Introduction to Blue Carbon: Science, Offsets and Opportunity

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www.estuaries.org

Who we are

RESTORE AMERICA'S ESTUARIES

Restore America's Estuaries is dedicated to the protection and restoration of bays and estuaries as essential resources for our nation.

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Tidal Wetland Ecosystem Services

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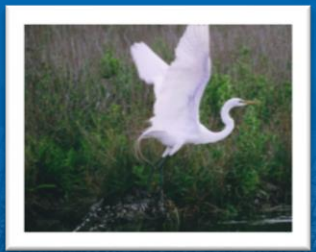
- ✓ Increased resilience
- ✓ Key marine habitat
- ✓ Improved water quality
- ✓ Shoreline protection
- ✓ **Climate Mitigation**



What Is Blue Carbon?

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"Blue Carbon"

The greenhouse gases (GHGs) stored in, sequestered by, and released from coastal marine ecosystems such as seagrasses, mangroves, salt marsh and other tidal wetlands.

<u>Goal:</u>

Enhance management of, and Increase public and private investment in coastal habitat restoration and conservation

RAE Blue Carbon Strategy

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Introduction into Carbon Markets

- VCS Requirements
- Restoration Methodology
- *Conservation Methodology*
- *Demonstration projects*

Support Science

- Snohomish Estuary Assessment
- Tampa Assessment

Explore Policy and Regulatory Options

- e.g. 'Carbon reserves'

Coordinate Blue Carbon Initiatives

- e.g. National/Regional Working Groups

Raise Awareness and Build Capacity

Relevant Greenhouse Gases (GHGs)

