Blue Carbon

Coastal Carbon Accumulation and Greenhouse Gas Fluxes in Tidal Saltmarshes

Background

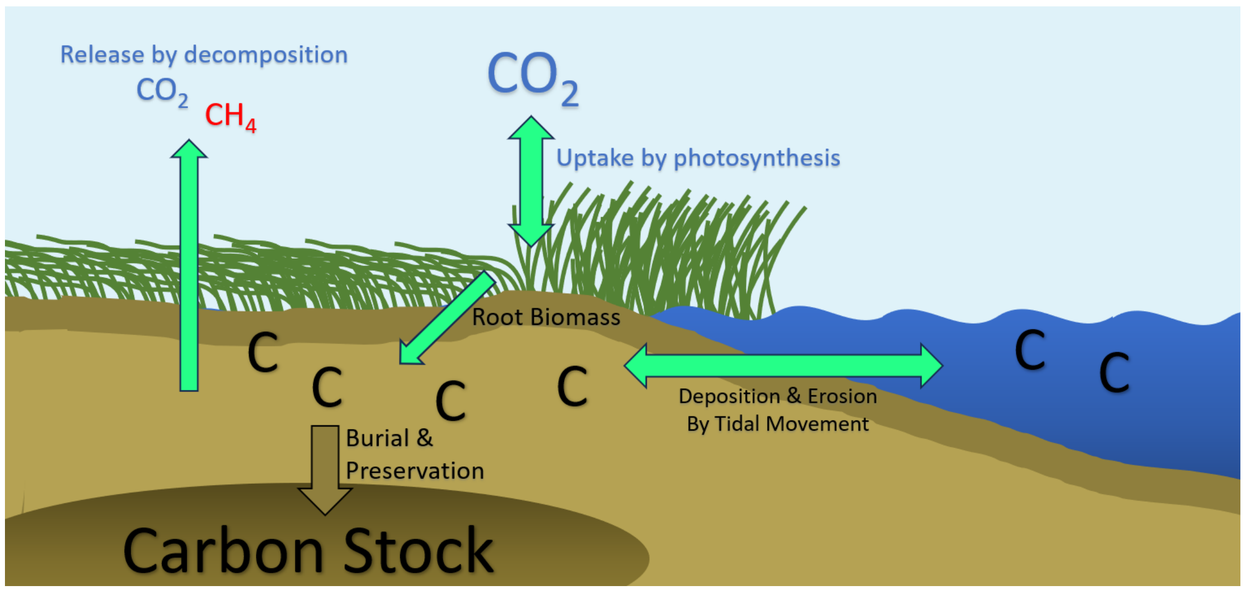

Figure 1: Conceptual diagram showing movement of carbon within a saltmarsh.

What is Blue Carbon?

Blue Carbon in carbon that is stored in coastal wetlands including saltmarshes, seagrass meadows, and mangroves. As shown below, blue carbon habitats have the potential to store more carbon per area than terrestrial habitats (Howard et al., 2014).

In our study area within the Bay of Fundy, we found very high initial rates of sedimentation leading to high rates of carbon accumulation in the first years after restoration [see Figure 5] (van Proosdij et al., 2023).

Why Saltmarshes?

Salt marshes act as a natural carbon sink, taking up CO2 through photosynthesis and storing carbon in their soils for long time periods of time, helping to reduce the amount of greenhouse gases in the atmosphere.

- Regular flooding creates a lack of oxygen in the groundwater of saltmarshes, which slows down most microbes from being able to break down the carbon and reintroduce it to the atmosphere.
- Salinity usually prevents the production of other greenhouse gases in salt marshes, like methane (CH4)

