Connecting Wetlands Restoration and Soil Conservation to the the Carbon Market and Beyond

Stephen Crooks Ph.D.
Climate Change Services Director
ESA PWA

Blue Carbon: The Role of Watershed Stewardship in the Carbon Market


Photo: Lisa Windham-Myers

Bay Area Watershed Network
February 21st, 2013,Oakland, CA.

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Ecosystems in focus for climate change mitigation

Forest

Peatland

Mangroves

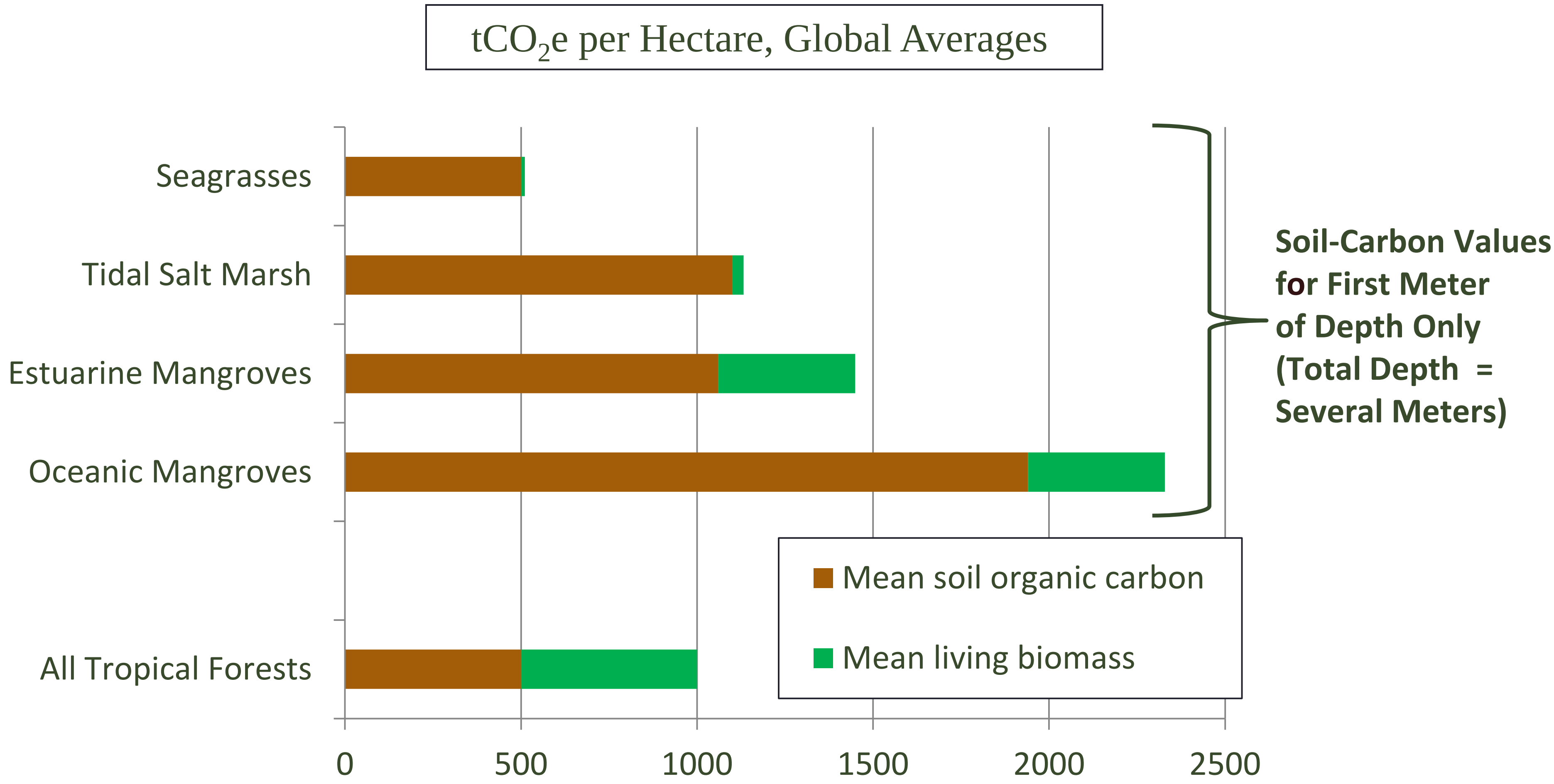
Tidal Marshes

Seagrass

Long-term carbon sequestration and storage

Carbon from plants gather in soil and builds up over thousands of years

Distribution of carbon in coastal ecosystems



Donato *et al*., 2011 (*Nature Geoscience*); Crooks *et al*., 2011 (*World Bank*); Murray *et al*., 2011 (*Duke Report*); Fourqurean *et al*., 1012 (*Nature Geoscience*) ; Pendleton *et al*., 2012 *PlosOne*