CO_2

Sequestered by plants and stored in plant material and soil

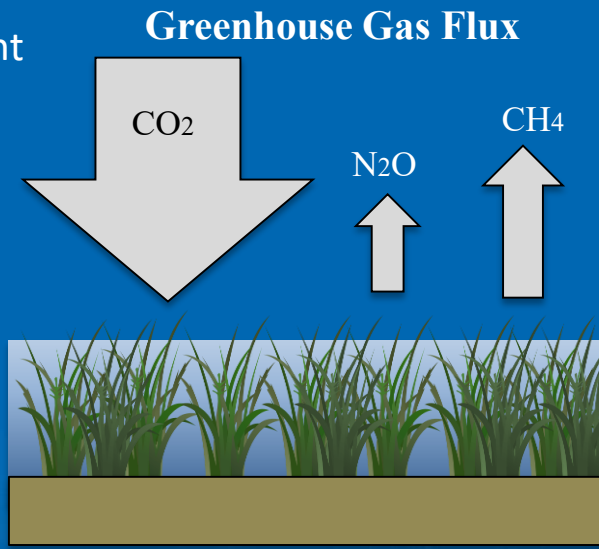
N_2O

Production is anthropogenic in wetlands and estuaries, x300

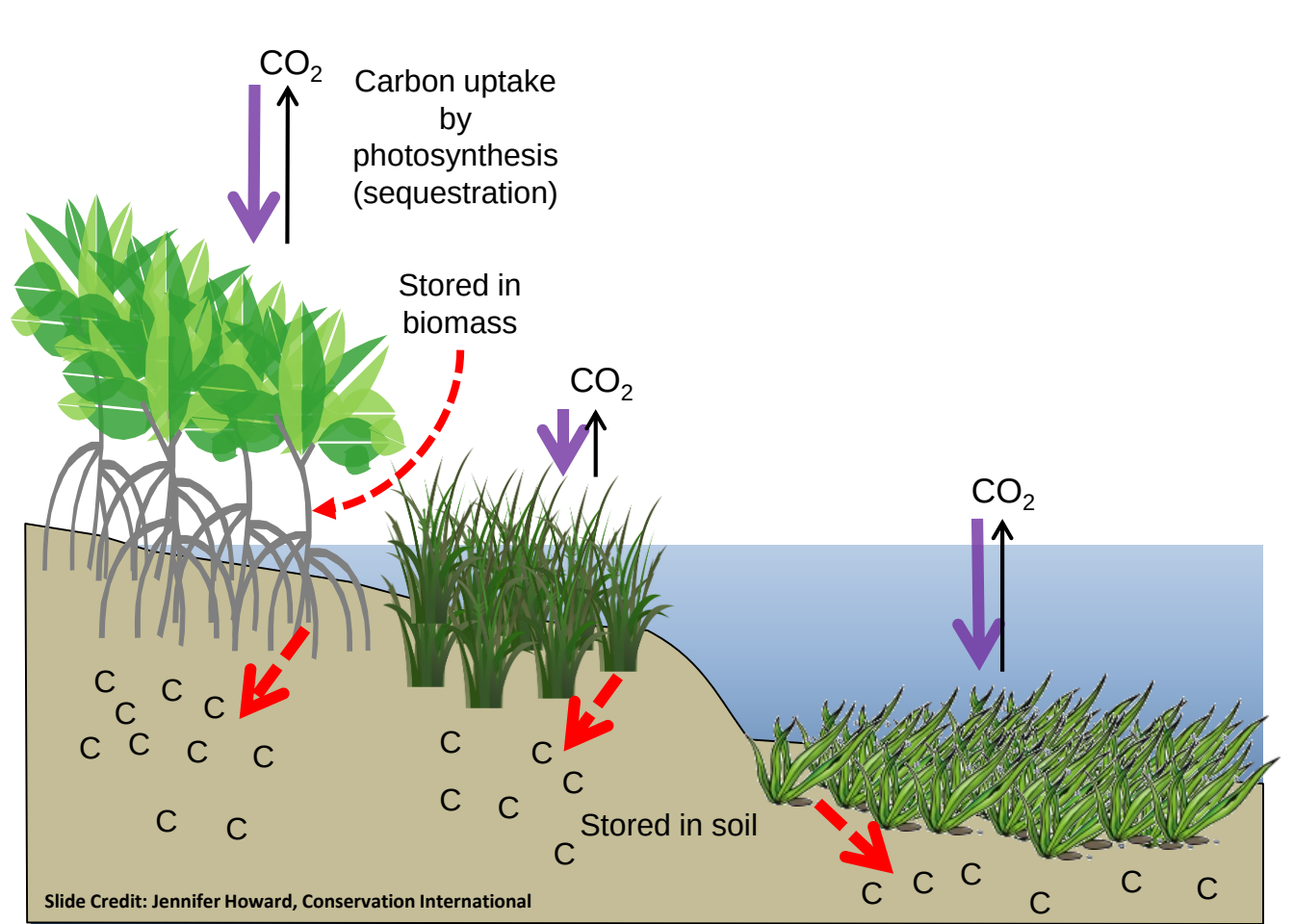
CH_4

Highly variable at <18 ppt salinity

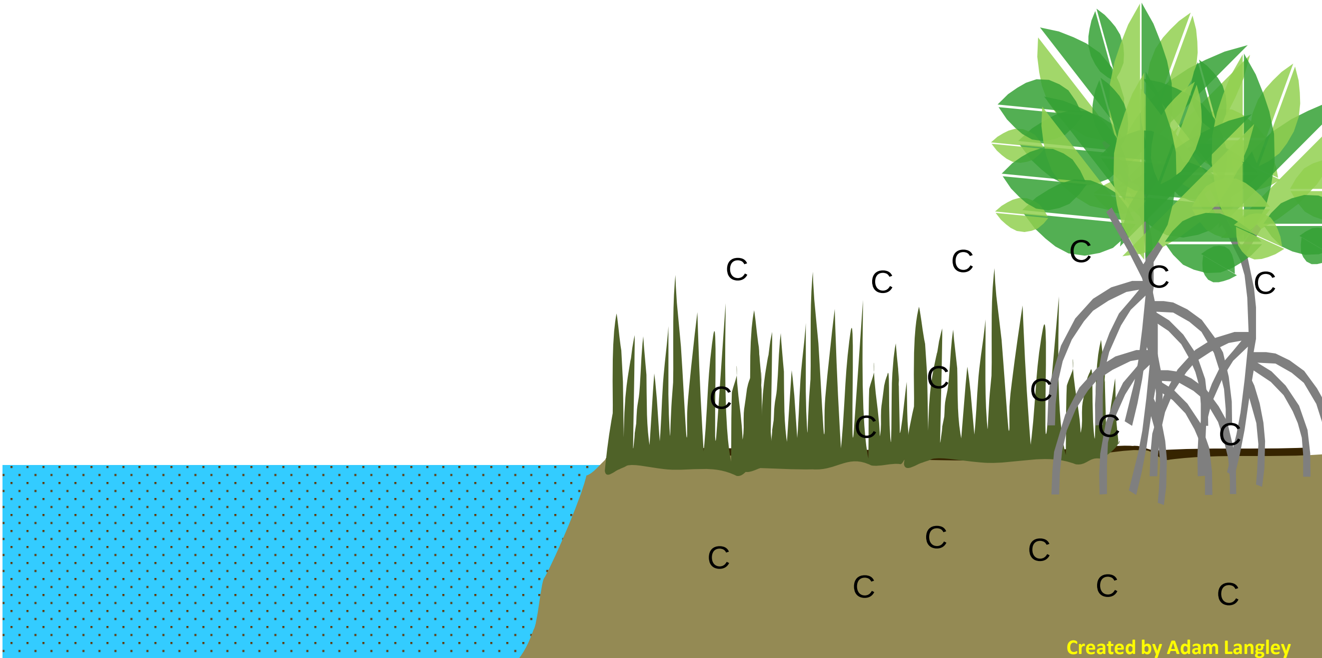
*Insignificant above 18-20 ppt, x 21 - 34



