

DETERMINING HAZEN COEFFICIENTS FOR MEASURING THE
HYDRAULIC CONDUCTIVITY OF
LONG ISLAND PINE BARRENS SOIL.

Edward Fontana-Daguerre, Department of Earth and Space Sciences and The Center for Science, Mathematics and Technology Education, SUNY, Stony Brook, NY 11794-2100

Studies have linked the variation of ecosystems on Long Island to the conditions of the local geology and the effect these conditions have on the rate with which water is conducted through the soils and surface sediments. Therefore establishing values for hydraulic conductivity for the soils and sediments at sites located in various ecosystems would be useful in testing the theories that are based on this concept.

Hydraulic conductivity of unconsolidated sediments is rarely measured directly. Values for hydraulic conductivity are commonly established through equations based on the relationship of grain size and the sorting of the sediment. The main reason for this is the relative ease of determining values in this way. One only needs to collect and sieve a sample when using this method to calculate values of hydraulic conductivity. One such technique is the Hazen method. The equation this method is based on is as follows:

$$K=c(d_{10})^2$$

Where K is the hydraulic conductivity, c is a coefficient based on the sorting of the sediment and d_{10} is the effective grain size.

Calculating the hydraulic conductivity in this fashion can lead to discrepancies in the values of hydraulic conductivity. There are essentially two problems which arise using the Hazen method. The first is the determination of the coefficient based on the sorting of the sediments. The value for this coefficient is derived from tables and is subjective in nature. Thus, variations in the hydraulic conductivity value will occur based on the assessment of the degree to which a sample is sorted as interpreted by the individual researcher. The second problem is due to the fact that the equation does not take into account variations in the composition of sediment grains. The characteristics of the grains in a given sample may vary, especially in the soils under consideration. This may, in turn, lead to a variation in the calculated rate of hydraulic conductivity for that sample.

The direct measurement of the hydraulic conductivity offers a solution to both of these problems. In this study undisturbed samples were taken to a depth 27cm from a site in the Dwarf Pine Plains in Westhampton. The hydraulic conductivity for these

MONITORING THE SHORELINE: TRACKING AND PREDICTING SEDIMENT LOSS
AND GAIN IN EAST HAMPTON TOWN

Barnaby Friedman, East Hampton Town Natural Resources/Environmental Protection
Suite 105, 300 Pantigo Place, East Hampton, New York 11937
Lucy Miller, East Hampton Town Natural Resources/Environmental Protection
Pat Janums, East Hampton Town Natural Resources/Environmental Protection
Betsy Jacobs, Southampton College of Long Island University
Geology, Southampton College, Southampton, N.Y. 11968
Walter Galcik, East Hampton Town Natural Resources/Environmental Protection
Donna Daiute, East Hampton Town Natural Resources/Environmental Protection

East Hampton Town is surrounded by seawater on three sides and has 110 miles of coastline. In the last 12 years this coastline has been raked by five major noreasters and two hurricanes, not to mention several lesser noreasters and many serious encroachments by severe tropical storms. Public and private lands along the shore, including residences and businesses, and town infrastructure, have experienced considerable losses to erosion over this period. In order to better understand the short-term and long-term consequences of such frequent attacks of storm driven seas along its coast, in 1994 East Hampton initiated a townwide shoreline monitoring program. The town's Natural Resources and Environmental Protection Department is responsible for carrying out this program. Although only in its third year, the program is already well established and the resource base thus far developed is being used in a variety of ways, including strategic land use mapping and planning, hazard mitigation planning, natural resources protection, habitat remediation, and shoreline feature protection and stabilization.

