

IMBeR West Pacific Symposium 2021

## **Session 1: Coastal Blue Carbon: Measurements, Modeling, and Assessment**

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### 1. One or two major highlights from each presentation

Keynote speech (**Xiaowei Li**) –Valuation of wetland ecosystem services in national nature reserves in China’s coastal zones

- This study is the first attempt to establish a valuation framework and database for the nine ecosystem services of 13 wetland types in China's coastal zones. We constructed a literature database containing over 170 papers (808 observations) on field-scale research for wetlands in China's coastal zones.
- This study provides a picture of the ESV of 13 wetland types and shows that spatial, statistical, and literature data are useful and inexpensive in estimating ESV of different wetland types in coastal zones.
- The values of wetland ecosystem services revealed considerable spatial variability along China's coastal zones;
- The results provide insight into wetland trade-offs and the prioritization of wetland types with high service values, which would provide scientific support for resource managers and policy-makers in wetland conservation and restoration.

Oral Presenter 1 (**Susana Lincoln**) - Carbon stocks of seagrass meadows in Vanuatu, South Pacific

- In Efate Island, seagrasses carbon storage lower than global average.
- Near developing urban area of Port Vila, seagrasses challenged by poor water quality.
- Protection and management needed to ensure sustainable seagrass ecosystem services.
- Seagrass data still lacking.

Oral Presenter 2 (**Mohammad Rozaimi**) - Insights into blue carbon storage and ecosystem connectivity from studies of the seagrass meadows in Sungai Pulai estuary (Johor, Malaysia)

Pacific

- Spatial heterogeneity of carbon storage.

- Estuarine deposits of mangrove-derived carbon = connectivity of blue carbon habitats.
- Temporal and spatial scale variation in carbon sequestration by macroalgae.

Oral Presenter 3 (**Vincent Saderne**) - Total alkalinity production in a mangrove ecosystem reveals an overlooked Blue Carbon component

- Dissolution of calcium carbonates can be a major, permanent, sink of atmospheric CO<sub>2</sub> in mangroves growing on carbonate soils.

Oral Presenter 4 (**A'an Johan Wahyudi**) - Carbon offset potential from tropical seagrass conservation in Indonesia

- Emission reduction at the year 2020 ranged 0.03-1.02 tC/yr(with leakage) or 0.05-2.04 tC/yr (without leakage).
- The percentage of emission reduction among the five provinces ranged from 0.75% to 11.3%.
- About 9.03 tC/yr emission from seagrass ecosystems in Jakarta will decrease by up to 8.01 tC/yr.

Oral Presenter 5 (**Xiaoguang Ouyang**) - Mangrove respiration is coupled with carbon and nitrogen uptake in the microphytobenthos of mangrove sediments

- Mangroves provide C and N for maintaining the growth of MPB.
- MPB obtain C and N from mangrove biomass via porewater.
- Mangrove-MPB coupling is a new mechanism regulating carbon and nitrogen cycling in mangrove forests and should be incorporated into models partitioning the fate of mangrove derived carbon, along with the duration of nutrient uptake.

Oral Presenter 6 (**Nirupama Saini**) - Exploring the seasonal variabilities of carbonate chemistry parameters in a mangrove ecosystem of the Northern Indian Ocean

- Invaluable to conservation because with the world's fast dwindling seagrass ecosystems, every bit of even the smallest seagrass beds is worth conserving to maintain the ecosystem services which human beings depend on. Understanding the characteristics of this ecosystem will help us build a more resilient ecosystem and aids in Blue Carbon storage pattern.

Oral Presenter 7 (**Anisah Jessica Lee**) - Spatio-temporal analysis of local scale seagrass of MiddleBank in the northern Straits of Malacca

- Monthly data from 2014 to 2020-pCO<sub>2</sub>, in surface water varies from 57.68 μatm to 1,17,160.34 μatm. Possible source of CO<sub>2</sub>?
- Observation of high pCO<sub>2</sub> values in post-monsoon and monsoon indicates the contribution of riverine discharge in elevating the pCO<sub>2</sub> concentration in the surface water.

- pH is found to be the major driver of pCO<sub>2</sub> in the region.

Poster Presenter 1 (**Laetitia Allais**) –Investigation of geochemical, biological, and physical controls on the carbon storage capacity in Hong Kong coastal wetlands

- Overall, our data show that the mangrove ecosystems around Hong Kong are highly heterogeneous. The different environmental characteristics point towards possibly different biogeochemical cycles driving carbon burial within each site.
- These are also likely to drive the microbial communities, which are key for carbon degradation and burial. With anthropogenic activities influencing environmental characteristics within wetland, addressing the geochemical and biological drivers of carbon sequestration remain an essential next step.

Poster Presenter 2 (**Jianqu Chen**) –Estimation of seaweed biomass in the intertidal zone of GouQi Island based on multispectral UAV

- It was found that each seaweed had different correlation with different spectral parameters, but they all showed significant correlation with infrared derived vegetation index.

Poster Presenter 3 (**Jenny Choo**) –Study of DOC, DIC and its  $\delta^{13}\text{C}$  drivers from tropical peat-draining rivers: Implications on blue carbon loss

- our findings showed considerable amount of DOC ( $804.81 \pm 95.71 \mu\text{M}$ ) was being discharged into the river systems (i.e. Simunjan, Sebuyau, Pusa) in 2016/2017, with depletion of  $\delta^{13}\text{C}$ -DOC values ranged from -47 to -20.1 ‰. As such, these findings provide insights on the impacts of peatlands disturbances which have resulted in carbon loss into our river systems over time.

Poster Presenter 4 (**Gao Qin**) –Organic carbon burial records since the Late Pleistocene in Hangzhou Bay, China

- The good correspondence of these events with low OC-AMAR indicated that cold climate events during geological history in the Hangzhou bay adversely affected carbon burial in the sediments.

Poster Presenter 5 (**Zhiyao Xiong**) –A new method of estimating carbon sequestration and biological pump efficiency in coastal waters

- This study developed a new method for estimating carbon sequestration and biological pump efficiency (BPE) based on an increase in DIC in the pycnocline layer and bottom layer due to respiration release of DIC.

## 2. One paragraph of session summary

This session discussed the blue carbon sink, storage in the biomass above ground and sediments, and the associated geochemical, biological, and physical controls in salt

marshes, mangroves, seagrass, phytoplankton, and macroalgae ecosystems. It also discussed the blue carbon loss induced by lateral exchanges of carbon in the coastal wetlands. This session deepened the understanding of the dynamic carbon process within coastal wetlands to better monitor and manage the blue carbon ecosystems.

3. New IMBeR West Pacific Marine Biosphere Research projects/directions for the next three years from this session (one or two bullet points)
  - ✓ -The complete blue carbon budget, including vertical and lateral exchanges of carbon, and blue carbon modeling.
  - ✓ - Carbon market and coastal blue carbon trading