*Poffenbarger et al. (2011) *Wetlands;* Holm et al. (2016) *Wetlands*


CO_2
Carbon uptake by photosynthesis (sequestration)
Stored in biomass
CO_2
CO_2
C
Stored in soil
Slide Credit: Jennifer Howard, Conservation International

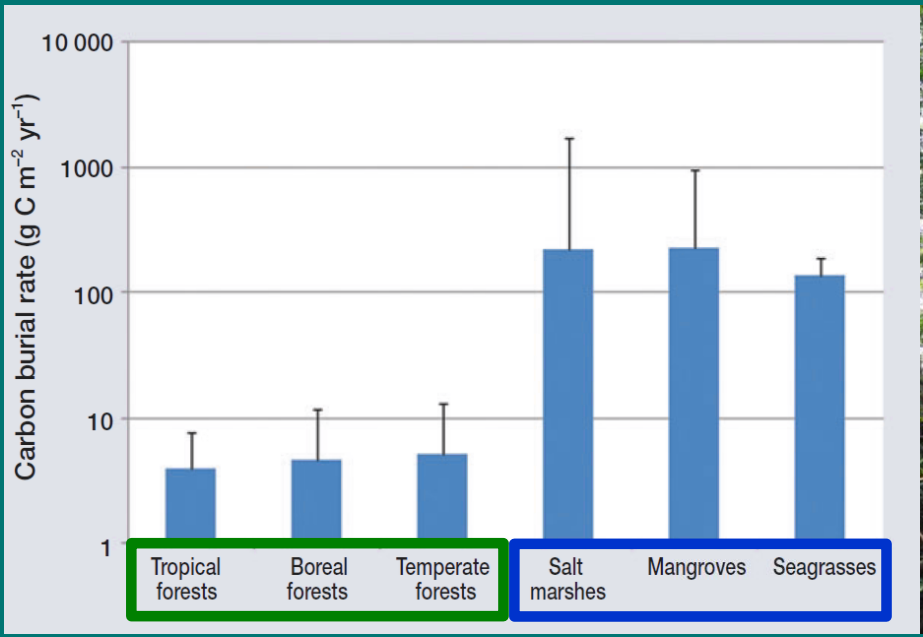
Ability to build up C stores over time

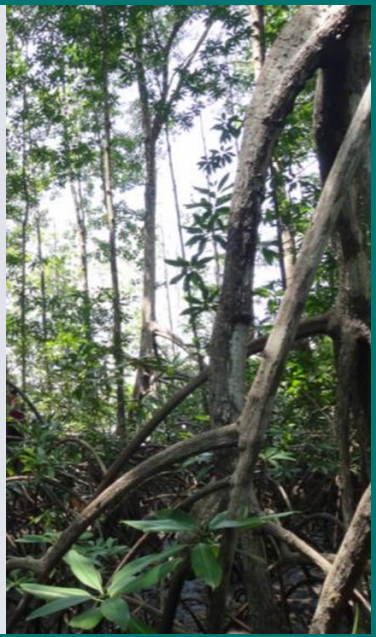


Created by Adam Langley

Blue Carbon Science

Annual Rate of Carbon Burial





McLeod et al. 2011, Frontiers

Blue Carbon Science

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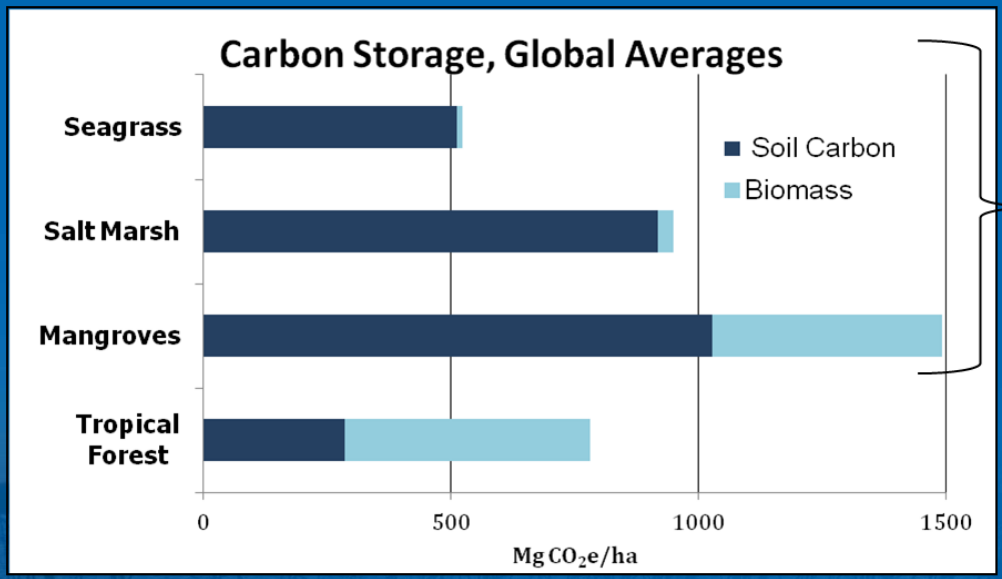
Primary Carbon Storage in Soils



Soil carbon values for 1st meter of depth only (total depth = several meters)

Source: Pendleton et al. (2012) and Pan el al, (2011)

Global Habitat Loss

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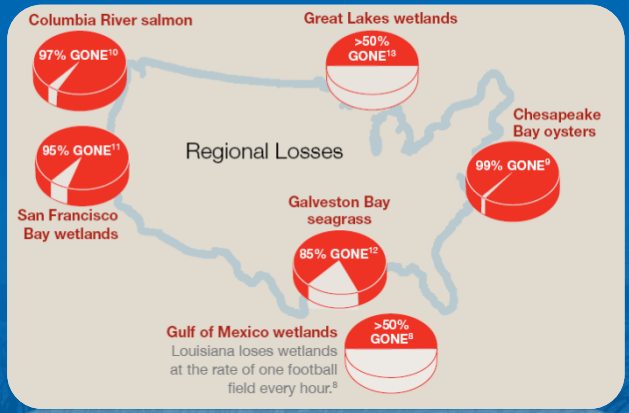
- Global habitat loss 0.7-7% per year (E. Pidgeon, 2009)
- U.S. habitat loss ave 80,000 acres/year (2013 Status and Trends Report, NOAA/FWS)
- Half a billion tons CO_2 released annually (Pendleton et al. 2012)



Why Is Blue Carbon Important?

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- Drained/degraded wetlands release stored carbon
  (~500M tons emitted per year)
- Low restoration rate in the U.S.
- Driver for increased conservation and restoration
  - ✓ Increased resilience
  - ✓ Key marine habitat
  - ✓ Improved water quality
  - ✓ Shoreline protection
  - ✓ **Climate mitigation**
- Climate adaptation

Snohomish Estuary Assessment

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What is the blue carbon benefit of estuary restoration?

