

Long Island: A Learning Laboratory for Earth and Environmental Sciences

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One of the most effective means of teaching Earth and Environmental Sciences is to engage students in hands-on research projects and field activities that investigate the geology and biota of the area in which they live. This method of teaching employs the landscape that is most familiar to the students as a framework for their conceptualizing of natural phenomena. The new Regents Earth Science Program Modification encourages this type of teaching and provides educators with an excellent opportunity to stimulate interest in science among students and to promote an understanding of science as a process of discovery. In order to promote Long Island as a learning laboratory, the Center for High Pressure Research and the Museum of Long Island Natural Sciences offer courses, field activities, research projects and information packages for teachers and their students.

Long Island is a particularly effective outdoor learning laboratory due to its great variety of natural features and associated phenomena. Easily observable landforms include moraines, outwash plains, glacial kettles, barrier islands, dunes, lagoons, coastal headlands, spits, tombolos, estuaries and bodies of fresh water. Sedimentary strata that can be examined by students include till, outwash, lake bed clay, loess, and Cretaceous gravel, sand and clay. Recent deposits include salt marsh peat, bog peat, streambed gravel and sand, pond-bottom silt and organic material, dune sand and a variety of soil types. In coastal bluffs and excavations, students can observe sedimentary structures such as faults, folds and cross bedding. Students can introduce themselves to mineralogy and petrology by studying the great variety of beach cobbles and boulders that occur on the North Shore. Long Island's vegetational communities include oak-hickory forest, pine barrens and marine and freshwater wetlands. By studying vegetation and geology together in the field, students learn how they are related.

During the past several years, faculty and staff of the Department of Earth and Space Sciences at the University at Stony Brook have served as mentors for high school and undergraduate students who studied various aspects of Long Island's natural environment. In one project, a high school student collected data on the rock types of cobbles and boulders on North Shore Long Island beaches in order to determine directions of movement of Pleistocene ice sheets. Another student investigated the relationship of the distribution of salt marsh grass species to the mean high water and spring high water levels. To do this, she visited marshes during high tide, so she could use the water surface as a datum for measuring elevations of vegetational boundaries. Currently, a high school student is studying the relationship of soil particle size distribution to sizes of pitch pines (*Pinus rigida*) in the Long Island Dwarf Pine Plains. He is collecting soil samples and measuring tree heights along a transect from a tall pitch pine woodland to a dwarf pine forest. During visits to the Department of Earth and Space Sciences at the University at Stony Brook, he sieves the soil samples and records the data, which he enters into a spreadsheet program for analysis. This summer, a group of ten students who are entering the ninth grade and are participating in the Summer Science Camp program at the University will be investigating

chemistry and water movement in a group of ponds in the Central Pine Barrens. During the course of their research project they will learn about water sampling techniques, laboratory analysis and mapping.

An self-guided interpretive trail and an accompanying field guide are being developed for Flax Pond, a salt marsh in Old Field. The trail traverses upland areas, high marsh, low marsh, a cobble beach, an inlet and vegetated storm overwash areas. Using the guide, teachers and students will be able to learn, first hand, about the geological and ecological phenomena that shape the development of salt marshes and the role of these marshes in the coastal food web and the buffering of storm effects.

Long Island Water Resources: A Curriculum Activities Guide, developed by the Museum of Long Island Natural Sciences contains lesson plans for grades K through 12. Included are activities on aquatic environments that take students into the field, exercises on mapping Long Island's aquifers, land use planning exercises, and lessons on pine barrens, surface water, and environmental degradation as these subjects apply to Long Island. The Museum also offers field-oriented school programs on Long Island geology, salt marshes, the seashore and pine barrens for grades K through 6. These programs include an introductory indoor component, followed by a field trip.

Several courses offered to teachers by staff of the Museum of Long Island Natural Sciences and the Center for High Pressure Research through the University at Stony Brook's School of Continuing Education utilize natural areas on and near Long Island as field sites. In "Long Island Geology", participants explore a north-south transect across the moraines, outwash plains and the barrier beach along the South Shore. An additional trip takes them to the South Fork. "Long Island's Natural Environment" includes trips to the Pine Barrens, Mashomack on Shelter Island and a canoe trip on the Peconic River. "Wilderness and Society" requires an overnight at Fire Island National Seashore, a Carmans River canoe trip and visits to Hubbard County Park and other relatively unaltered parts of Long Island, and offers an optional two-night wilderness backpack in the Catskills.

Electronic media are an effective means of disseminating and learning about natural phenomena. In 1994, a hydrogeology student in the Masters program in Hydrogeology at the University at Stony Brook used Asymetrix Multimedia Toolbook software to develop an illustrated demonstration on Long Island's groundwater. A World Wide Web site entitled "Long Island's Natural Environment Online" (LINE OnLINE) is being developed by the Center for High Pressure Research and the Marine Sciences Research Center, both located at the University at Stony Brook. Through text, images and eventually sound and digital video, this service will disseminate information on Long Island's geology, marine environment, terrestrial ecology and hydrogeology to schools and the general public. LINE OnLINE will include short articles written by researchers on a wide variety of topics concerning Long Island's natural history as well as educational lesson plans for schools. Many of these lesson plans will include activity oriented field investigations designed for specific sites on Long Island.