

Macrosystem Controls of Carbon Storage in Mangroves: Using Coastal Environmental Settings as a Model for Global Estimates

Speaker: **Professor Robert R. Twilley**
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Chair: **Dr Dan Friess**
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Abstract

Global estimates of carbon storage in mangroves have used a diversity of frameworks to explain disproportionate differences among hemispheric patterns using local and regional data extrapolated to global estimates. This lecture will focus on a former conceptual model, the coastal environmental setting, as a means to develop global estimates in contrast to the more popular latitude-based hypotheses largely believed to explain hemispheric variation in mangrove ecosystem properties.

To demonstrate how local and regional estimates of carbon stocks and sequestration rates linked to coastal environmental settings can render more realistic global estimates for mangroves, several ecosystem properties will be described including aboveground biomass, litter fall, soil organic carbon (SOC), and soil burial rates. 552 sites across 43 countries were classified into distinct coastal settings according to two concurrent worldwide typologies of nearshore coastal systems. Our findings reveal striking differences between published values and contemporary global mangrove SOC extrapolations based on country-level mean reference values, particularly for karstic-dominated coastlines where mangrove SOC stocks have been underestimated by up to 50%.

We argue that this inconsistent reporting of SOC stock estimates between river-dominated and karstic coastal environmental settings is likely due to the omission of geomorphological and geophysical environmental drivers, which control C storage in coastal wetlands. We encourage the science community to utilize coastal environmental settings and new inventories of geomorphological typologies to build more robust estimates of local and regional estimates of SOC that can be extrapolated to global C estimates.

About the Speaker



Dr. Twilley is Executive Director of Louisiana Sea Grant College Program and professor in the Department of Oceanography and Coastal Science at LSU. Presently, Dr. Twilley serves as President-of Coastal and Estuarine Research Federation, an international coastal science society. Most of Dr. Twilley's research has focused on coastal systems ecology both in the Gulf of Mexico, throughout Latin America, and in the Pacific Islands. His research in mangrove ecosystems continues to focus on resolving global carbon estimates of ecosystem properties. More recently, Dr. Twilley has been involved in developing ecosystem models coupled with engineering and landscape designs to formulate adaptation strategies for coastal communities. He received his BS and MS from East Carolina University, PhD from University of Florida and post-doctoral studies were at University of Maryland Center for Environmental Studies.

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