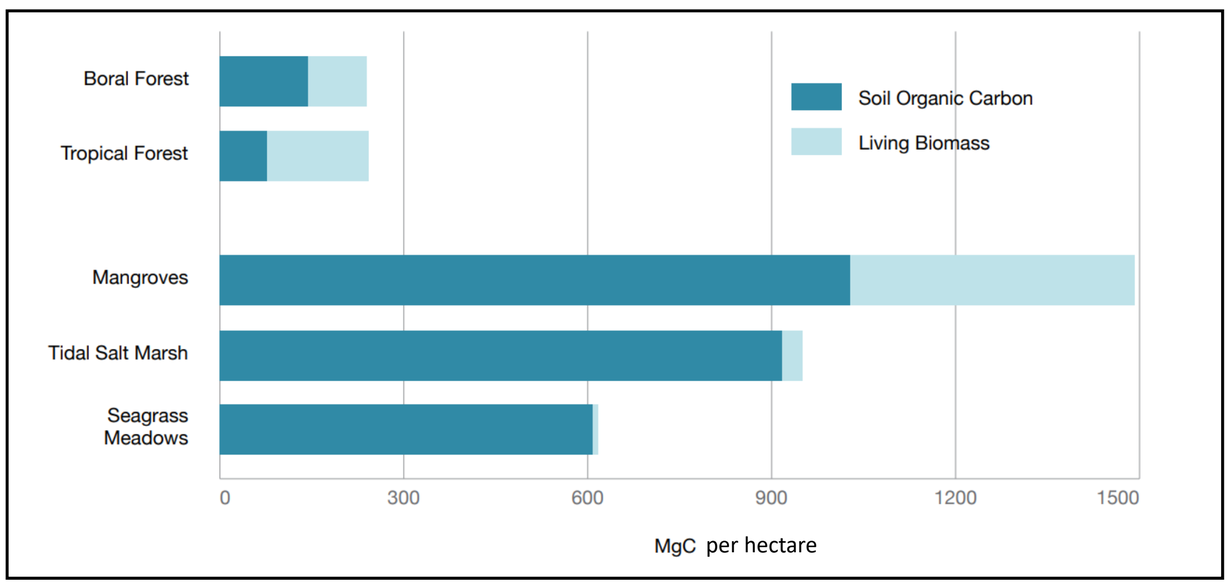

Figure 2: Relative Carbon stores of various ecosystems in megagrams per hectare (1 Mg = 1 metric ton); (from Howard et al., 2014).

Measuring Carbon Accumulation & Storage

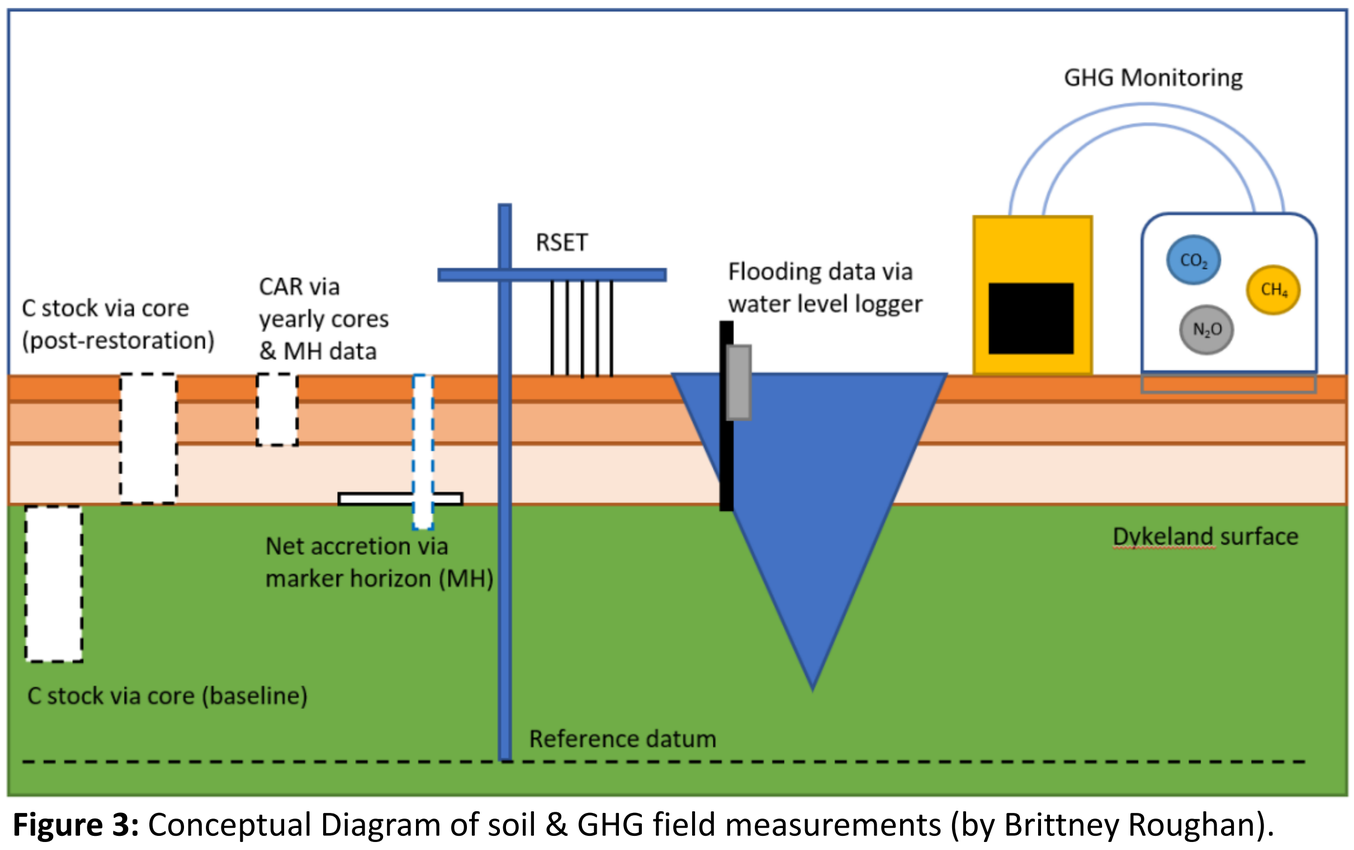

Figure 3: Conceptual Diagram of soil & GHG field measurements (by Brittney Roughan).