Rates of Wetland Loss

Ecosystem	Global Extent (km^2)	Annual Rate Of Loss (%)
Tidal Marsh	400,000	1 - 2
Mangrove	160,000	1 - 2
Seagrass	300-600,000	1 - 2

OPEN ACCESS Freely available online
PLOS ONE

Estimating Global "Blue Carbon" Emissions from Conversion and Degradation of Vegetated Coastal Ecosystems

Linwood Pendleton[1], Daniel C. Donato[2*], Brian C. Murray[1], Stephen Crooks[3], W. Aaron Jenkins[1], Samantha Sifleet[4], Christopher Craft[5], James W. Fourqurean[6], J. Boone Kauffman[7], Núria Marbà[8], Patrick Megonigal[9], Emily Pidgeon[10], Dorothee Herr[11], David Gordon[1], Alexis Baldera[12]

Table 1. Estimates of carbon released by land-use change in coastal ecosystems globally and associated economic impact.

	Inputs			Results	
Ecosystem	Global extent (Mha)	Current conversion rate (% yr^{-1})	Near-surface carbon susceptible (top meter sediment+biomass, Mg CO_2 ha^{-1})	Carbon emissions (Pg CO_2 yr^{-1})	Economic cost (Billion US$ yr^{-1})
Tidal Marsh	2.2–40 (5.1)	1.0–2.0 (1.5)	237–949 (593)	**0.02–0.24 (0.06)**	**0.64–9.7 (2.6)**
Mangroves	13.8–15.2 (14.5)	0.7–3.0 (1.9)	373–1492 (933)	**0.09–0.45 (0.24)**	**3.6–18.5 (9.8)**
Seagrass	17.7–60 (30)	0.4–2.6 (1.5)	131–522 (326)	**0.05–0.33 (0.15)**	**1.9–13.7 (6.1)**
Total	33.7–115.2 (48.9)			**0.15–1.02 (0.45)**	**6.1–41.9 (18.5)**

