New Carbon Market Procedures Recognizing the Value of Delta Wetlands

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Deltas in Times of
Climate Change II

Rotterdam, The Netherlands   24-26 September 2014

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Contents

- Coastal wetlands and climate change
- Carbon markets
- GHG accounting of wetlands restoration/conservation

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Deltas are hotspots of high organic carbon soils worth protecting

If done with appropriate landscape planning, the restoring wetland has potential to recover quickly because sediment supply is high

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Degradation of coastal wetlands globally

- Converted and degraded coastal wetlands emit 450 million tonnes (Mt) of carbon dioxide (CO_2) annually
- At current conversion rates, 30–40% of tidal marshes and seagrasses and nearly 100% of mangroves could be lost in the next 100 years
- Resulting in economic damages of US $6 to 42 billion, each year

(Pendleton *et al*. 2012)

Climate change mitigation responses

- IPCC (2014)
  - Guidance to nations on procedures for incorporating the human impacts to wetlands within accounting for national greenhouse gas (GHG) emissions and reductions
- Carbon markets
  - UNFCCC / CDM: Mangrove restoration
  - Voluntary markets: Verified Carbon Standard (VCS) and American Carbon Registry (ACR)
- Opportunities:
  - International compliance (UNFCCC): limited in the short term
  - National compliance: e.g. US initiatives at state level
  - International voluntary : CSR driven

Incentives for restoration/conservation

- Climate change mitigation

but also

- Coastal protection incl. response to sea level rise
- Habitat protection
- Adaptation to climate change

Climate change mitigation must be integrated with other benefits of restoration and protection

Dominant barrier to implementation:

Lack of Funding

Scale of the funding problem in the USA in 28 National Estuary Programs (NEPs)

Indicator: Activity Penetration scores 1.08%

defined as: AP = OA / MAP

Where:

- AP: Activity Penetration of the project activity (percentage)
- OA: Observed Adoption i.e. the average annual aggregate reported tidal wetland restoration projects for 2009 - 2012, as reported by NEPs and their partners to the U.S. Environmental Protection Agency
- MAP: Maximum Adoption Potential of the project activity i.e. the aggregate tidal wetland restoration goals of the NEPs

Dominant reason: lack of funding

Carbon markets require standards

- Carbon market standards such as the VCS
- Principles taken from ISO 14064
  - Completeness
  - Consistency
  - Accuracy
  - Transparency
  - Conservativeness
- Made operational in
  - Detailed requirements and guidance for project design and GHG accounting
  - Procedures for validation and verification
  - A registry and clearing house for ‘carbon credits’

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Project accounting and documentation

- <u>Methodologies</u> 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

- <u>Project description</u> or design documents provide information on how a specific project complies with the requirements and applies the methodology

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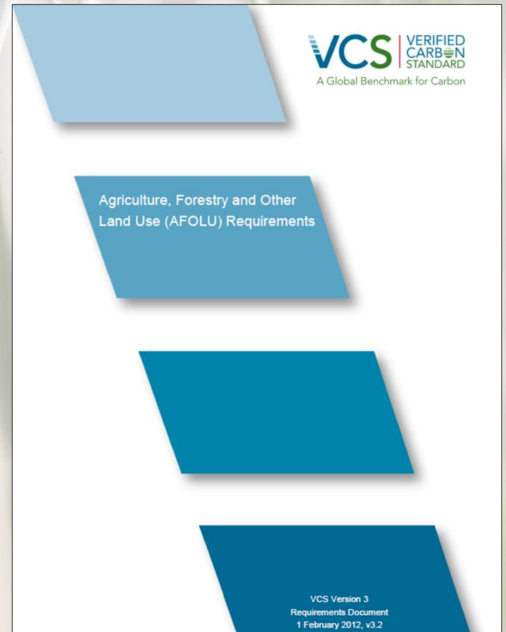
VCS AFOLU Requirements

- AFOLU Program Specific Issues
- Project Requirements
- Methodology Requirements
- Validation Verification Requirements



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VCS VERIFIED CARBON STANDARD
A Global Benchmark for Carbon