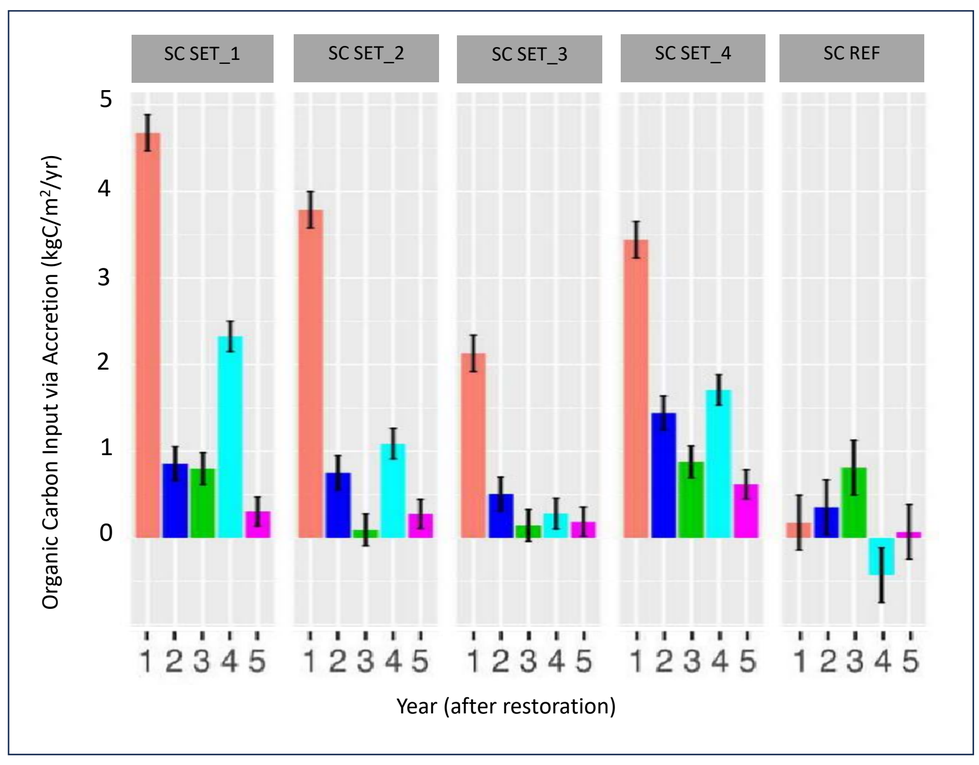

Figure 5: Estimated organic carbon input via sediment accretion over time at St. Croix West restoration site.

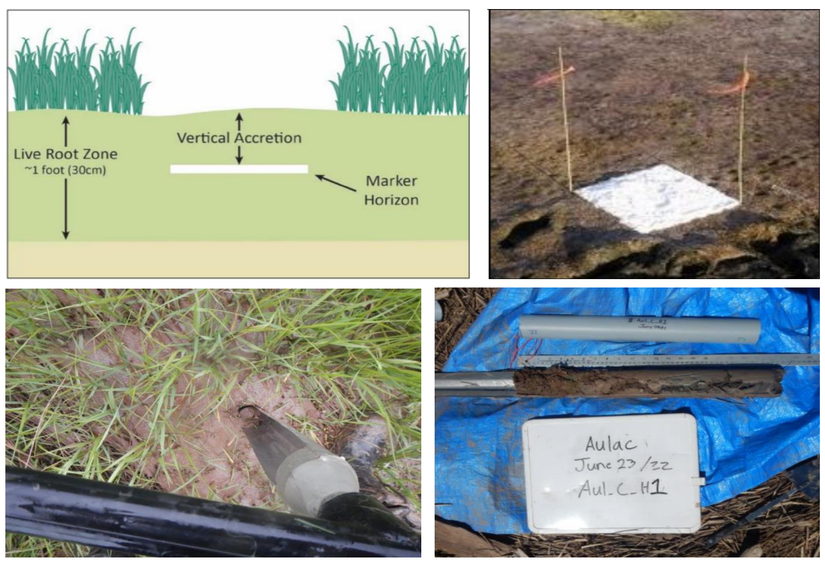

Figure 4: Conceptual diagram of a marker horizon [top left] (from Lynch et al., 2015); Photo of marker horizon installation [top right] (from Graham, 2018); field images of sediment coring [bottom] (photos by Brittney Roughan).

Soil Organic Carbon

Marker Horizon (MH)

A visible layer of clay allows us to measure the depth of any sediment deposited above it.

Soil Cores

Soil cores are taken and processed in the lab to determine the concentration of carbon within the soil.

Rod Surface Elevation Table (RSET)

The RSET (not pictured) accurately measures relative changes in surface elevation.

Figure 6: Eosense auto-chamber [left] (photo by Brittney Roughan); GASMET gas analyzer [right] (photo by Evan Rundle).

Greenhouse Gas Flux

Gas Analyzer - GASMET GT5000

The Gas analyzer [right] and auto-chamber [left] are used to measure the amount of greenhouse gases being emitted or absorbed by the soil.