**Introduction**

- Tropical seagrass meadows support high metabolic rates than temperate meadows (Duarte et al., 2010) probably due to tropical climatic conditions (temperature and light intensity) that their contributions to carbon dioxide (CO$_2$) exchange and sequestration is promising.

- However, tropical seagrass meadows shelters considerable amounts of calcareous macro algae (Halimeda species) as reported from Chwaka Bay, Zanzibar, Tanzania (Kangwe, 2006; Gullstrom et al., 2006) with promotion of calcification process by photosynthetic activities of seagrasses (Semesi et al., 2009).

- Calcification process is a source of CO$_2$ in the atmosphere (Gattuso et al., 1998)

\[ Ca^{2+} + 2HCO_3^- \rightarrow CaCO_3 + H_2O + CO_2 \]

Thus, it is not known whether their coexistence and promotion of calcification process counteracts macrophytes CO$_2$ exchange and sequestration efficiency.

Therefore this study was designed and executed to understand the influence of submerged vegetation on the fluxes of CO$_2$ over the water surface in the tropical seagrass meadows.

**Goals**

- **General aim:** To understand the influence of submerged vegetation on the fluxes of CO$_2$ over the water surface in the tropical seagrass meadows.

  - **Specifically**
    - **1.** To evaluate the effect of vegetation composition on air–water CO$_2$ fluxes in a seagrass dominated area
      - By *in situ* measurements of air–water CO$_2$ exchange and water parameters
    - **2.** To determine relative contribution from calcifying and non-calcifying marine macrophytes on air–water CO$_2$ exchange
      - This was achieved through controlled mesocosm experimental set up, where CO$_2$ fluxes were compared at different densities of seagrass and calcifying algae.

**Material and methods**

1. *In situ* measurements of air–water CO$_2$ fluxes by using Floating chamber technique

2. Mesocosm experimental setup

**Preliminary results**

1. PLS Modelling Performance (influence of vegetation composition)

   **Carbon dioxide fluxes 6-25 Nov 2017, PLSM1 (PLS)**

   - **CO$_2$ flux in the field**
   - **CO$_2$ flux in the field**
   - **CO$_2$, in the field**

<table>
<thead>
<tr>
<th>Rate of CO$_2$ Flux, 50% seagrass</th>
<th>Rate of CO$_2$ Flux, 75% seagrass</th>
<th>Rate of CO$_2$ Flux, 25% seagrass</th>
<th>Rate of CO$_2$ Flux, 100% rhodoliths</th>
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<td>[Graph showing data]</td>
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   **CO$_2$ fluxes at different densities of seagrass and calcifying algae**

   - **2.** Carbon dioxide fluxes at different densities of seagrass and calcifying algae

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<tr>
<th>Rate of CO$_2$ Flux, 100% sand</th>
<th>Rate of CO$_2$ Flux, 100% seagrass</th>
<th>Rate of CO$_2$ Flux, 100% rhodoliths</th>
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**References**