- Afforestation, Reforestation, Revegetation (ARR)
- Agricultural Land Management (ALM)
- Improved Forest Management (IFM)
- Reduction Emissions from Deforestation and Degradation (REDD)
- Avoided Conversion of Grasslands and Shrublands (ACoGS)
- Wetlands Restoration and Conservation (WRC)

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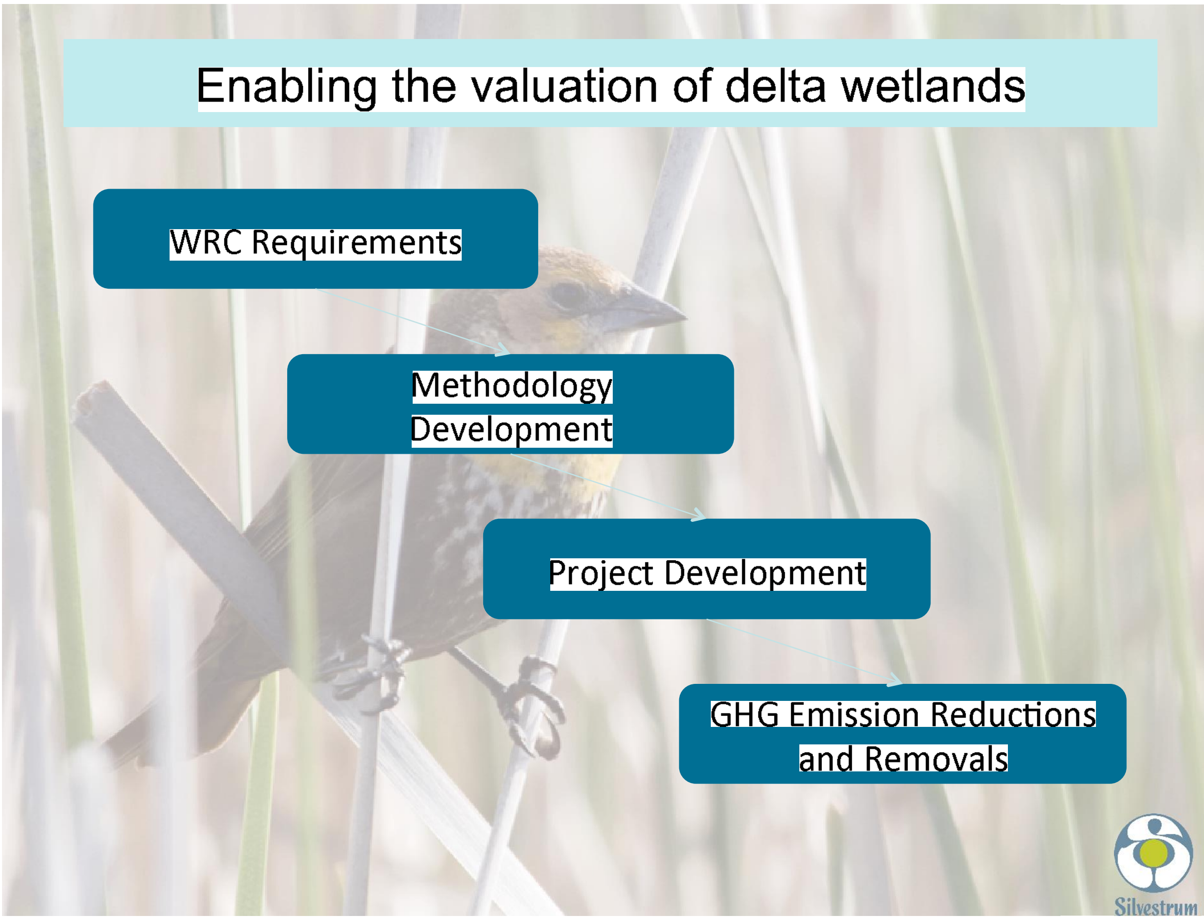
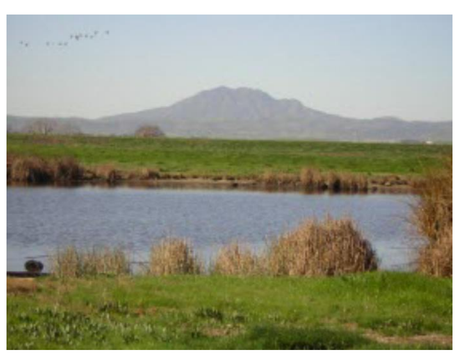
Enabling the valuation of delta wetlands



