

## **Holly Michael**

Unidel Fraser Russell Chair for the Environment within Departments  
of Geological Sciences and Civil Engineering  
University of Delaware

### **“Land-Sea Water Exchange from Ripples to Shelves: Implications for Coastal Ecosystems and Ocean Chemistry”**

**ABSTRACT:** The physical and chemical processes of groundwater flow and solute transport in coastal systems are a primary control on chemical fluxes between land and sea. These fluxes sustain ecosystems and promote biogeochemical cycling, they change the chemistry of the ocean over geologic time, and they contribute to worldwide problems such as seawater intrusion and estuarine eutrophication. These exchanges occur over diverse scales, and often require a range of methods for quantification, across multiple disciplines. Examples of these exchange processes and approaches to quantification will be discussed. These include field and modeling studies that illustrate the influence of hydrologic, geologic, and geochemical interactions on nutrient fluxes to coastal surface waters on benthic and estuary scales. Numerical modeling of variable-density groundwater flow and salt transport applied to the geologically complex aquifer system of the Bengal Delta demonstrates the impact of geologic structure and preferential flow on water exchange processes across the continental shelf.