Current restoration plans of 3,300 acres:

- 2.55 million tons CO_2
- 1-year emissions 500,000 cars

Full restoration 11,600 acres:

- 8.9 million tons CO_2
- 1-year emission 1.7 million cars

Executive summary and Full report available at:
www.estuaries.org/bluecarbon-science

Blue Carbon Finance Considerations

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Motives are two-fold:

1. Achieve real, additional and measurable GHG emission reductions or removals (in support of any ecosystem benefits, ecological, economic, social, etc.)
2. Tap into additional funding

Optimizing the carbon finance component should inform the project from the start.

Carbon Offsets

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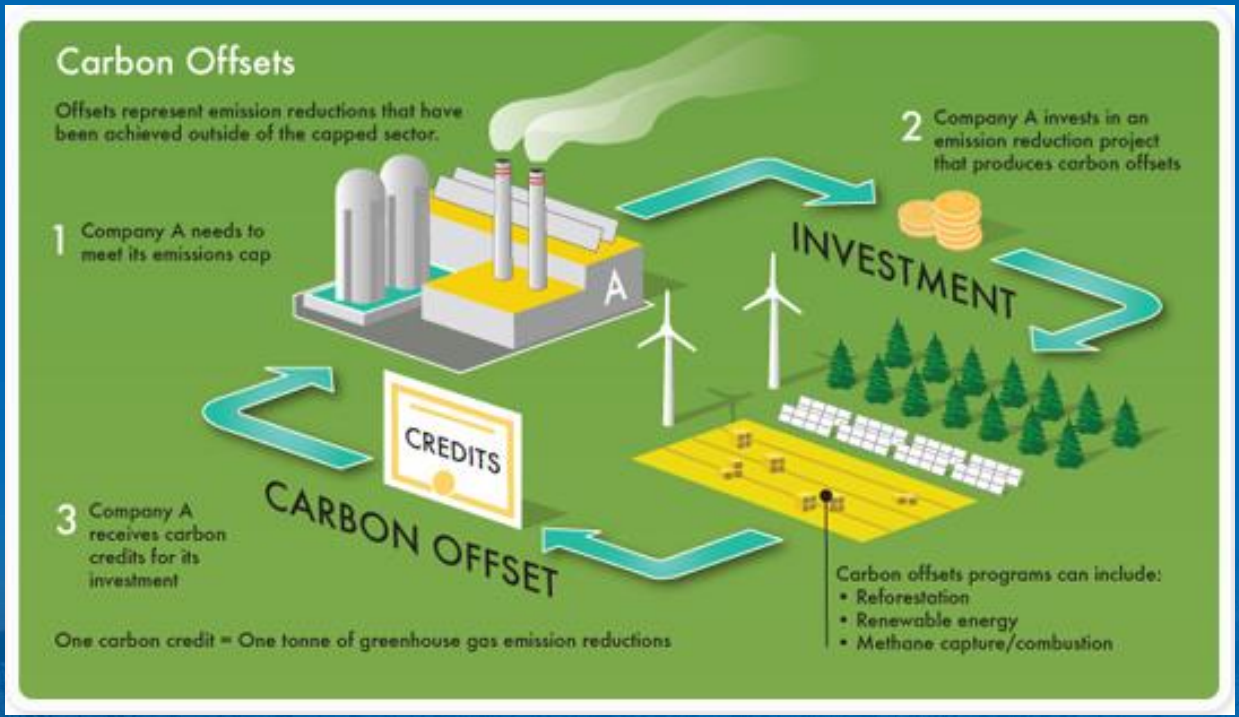

1 Carbon Offset = 1 ton CO_2eq

Voluntary Market

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Standards ensures quality and integrity of carbon offsets

- General requirements & guidance on GHG accounting
- Procedures for validation and verification