Compare to national emissions from all sources

Poland

Japan

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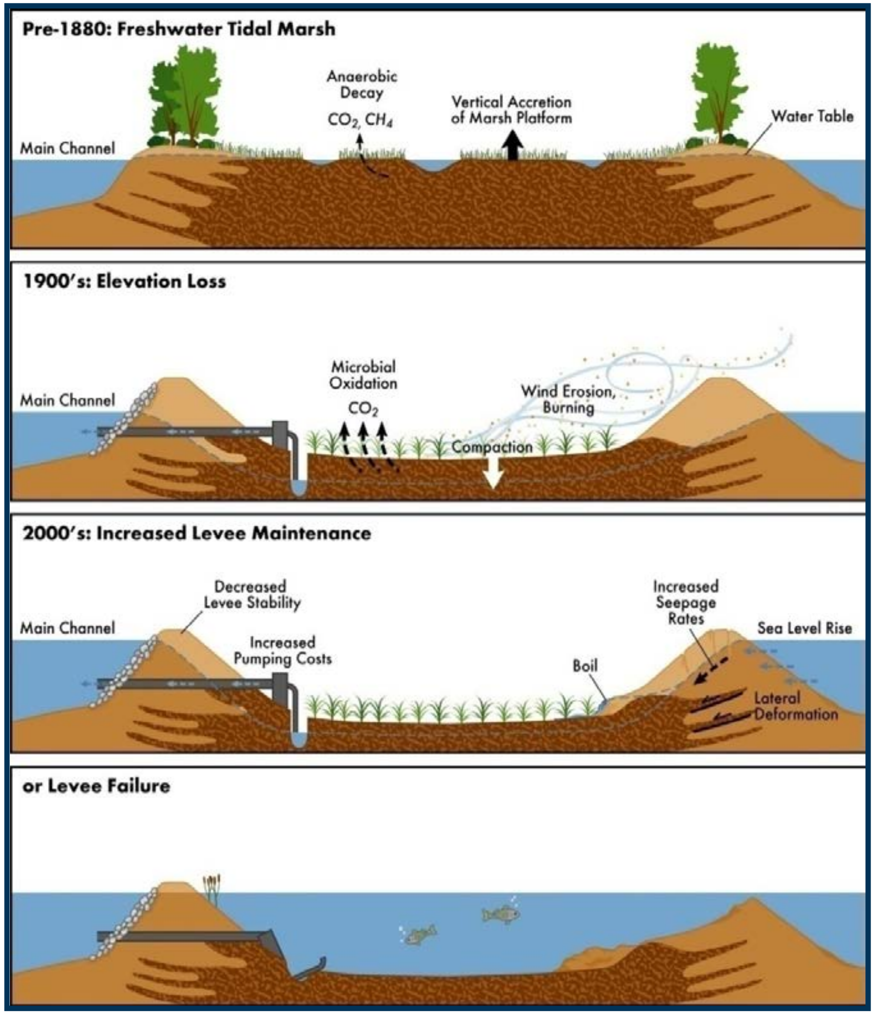
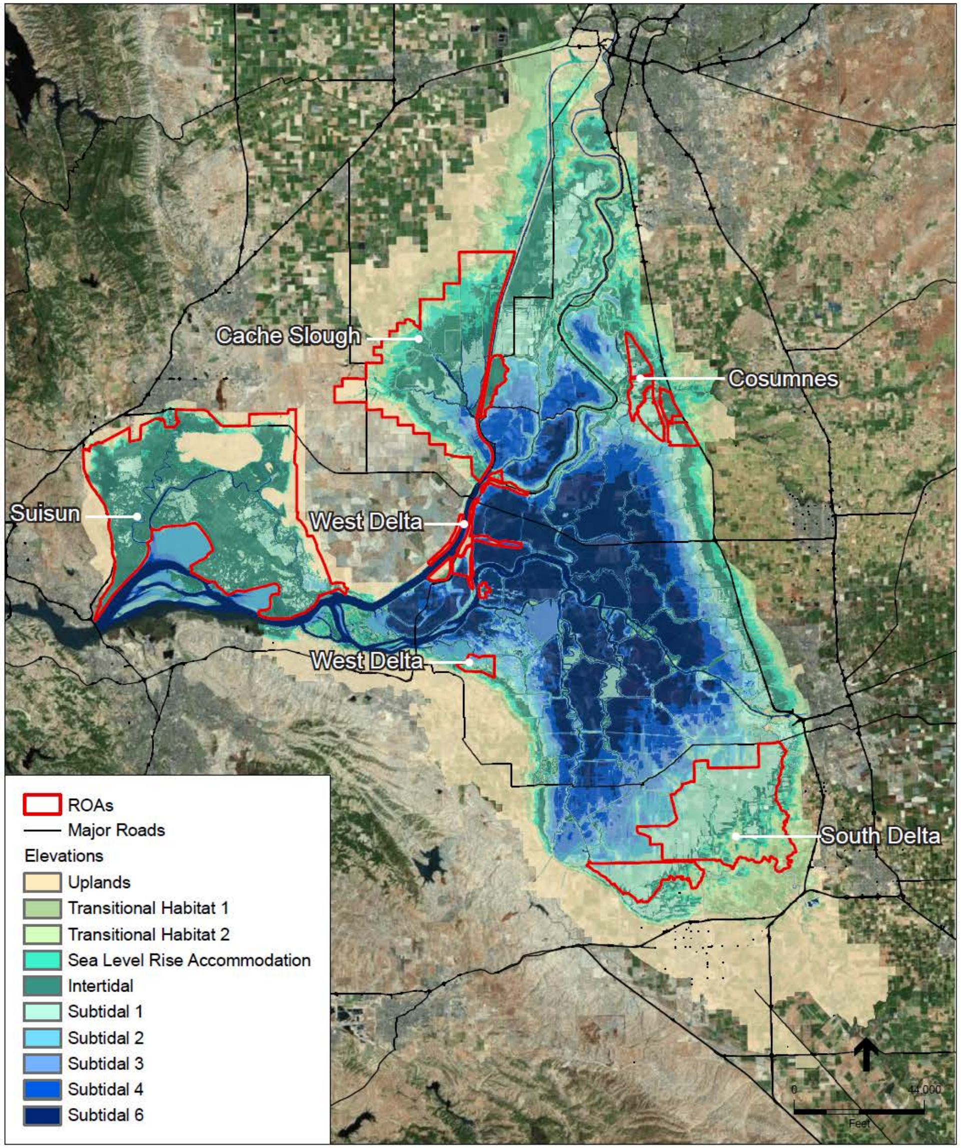
The Delta

