A Field Course to Improve Student Performance and Scientific Interest in Applied Hydrology

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Hydrology is, in large part, a field-based science and our students need a hands-on experience in planning and conducting hydrological site investigations and carrying out watershed characterizations, with a focus on contamination remediation or restoration. At the same time, recent advances in computer modeling of groundwater systems have made modeling an equally essential skill for students in hydrology. The professionals who use hydrologic data are responsible for their content, including inherent errors and mistakes that have occurred in the field. Without knowing what difficulties there are in collecting field data and what might go wrong, an office person may ignorantly use poor data in a design problem.

An innovative three-week practical hydrology course incorporating both fieldwork and computer analysis was offered by Queens College (City University of New York) in the summer of 2001. The course was taught in collaboration with the United States Geological Survey (USGS) Water Resources Division and was designed to introduce students to a broad spectrum of hydrogeologic regimes and practices. Field segments were taught on the Queens College Campus in Flushing (urban), in Great Neck in Nassau County, (suburban), and at Caumsett State Park, Suffolk County (pristine). Two Queens College's field sites, each of which presents different hydrogeologic environments were utilized: Caumsett State Park, situated in the unconsolidated pre-glacial and glacial strata of Long Island's north shore, and the Queens College campus' groundwater monitoring well network.

Students gained first-hand experience in drilling and installing groundwater monitoring wells, designing the monitoring system, and collecting, describing, and testing subsurface materials. They followed up by analyzing the data they have collected, and modeling groundwater flow. Students also combined the principles and practices of surface water sampling and monitoring, water quality control and assurance, use typical industrial field equipment for determining water chemistry, learn how to calibrate and use electrochemical probes to measure pH, specific conductance, temperature, and dissolved oxygen. All the data were combined to determine (1) aquifer properties and water flow at Queens College Campus and in Great Neck Peninsula, (2) gamma-ray borehole geophysical logging, a hollow-stem auger and Geoprobe drilling method to determine hydro-stratigraphy at Caumsett and (3) a complete water-budget at the Caumsett site. These experiences prepare our students much better for careers in hydrogeology and makes them much more attractive to employers as they compete for their first entry-level position. This course have made our students much more competitive as they seek entry to the job and graduate school arenas.