Typical project activities

- Conservation of mangroves – REDD
- Improved management of mangroves – IFM
- Restoration of mangroves – ARR, restoring hydrology
- Restoration of sediment supply on tidal marshes
- Restoration or conservation of natural vegetation of wetlands



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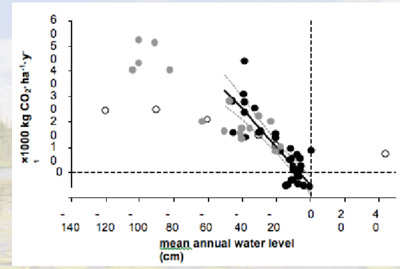
GHG accounting

- Spatial and temporal dimensions
- Direct measurements (fluxes) or
- Proxies
  - Carbon stock changes
  - Water level
  - Salinity and others…
- Leakage
- Uncertainty versus conservativeness
  - Avoid complex/expensive measurements by conservatively neglecting pools and fluxes



Content of methodologies

- Applicability conditions
  - Relate procedures provides to specific project circumstances
- Project boundaries
  - Geographical – temporal – carbon pools – GHGs
- Baseline scenarios and additionality
- Baseline GHG accounting
- Project GHG accounting including leakage
- Permanence
- Monitoring protocol

Poorly constrained issues in coastal wetlands

- Trace gas emissions
- Landscape-level carbon issues
  - Allochthonous carbon sources
  - Fate of eroded carbon pools
- Changes in wetland boundary due to sea level rise

Solutions for GHG accounting can be found in conservative default values and proxies

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Allochthonous carbon

- Question: What portion of the carbon in tidal wetland soils is imported from outside the wetland?
- Credit Issue: Allochthonous carbon receives credit only if decomposition rate decreases in the wetland.
- Science: Allochthonous carbon is mostly of terrestrial origin and recalcitrant. Its fate can be complete burial or partial decomposition.
- Conservative Approach: Assume no change in preservation when stored in the wetland.
- Challenge: Simple approach to account for allochthonous carbon sequestration.

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Fate of carbon in inundating tidal wetlands

- Question: What is the fate of soil organic carbon when a systems converts to open water?
- Credit Issue: Credit for preventing inundation can be granted only if normally carbon is returned to the atmosphere (erosion and oxidation).
- Science: Submerged wetland soils persist for decades.
- Conservative Approach: Assume inundated soil carbon remains sequestered in the baseline and oxidizes in the project scenario.
- Challenge: Simple approach to account for inundation.

Methane & Nitrous Oxide

- Question: How much methane and nitrous oxide do tidal wetlands emit?
- Credit Issue: Credit is given for reduction in total greenhouse gas emissions and wetland generally emit methane and nitrous oxide.
- Science: Methane emissions are low at high salinity. Nitrous oxide emissions are low if nitrate loading is low.
- Conservative Approach: Assume zero baseline emissions. Measure project emissions at times and places where they will be highest.
- Challenge: Develop proxies and methods that decrease effort and allow less conservative estimates.

Implications of sea level rise

- Geographic project boundary that considers projections of expected relative sea level rise and effects on the lateral movement of wetlands.
- In eroding wetlands, as said, fate of carbon is not clear – but it is conservative to assume no carbon is oxidized in the baseline and all carbon is oxidized in the project case.
- However, in a well-designed conservation project, the resilience to sea level rise is likely to increase.

Guidance (under development)

- Methodologies
  - Methodology for Coastal Wetland Creation
  - GHG Accounting Methods for Tidal Wetlands and Seagrass Restoration (under development)
  - Extension of a REDD+ modular methodology including tidal wetlands restoration and conservation (under development)
- Guiding Principles for Delivering Coastal Wetland Carbon Projects (UNEP)
- Blue Carbon as an Ecosystem Service - User Manual (Restore America's Estuaries)


Thank you
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