High organic sedimentation
Low mineral sedimentation

Once established marshplain is insensitive to mineral sedimentation

Former natural morphology reflected processes set in motion 6000 years ago





SOURCE:

DWR 2007 LiDAR; ESA-PWA 2012

Bay Delta Science Conference.

Figure 1

Elevations and ROAs of Delta-Suisun Marsh Planning Area

Emissions from One Drained Wetland: Sacramento-San Joaquin Delta

Area under agriculture	**180,000 ha**
Rate of subsidence (in)	1 inch

5 million tCO_2/ yr
released from Delta

1 $GtCO_2$ release in c.150 years
4000 years of carbon emitted
Equiv. carbon held in 25% of California's forests

Accommodation space: 3 billion m^3

Opportunity to link Adaptation and Mitigation

Levee Decisions and Sustainability for the Sacramento-San Joaquin Delta

Robyn Suddeth, Jeff Mount, Jay Lund

Center for Watershed Sciences
University of California, Davis

July 13, 2009

Fragile levee system prone to failure.

Levee upgrades expensive, minimal improved reliability.

"…maintaining the current Delta landscape is is unlikely to be economical from a business or land use perspective."

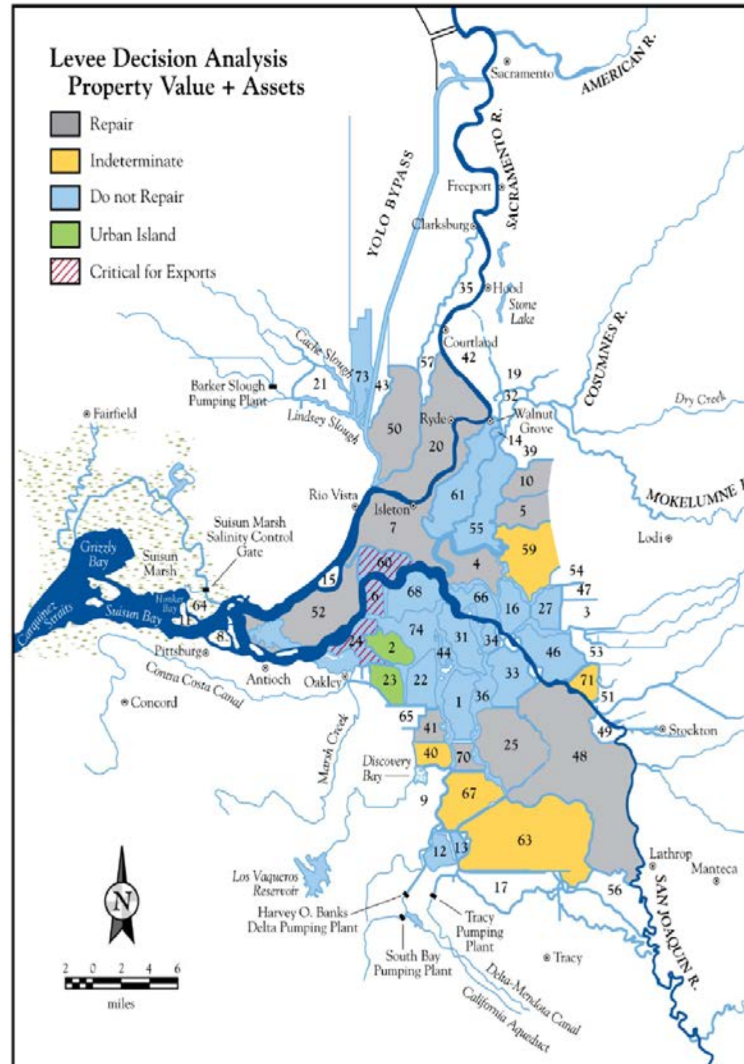


Figure 4. Repair decision using property values plus assets to calculate net present values