This monitoring program incorporates the following survey and measurement elements: 1) ground based photography; 2) aerial photography; 3) ground based video; 4) aerial video; 5) plane surveying; 6) meteorological monitoring; 7) tide gauging; 8) wave monitoring; 9) substrate mapping; 10) historical research and analysis. The town's program also attempts to incorporate findings from on-going geographically coincident studies, e.g., the U.S. Corps Of Engineers "Fire Island To Montauk Point Reformulation" study and earlier coastal geomorphological studies that focused on, or included, parts of this coastline. See, for example, works by Bokuniewicz (1981), Bruno et al (1991), Leatherman (1989), Leatherman and Allen (1985), Zimmerman et al (1988), and Zarrillo (1989).

Shorter-term processes monitored include: 1) pre- and post-storm shore profiles and volume changes; 2) pre-winter and post-winter shore profiles and volume changes; 3) the measurement of erosion rates in terms of dune loss, bluff loss, beach loss and deflation from year to year; 4) short-term processions and accretions, including overwashes and shoaling 5) dune migration; and 6) impacts from ORV driving 7) impacts of shore-hardening structures and surrogate beach and dune building.

Currently, all of the measurements and other data collected are being compiled into a spatially coordinated data base for GIS rendering, the end product of which will be a set of multi-layered, multi-character townwide shoreline maps describing the shoreline over a series of intervals.

ACKNOWLEDGMENTS

The authors would like to thank the Town Of East Hampton, the East Hampton Town Trustees, the Nathan Cummings Foundation, the Federal Emergency Management Agency, N.Y.State Emergency Management Office and the N.Y.State Department Of State for financial support.

REFERENCES

- Bokuniewicz, H.J.(1981) The Seasonal Beach at East Hampton, New York, Shore and Beach, 49,28-33.
- Bruno, M., S. Leatherman, and H. Bokuniewicz (1991) Sand Transport Near The Groins At Georgica Pond, East Hampton, N.Y., Working Paper No. 52, Mar.Sci.Res.Ctr, SUNY, Stony Brook.
- Leatherman, S.P.(1989) Shoreline Changes At Wainscott, East Hampton, N.Y.
- Leatherman, S.P. and J.R. Allen(1985) Geomorphic Analysis, Fire Island Inlet To Montauk Point, Long Island, New York: Reformulation Study, National Park Service, North Atlantic Region.
- Shaffer, G.S. and T.C.Jorling(1993) Emergency Response To Coastal Storms, Draft Final Report, V.1., New York State Coastal Erosion Task Force.
- Schafer, G.S. and T.C.Jorling(1993) Long Term Strategy, Draft Final Report, V.2, N.Y. State Coastal Erosion Task Force.
- Taney, N.C. (1961) Geomorphology Of The South Shore Of Long Island, New York.Tech Memo 36, Coastal Eng. Res. Cntr, U.S. Army Corps. Engs.
- Tanski, J. and H. Bokuniewicz(Eds.)(1990) Identification And Assessment Of Technological Information Requirements For Developing Coastal Erosion Management Strategies, Proceedings Of Workshop, Special Rep.103, N.Y. State Sea Grant Inst.
- Tanski, J. and H. Bokuniewicz(Eds.)(1990) An Overview And Assessment Of The Coastal Processes Data Base For The South Shore Of Long Island, Proceedings Of Workshop, Special Report 104, N.Y. State Sea Grant Inst.
- Tanski, J. and H. Bokuniewicz(Eds.)(1990) A Preliminary Assessment Of Erosion Management Strategies For The South Shore Of Long Island, Proceedings of Workshop, Special Rep.105, N.Y. State Sea Grant Inst.
- Tanski, J. and H. Bokuniewicz(Eds.)(1992) Development Of A Coastal Erosion Monitoring Program For The South Shore Of Long Island, New York. Special Rep. 106, N.Y. State Sea Grant Inst.
- Zimmerman, M.S., H.J.Bokuniewicz and L. McTiernan(1988) Beach Conditions At East Hampton, New York, January Through December 1988.
- Zarillo, G.(1989) Assessment Of Long-Term Shoreline Recession Rates On Eastern Long Island. Florida Inst.Tech.