



Buried alive or washed away: The challenging life of mangroves in the Mekong Delta.

William Nardin (1), Sergio Fagherazzi (2), and Karin Bryan (3)

(1) University of Maryland Center for Environmental Science, Horn Point Laboratory, Cambridge (MD), USA (wnardin@umces.edu), (2) Department of Earth & Environment, Boston University, Boston (MA), USA, (3) Coastal Marine Group, School of Science, University of Waikato, Hamilton, New Zealand

Mangroves colonize tropical shorelines, protecting coastal communities and providing valuable ecosystem services. Mangroves associated with deltas cope with a very dynamic environment characterized by strong gradients in salinity, deposition triggered by sediment inputs, and erosion caused by waves and currents. Mangroves are adapted to this ever-changing landscape, with different species colonizing different elevations in response to inundation frequency. A series of feedbacks between hydrodynamics, sediment transport, and mangroves was observed in a fringe forest of the Mekong Delta, Vietnam. *Sonneratia* spp. rapidly encroach upon sandy areas because the stable substrate favors seedling establishment. In contrast, fewer seedlings are present in muddy locations where currents and waves frequently rework the bottom. Along muddy shorelines that are eroding, turbulence increases local scour near roots and trunks, undercutting the trees. Enhanced sediment accumulation due to delta progradation can smother the mangrove roots and lead to forest dieback. We found clear evidence that mangroves affect both hydrodynamics and sediment transport, thus engineering the landscape and enhancing sediment trapping and delta progradation. *Sonneratia* spp. are replaced by *Aegiceras corniculatum*, *Avicennia marina*, and *Nypa fruticans* when the seabed becomes high enough, indicating that ecological succession is present in a fast prograding deltaic environment. Thus, it is imperative to determine the small-scale feedbacks between mangroves, hydrodynamics, and sediment transport in order to build quantitative ecogeomorphic models of deltaic sedimentation that can be used to explain the distribution of mangrove species, the forest structure, and large-scale dynamics in a tropical deltaic setting.