Carbon Capture Wetland Farm Bio-Sequestration

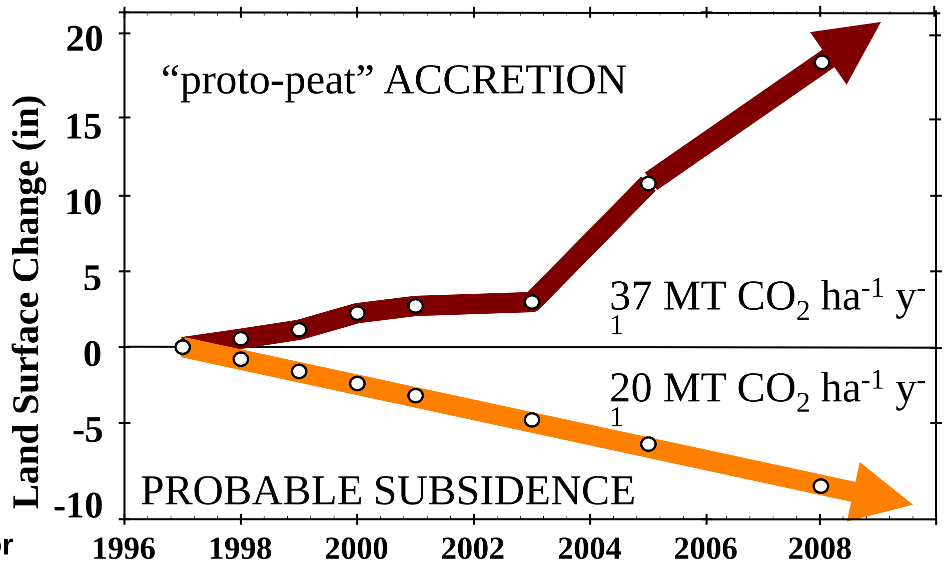
Stops peat oxidation and accretes "proto-peat" rapidly

Continuously submerged about 1 ft

Low oxygen conditions

Balance between plant growth and reduced decomposition

Average annual soil sequestration: 1 kg C m^{-2} yr^{-1} in soil



USGS
U.S. Department of the Interior
U.S. Geological Survey

Miller et al. 2008, SFEWS

Wetlands Carbon management: The Game Plan

- United Nations Framework Convention on Climate Change
  - Brief national climate change negotiators
  - Identify policy opportunities
  - Engage IPCC
  - International demonstration (e.g. GEF project)
- National Government
  - Establish science research (e.g. NSF, NOAA)
  - Recognize wetlands in national accounting
  - Agency awareness and action
- Local
  - Landscape level accounting
  - Establish carbon market opportunities
  - Look for synergistic conservation benefits
  - Demonstration projects and public awareness

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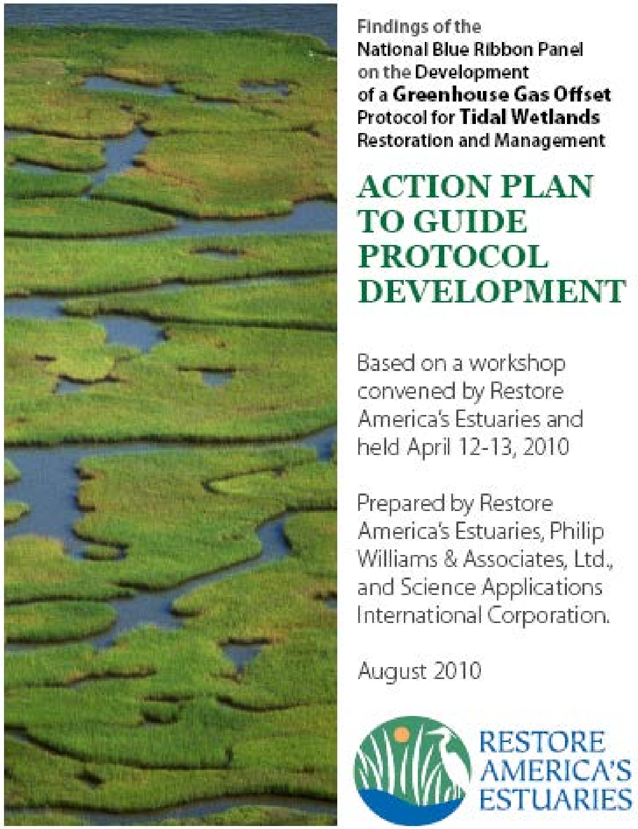
Blue Ribbon Panel: Action Plan

<u>Foundational Issues</u>

- Defining Project Types
- Eligibility
- Quantifying GHG Reductions
- Permanence

<u>Regional Case Studies</u>

- Managed (Tidal) Freshwater Marsh
- Salt Marsh
- Large Deltas (e.g. Mississippi)
- (Mangroves, seagrasses added)
- (Seasonal floodplains)



http://estuaries.org/climate-change.html

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Climate Change Negotiations, Cancun: The big break!

