COASTAL WETLANDS

OVERVIEW OF A HIGH-IMPACT DRAWDOWN SOLUTION

Coastal wetlands, including mangroves, seagrasses, tidal salt marshes and freshwater marshes, are powerful carbon sinks. These ecosystems sequester carbon in plants and soils.

TECHNOLOGY AND MARKET READINESS

The state of Georgia has ~100 miles of coast and the coastal wetlands. Further, with a few small exceptions these wetlands are owned by federal, state and conservation agencies (the exceptions being Jekyll Island, Tybee Island, and St. Simons). Georgia's Department of Natural Resources reports 420,324 acres of tidal salt and freshwater marshes in Georgia comprising the largest number of tidal wetlands of any state in the U.S. Atlantic seaboard (Seabrook 2006, Edwards et al. 2013) [1]. Further, Georgia's tidal marshes are among the most productive ecosystems in the world on a per unit area basis (NASEM 2019, EPA 2019, Edwards et al. 2013, Schlesinger and Bernhardt 2013, Ouyang and Lee, 2014, Schubauer and Hopkinson 1984, E. Odum 1961). Thus, maintaining Georgia's Coastal Wetlands is an important Drawdown Georgia solution.

LOCAL EXPERIENCE AND DATA AVAILABILITY

We have many local coastal wetland experts at universities, state and federal agencies, and NGO's and much data from Georgia.

TECHNICALLY ACHIEVABLE POTENTIAL FOR INCREASED CO2 SEQUESTRATION

Globally tidal marshes sequester 7.98 t CO2 ha-1 each year (NASEM 2019, EPA 2019). Georgia has 420,374 acres of tidal marshes1 so has an annual CO2 sequestration rate of 1.4 Mt CO2 mainly in sediments. In comparison, estimates for the entire continental U.S. coastal wetlands including the mangrove forests of Florida is 8 Mt CO2e per year (NASEM 2019, EPA 2019).

COST COMPETITIVENESS

The vast majority of Georgia's coastal wetlands are already protected by government and conservation agencies making this solution very cost competitive in terms of initial land acquisition. However, sea level rise will make the management and conservation of coastal wetlands more expensive due to management efforts such as acquiring buffers for future marsh migration.

BEYOND CARBON ATTRIBUTES

Coastal wetlands, including salt marshes in estuaries and freshwater wetlands, provide positive social-economic benefits by acting as the first line of defense from storm surges and floods. A study on flood damage reduction in the Northeastern United States found that wetlands avoided $625 million in flood damage during Hurricane Sandy, and on average, coastal wetlands reduced annual flood losses by 16% (Narayan, et al., 2017). Coastal wetlands enhance water quality and provide crucial habitat, nurseries, and shelter for fish, migratory birds, and other wildlife. Over 35% of endangered species live only in wetlands, with additional species requiring wetland habitats to reproduce (Kusler, 1983).

Other benefits include the potential increase in fishery and coastal tourism. Since over one third of all U.S. adults participate in wetland tourism activities, wetlands are a huge economic opportunity for their respective communities [3].

These factors can lead to increased quality of life, jobs, and safety for the residents living within coastal communities. A potential beyond carbon concern relates to development and construction firms' inability to develop coastal floodplain areas.

References:

Edwards, Ambrose, and Kirkman. (2013). The Natural Communities of Georgia. UGA Press. Athens, GA.

EPA 2019. Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990-2017. United States Environmental Protection Agency, Washington, DC. https://www.epa.gov/ghgemissions/inventory-us-greenhouse-gas-emissions-and-sinks-1990-2017

Kusler, J. A. 1983. Our National Wetland Heritage: A Protection Guidebook. Environmental Law Institute, Washington, D.C.

Narayan, S., Beck, M. W., Wilson, P., Thomas, C. J., Guerrero, A., Shepard, C. C., Trespalacios, D. (2017). The Value of Coastal Wetlands for Flood Damage Reduction in the Northeastern USA.

National Academies of Sciences, Engineering, and Medicine 2019. Negative Emissions Technologies and Reliable Sequestration: A Research Agenda. Washington, DC: The National Academies Press. https://doi.org/10.17226/25259.

Odum, E. P. (1961). The role of tidal marshes in estuarine productivity. New York Conservationist 15(6): 12-15.

Ouyang, X., and Lee, S.Y., (2014). Updated estimates of carbon accumulation rates in coastal marsh sediments. Biogeosciences, 11: 5057-5071.

Schlesinger, W. H. and Bernhardt, E.S. (2013). Biogeochemistry: An Analysis of Global Change. Academic Press. Amsterdam. 672 pp.

Schubauer, J. P. and C. S. Hopkinson. (1984). Above- and below-ground emergent macrophyte production and turnover in a coastal marsh ecosystem, Georgia. Limnology and Oceanography 29: 1056-1065.

Seabrook, C. (2006). Tidal Marshes IN: New Georgia Encyclopedia https://www.georgiaencyclopedia.org/articles/geography-environment/tidal-marshes.

Endnotes:

1. Georgia Department of Natural Resources (GADNR), n.d. Coastal Wetlands. Brunswick, GA. https://coastalgadnr.org/Wetlands
2. https://www.drawdown.org/solutions/land-use/coastal-wetlands
3. National Oceanic and Atmospheric Administration. (2020). Coastal Wetlands: Too Valuable to Lose. https://www.fisheries.noaa.gov/national/habitat-conservation/coastal-wetlands-too-valuable-lose

Corresponding Authors:

Jacqueline E. Mohan, M.E.M., Ph.D.
Associate Professor,Terrestrial Ecosystem Ecology & Biogeochemistry
Odum School of Ecology
University of Georgia
517 BioSciences Bldg.
Athens, Georgia 30602, USA
Web: http://www.uga.edu/mohanlab/

and

Dr. Puneet Dwivedi
Associate Professor (Forest Sustainability)
Warnell School of Forestry and Natural Resources
University of Georgia

180 E Green St Athens GA 30602
Email: puneetd@uga.edu
Twitter: @PuneetDwivedix
Publications: Google Scholar
Website: http://forestsustainabilitylab.uga.edu/