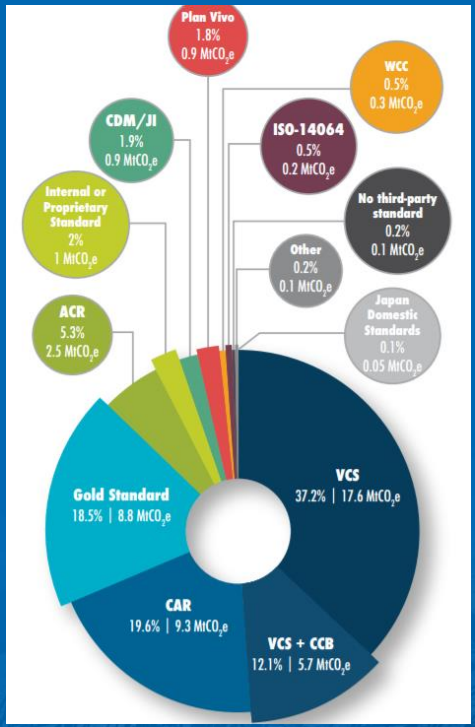
VCS VERIFIED CARBON STANDARD
A Global Benchmark for Carbon

CLIMATE ACTION RESERVE

American Carbon Registry

Methodologies provide step-by-step requirements for quantifying GHG benefits for a particular project activity

84 mil tons offsets in 2015, $278 mil



Voluntary Carbon Market

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Who is buying offsets? Energy, transportation, finance/insurance, events/entertainment and service sectors)

Rising Ambition: State of Voluntary Carbon Markets 2016. Ecosystem Marketplace.

Voluntary Carbon Market

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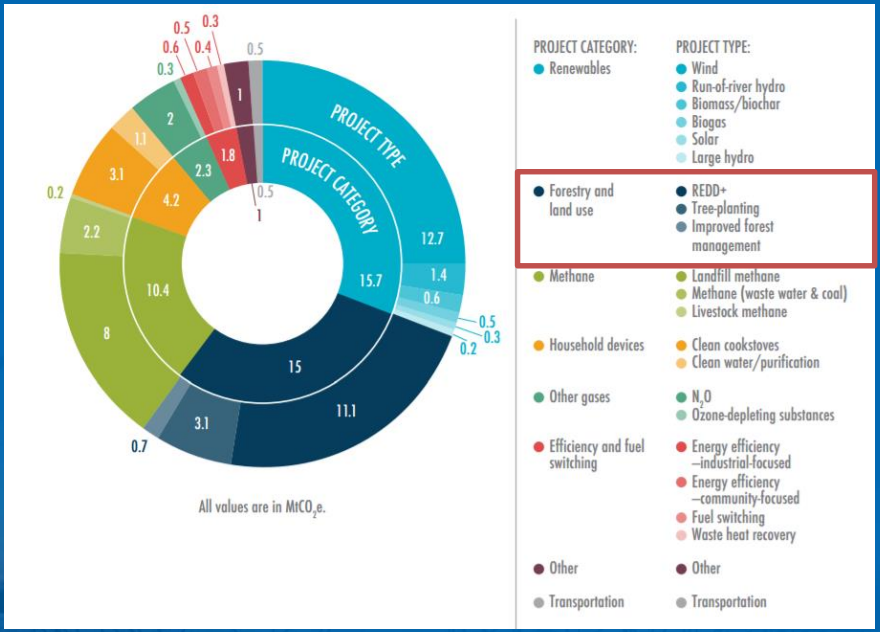
What type of offsets are selling?



"Companies primarily concerned with co-benefits often seek highly charismatic projects such as those that protect critical (and photogenic) ecosystems or provide benefits to vulnerable people." – Buying In, Ecosys Marketplace 2016.

Rising Ambition: State of Voluntary Carbon Markets 2016. Ecosystem Marketplace.

