

Weekly CEAFM Seminar: Spring 2017



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Center for Environmental
& Applied Fluid Mechanics

Date: **Friday, April 7, 2017**
Time: 11:00 AM
Location: Gilman Hall # 132
Speaker: **Prof. Holly Michael** (University of Delaware)

"The Influence of Geologic Heterogeneity on Large-Scale Groundwater Flow and Solute Transport: Mega-Cities and Continental Shelves"

Abstract

Sedimentary architecture plays a major role in determining groundwater flowpaths and subsurface transport of solutes. The sedimentary history of the Bengal Delta has determined the structure and pattern its aquifer system, producing complex, highly heterogeneous stratigraphic sequences. Groundwater is the primary water source for 95% of the tens of millions of people living in this densely populated region, but its quality is threatened by widespread and naturally occurring contaminants such as arsenic and salt. The role of heterogeneity and preferential flow is considered in two contexts through numerical modeling analysis. First, the vulnerability of low-arsenic, deep aquifers to contamination due to large-scale groundwater pumping is assessed. Second, the distribution of salinity in the coastal zone and associated land-sea fluxes on the scale of the continental shelf are simulated. Results show that preferential flow creates unpredictable contamination pathways and increases vulnerability of water supply to contamination, with important implications for water supply sustainability. Such flowpaths also create complex salinity distributions that result in freshened groundwater offshore and salinity gradients that drive large fluxes of saltwater through continental shelves, with implications for seawater intrusion, biogeochemical cycling, and the evolution of ocean chemistry. Application to the Hawaiian coastal aquifer will be discussed.