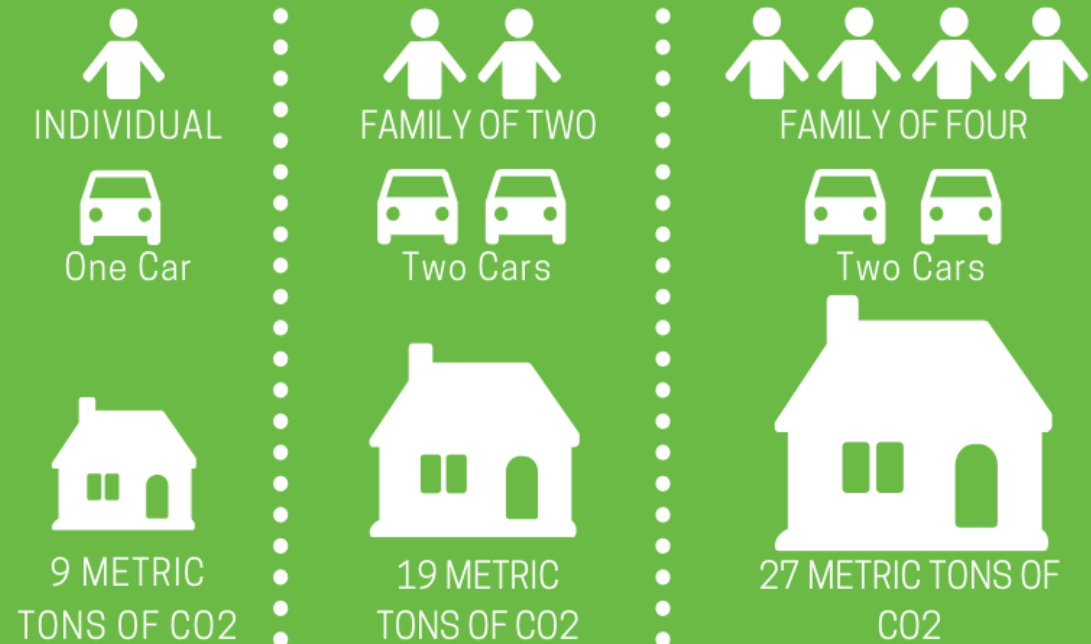
I'd like to support 0 metric tons of CO2 storage.

Your gift of **\$0.00** will support the equivalent of **0** metric tons of CO2 storage. If you still need to calculate your carbon footprint you can find our recommended calculators [here](#).

Next

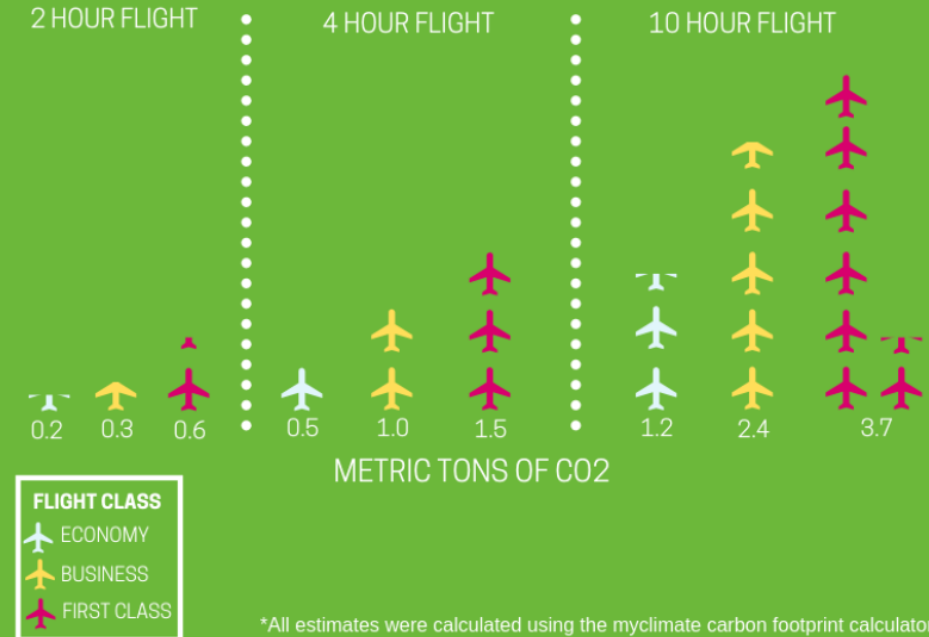


AVERAGE ANNUAL HOUSEHOLD CARBON FOOTPRINTS FOR HOUSTON FAMILIES



*These estimates were calculated for families living in Houston, Texas with average electricity and fuel usage values provided by the EPA and using the EPA's carbon footprint calculator.

CARBON FOOTPRINT ESTIMATES FOR INDIVIDUALS BY FLIGHT CLASS AND DURATION



*All estimates were calculated using the myclimate carbon footprint calculator.

Carbon Footprint Information on the TCX Website

<https://www.texascoastalexchange.org/>

Current Buyers

- Kirksey Architects
 - 772 Metric Tons
 - \$13,896 To TCX @ \$18/ton
- 5 year commitment
\$15 to GBF
\$3 to TCX



60 Individuals



Coming Next To Texas Coastal Exchange