IUCN

Linden Trust for Conservation

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CONSERVATION INTERNATIONAL

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2013 Supplement

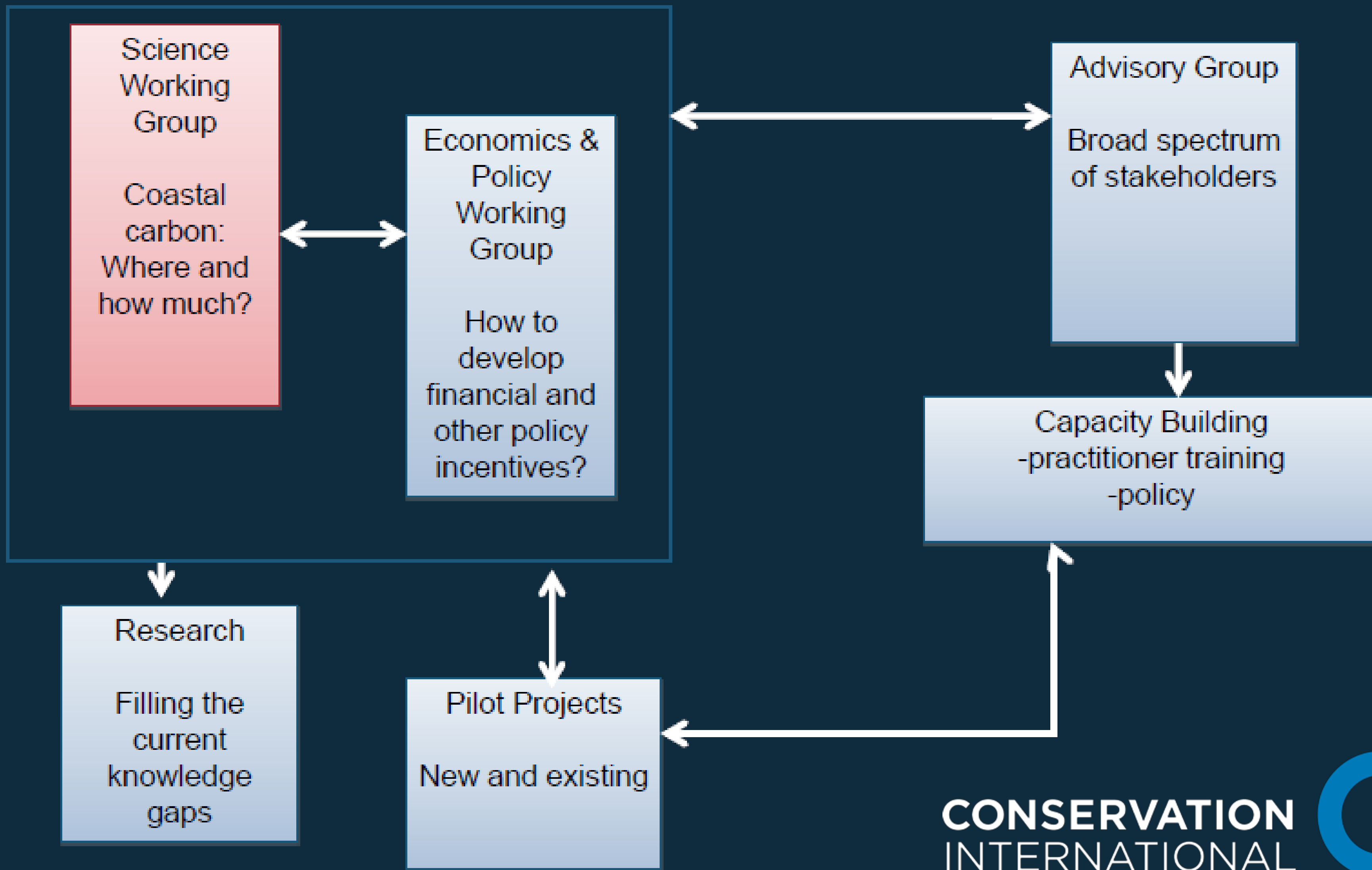
to the 2006 IPCC Guidelines for National Greenhouse Gas Inventories: Wetlands

Chapter 4

Coastal Wetlands!