Voluntary Carbon Market

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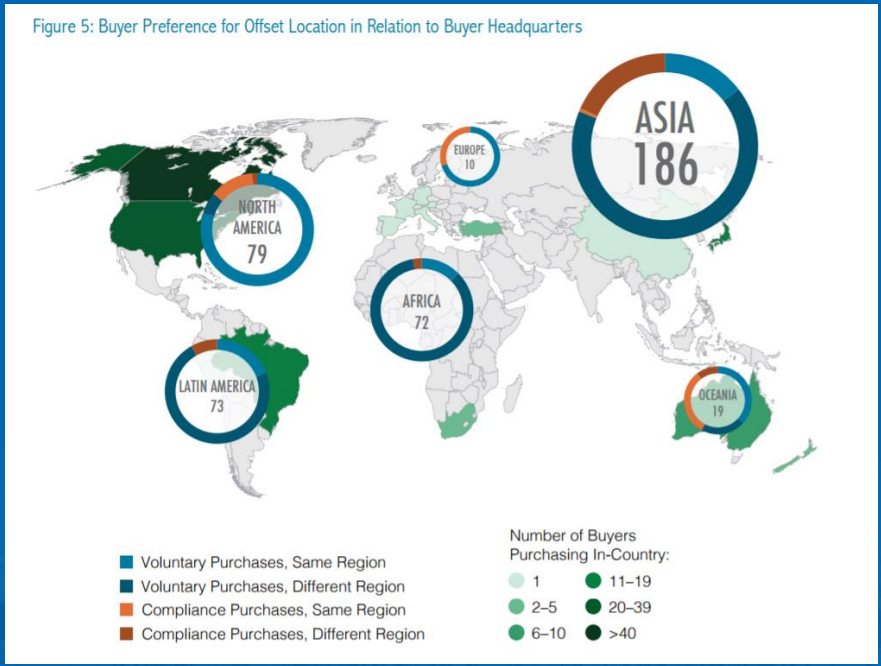
Where are offset purchases?

Buyers show preference for local offset projects



Buying In: Taking stock of the role of offsets in corporate carbon strategies. 2016. Ecosystem Marketplace.

Tidal Wetland Activities with Climate Benefit

Restoring Wetland Ecosystems (RWE) – reducing emissions and/or inc sequestration in a degraded wetland

Conservation of Intact Wetlands (CIW) – reduce GHGs by avoiding degradation/conversion

Blue Carbon: Low Hanging Fruit

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1. **Protection of existing stocks**
   Organic soils and biomass
2. **Reconnection of impounded waters** (formerly tidal)
   Methane reduction
3. **Rewetting of drained organic soil**
   Stopping carbon loss
4. **Restoration of wetlands**
   Complimentary with above

Pathway to Market Opportunities

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Methodology Development

Feasibility Analysis

Project Design Document

GHG Emission Reductions and Removals

Coastal Wetland Methodologies

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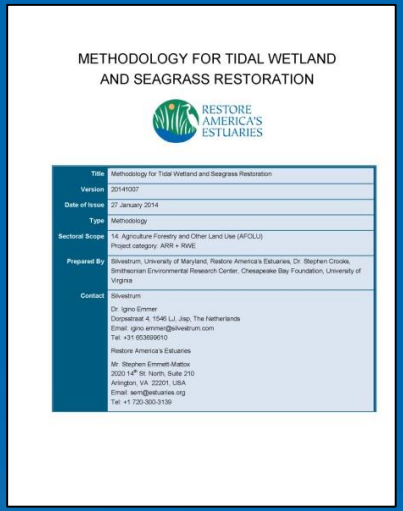
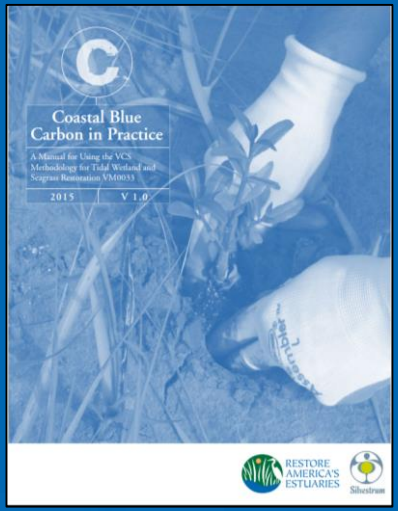
- Coastal Wetland Creation (VCS) – LA CPRA
- Restoration of Degraded Wetlands of the MS Delta (ACR) – Tierra Resources
- **Global Tidal Wetland and Seagrass Restoration Methodology (VCS) – RAE**
- Global Conservation Methodology - initiated by RAE