Daniel M. Alongi (Australia)
Guangcheng Chen (China)
Gail L. Chmura (Canada)
Stephen Crooks (USA)
Ansarul Karim (Bangladesh)
Hillary A. Kennedy (UK)
Baowen Liao (China)
Guanghui Lin (China)
Tiffany Troxler (USA)

Blue Carbon Initiative



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Blue Carbon Open Symposium

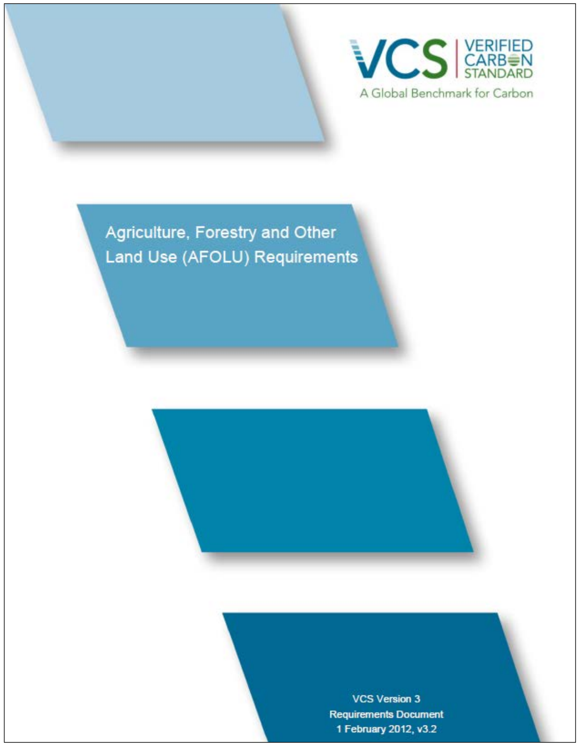
- European Parliament Intergroup meeting
- High attendance from different EU stakeholders, including MEPs and Directors EU Commission - DGs
- Representatives from the Blue Carbon Science Working Group – Kauffman, Fourqurean and Crooks.
- Awareness raising, discussion, networking

New Working Groups

- International Blue Carbon Working Groups
- US Federal Interagency BC Group
- World Bank Blue Carbon WG
- Other Nations
  - Indonesia, Costa Rica, Abu Dhabi, Australia

Wetlands Restoration and Conservation (WRC)
Adopted into Standard Oct 4, 2012
http://v-c-s.org/wetlands_restoration_conservation

Other Categories:
•Afforestation, Reforestation, Revegetation (ARR)
•Agricultural Land Management (ALM)
•Improved Forest Management IFM)
•Reduced Emissions from Deforestation and Degradation (REDD)



From Standard to Project

Standards for project activities

- General requirements and guidance on GHG accounting
- Procedures for validation and verification
- Registry and clearing house for ‘carbon credits’

Methodologies are step-by-step explanations of how emission reductions or removals are to be estimated in line with the requirements following accepted scientific good practice.

Project description or design documents provide Information on how a specific project complies with the requirements and applies the methodology

Characteristics of Good Projects

Size

- There are economies of scale that accompany large projects
  - Reduced costs of implementation
  - Reduced cost of monitoring, reporting and verification (MRV)
  - However, possible to aggregate multiple small projects

Low complexity

- Incorporating Ch4 into accounting adds cost
- For tidal marshes need to project forward response to SLR

Baseline emissions

- Reducing or preventing ongoing emissions from organic soils is creditable
- Restoration is additional

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Next Steps - Demonstration

- Landscape GHG assessment
  - Baseline GHG budgets
  - With management GHG budgets
  - Merger with climate change adaptation
- Feasibility and demonstration
  - Sacramento San Joaquin Delta
  - Tidal marshes
  - Seasonal Floodplains
- Stacking of credits

Stephen Crooks
Climate Change Services Director
ESA PWA
+1 415 272 3916
SCrooks@esassoc.com