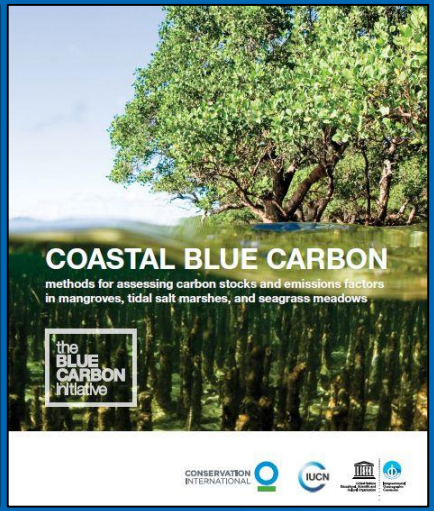
Blue Carbon Toolbox



Restoration Methodology



Project Guidebook



Field Manual

These resources and more at
www.estuaries.org/bluecarbon-resources

Pilot Projects

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Bringing Wetlands to Market

Herring River Restoration Project

- 1000 acres, tidal re-introduction
- Methane emission reductions

Fruit Farm Creek Project

- 300+ mangrove habitat
- Improving hydrology
- CO2 emission reductions + sequestration

http://www.waquoitbayreserve.org/research-m

Offsets on Public lands

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- Precedent transactions on public lands by several state DNRs and USFWS in southeast.
- 80k acres of ag land restored to bottomland hardwood forests with C funding.
- Agencies can accept donations that are conditional on donor claiming C rights.

….if donation is compatible with the agency's mission.

Slide credit: TerraCarbon

Blue Carbon & Sustainability

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Sustainability plans in FL

- Resiliency to storms, flooding, SLR
- Action plan for reducing GHGs
- Integrating natural elements for infrastructure improvements
- Increase green space for GHG reduction and resident quality of life

"Triple bottom line benefit – economic prosperity, environmental quality, and community quality of life"

Blue Carbon & Sustainability

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Coastal wetland benefits:

- Shoreline stabilization – SLR and erosion
- Storm and flood protection – Improve CRS rating
- Adaptable to changing coast line (vs hard infrastructure)
- Carbon capture and storage
- Many other ecosystem benefits supporting economy

+

Florida Blue Carbon: Summary of blue carbon activities

- **Florida east coast (academic studies):**

- Doughty et al. (2016) **Mangrove range expansion rapidly increases coastal wetland carbon storage. Estuaries & Coasts**.
  - Examined above- and below-ground C stock in transitional wetlands (marsh-mangrove) in the northern Indian River Lagoon

- Simpson et al. (2017) **Carbon storages along a climate-induced coastal wetland gradient**. Wetlands.
  - Examined above- and below-ground C stock in transitional wetlands (marsh-mangrove) from West Palm Beach to St. Augustine along FL east coast

- Both studies find greater C stock in mangrove than marsh habitats

Slide credit: Ryan Moyer, FL FWCC

- **Florida West Coast/SW Florida:**

- RAE/ESA Tampa Bay Blue Carbon Study – modelling and field assessments around Tampa Bay

- USF/FWC/UCF/UMD – Blue Carbon Project funded by USDA Joint Carbon Cycle Science Program (PIs: Smoak, Rosenheim, Moyer, Radabaugh, Chambers, Logamasino)
  - Assessing above-ground carbon stocks in SW Florida (S Charlotte Harbor to Ten Thousand Islands)
  - Assessing below-ground carbon stocks in same locations
  - Assessing long-term sequestration potential and rates of below-ground burial on multiple timescales
- USGS activities
  - SET network (tracks elevation changes) in Tampa Bay and Ten Thousand Islands. Additional below-ground stock assessments

- Fruit farm creek – RAE/Rookery Bay/USGS & others
  - Blue carbon feasibility study – more on this later

Slide credit: Ryan Moyer, FL FWCC

Recognition and Opportunities

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Existing Networks:

- U.S. National Working Group – led by RAE, NOAA
- N. American CEC – Blue Carbon Working Group
- Blue Carbon Initiative (International policy and science wg) – led by Conservation International, International Union for Consv of Nature, Intergovernmental Oceanographic Commission
- Global Blue Carbon Network and Database – CI, USGS, SERC

Blue Carbon National Working Group – May 2015 Meeting

Thank you!

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www.estuaries.org/bluecarbon