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Woods Hole Sea Grant: Coastal Processes

What Is That Sticking Out Of The Sand?
Maio, C.V. and Berman, G.A. 8 pages.

Ancient landscapes revealed along transgressing coastlines provide a time sensitive opportunity to research the environmental and human response to past climate change. Research and education opportunities afforded by recently revealed ancient landscapes are time sensitive, because once they are revealed in coastal settings they are often destroyed due to the continued landward march of the shoreline. With accelerated rates of sea level rise (SLR) and increased storm activity predicted for the future, paleolandscapes revealed along coastlines will be increasingly common and short lived. This fact makes it important that coastal scientists are prepared to research these sites and utilize their educational value before they are lost to the rising seas.

Related Files

» What's That Sticking Out of the Sand?

» Longshore Sediment Transport

» Portfolio: Estuarine and Coastal Processes

» Dune Restoration Using Cape American Beach Grass and Fencing

» Can Humans & Coastal Landforms Co-exist?: Proceedings of a Workshop Held at the Woods Hole Oceanographic Institution, Woods Hole, MA, January 24, 2001

» Coastal Landform System Sustainability Project: An Analysis of Activities Permitted on Coastal Landforms on Cape Cod, Massachusetts in 1999

» Coastal Landform Mangement in Massachusetts: Proceedings of a Workshop Held at the Woods Hole Oceanographic Institution, Woods Hole, MA USA, October 9-10, 1997

Longshore Sediment Transport, Cape Cod, Massachusetts

Berman, G.A., 46 pages.
The purpose of this report is to provide a qualitative understanding of the net motion of sediment along the beaches of Cape Cod, Massachusetts. ... It is hoped this document, derived from a synthesis of historic sediment transport and an in-depth analysis of transport inhibitors. will provide valuable qualitative resource for understanding Cape Cod's dynamic shoreline. This 46-page document includes full-color aerial maps of Barnstable County and is a valuable tool for conservation commissions, land owners, decision makers and the public at large. Available as .pdf (see Related Files to right) or as hard copy ($5).

Coastal Dune Protection & Restoration Using Cape American Beach Grass and Fencing

This bulletin addresses restoration of the dynamic frontal coastal sand dune system with sand fencing and 'Cape' American beachgrass. Other typical Northeast area dune plants, such as Rosa Rugosa, Bayberry, and Beach Plum occupy more stable secondary and backdune areas.

Coastal Landforms, Coastal Processes and Erosion Control on Cape Cod and Southern Plymouth, Massachusetts
O'Connell, J.F. (ed.)
DVD, Approximately 76 minutes, 2006 WHOI-V-07-001

These Dunes Aren't Made for Walking
Woods Hole Sea Grant
Poster (11" x 15"), 2006 WHOI-G-06-001
Printed on waterproof stock, this poster describes the importance of dunes as a first line of defense against ocean waves and encourages beachgoers not to trample the dunes.

Portfolio: Estuarine and Coastal Processes
Woods Hole Sea Grant
18 pp., 2005 WHOI-Q-05-003
Also available online as a PDF file: click here
Learn more of how, over the past three decades, Woods Hole Sea Grant has invested in research, extension, and outreach in the programmatic theme area Estuarine and Coastal Processes. This investment has resulted in better understanding of the physical, chemical, geological, and biological processes of coastal habitats. This information has been applied to critical management decisions in the coastal zone including water quality issues, shoreline erosion and storm damage, and food web dynamics.

Cape Cod Landforms and Coastal Processes
O'Connell, J.F. (ed.)
Poster (28" x 22"), $7.50 (includes mailing costs), quantity discounts also available, 2004 WHOI-G-04-004
For more information, click here.

Northeast Beaches: A Balancing Act
Only available on loan from the National Sea Grant Library
Urban Harbors Institute, University of Massachusetts
Abstracts from a conference held at the Woods Hole Oceanographic Institution October 23-26, 2002, 50 pp. WHOI-W-02-002

Can Humans & Coastal Landforms Co-exist?: Proceedings of a Workshop Held at the Woods Hole Oceanographic Institution, Woods Hole, MA, January 24, 2001

O'Connell, J.F. (ed.)
WHOI Technical Report WHOI-2001-14, 118 pp., $6.00, 2001 WHOI-W-01-001
(Click here to view this document as a 1.3 MB PDF file.)

Hydrodynamic Controls on Multiple Tidal Inlet Persistence
Only available on loan from the National Sea Grant Library
Salles, P.
Doctoral Dissertation. Massachusetts Institute of Technology/Woods Hole Oceanographic Institution Joint Program in Oceanography/Applied Ocean Science and Engineering, 272 pp., February 2001 WHOI-Y-01-001

Coastal Landform System Sustainability Project: An Analysis of Activities Permitted on Coastal Landforms on Cape Cod, Massachusetts in 1999
O'Connell, J.F.
WHOI Technical Report WHOI-2000-09, 58 pp., $6.00, 2000 WHOI-T-00-001
(Click here to view this document as a 464 KB PDF file.)

Theme Booklet: Estuarine and Coastal Processes
WHOI Sea Grant
4 pp., 2000 WHOI-G-00-005
Also available online: click here
Learn more of WHOI Sea Grant's investment in estuarine and coastal processes which has resulted in better understanding of the physical, chemical, geological, and biological processes of coastal habitats. This information has been applied to critical management decisions in the coastal zone including water quality issues, shoreline erosion and storm damage, and food web dynamics.

Coastal Landform Mangement in Massachusetts: Proceedings of a Workshop Held at the Woods Hole Oceanographic Institution, Woods Hole, MA USA, October 9-10, 1997
Crago, T.I. and S.D. DeRosa (eds.)
WHOI Technical Report WHOI-98-16, 119 pp., $12.00, 1998 WHOI-W-97-001
(Click here to view this document as a 2.3 MB PDF file.)
The workshop was designed to benefit resource management decision-makers through interactive exercises and discussions of coastal problems ranging from those that arise everyday to those of unusual complexity. The immediate objective of the workshop was to improve familiarity with existing management methodologies. The long-term objective was to improve the methodologies themselves.

A Comparison of Methods to Determine K in a Shallow Coastal Aquifer
Milham, N.P. and B.L. Howes
Ground Water, Vol. 33, No. 1, pp. 49-57, 1995 WHOI-R-95-001

Nutrient Balance of a Shallow Coastal Embayment: I. Patterns of Groundwater Discharge
Milham, N.P. and B.L. Howes
Marine Ecology Progress Series, Vol. 112, pp. 155-167, 1994 WHOI-R-94-004

Transport of Juvenile Gem Clams *(Gemma gemma)* in a Headland Wake
Rankin, K.L., L.S. Mullineaux, and W.R. Geyer
Estuaries, Vol. 17, No. 3, pp. 655-667, 1994 WHOI-R-94-006
Accumulation of bivalve recruits in the bottom convergence at the center of coastal eddies has been suggested as a possible mechanism resulting in locally abundant adult populations. The authors investigated transport of juvenile gem clams *(Gemma gemma)* in a headland wake to determine whether they accumulated, and where. Velocity measurements during three flood tides showed that a wake consistently formed, but that flow speeds were too slow to transport juvenile clams to the eddy center. Instead, the clams were deposited just inside the wake perimeter, where shear velocities decreased to levels below critical erosion velocities of the clams. This result demonstrated that accumulation in a coastal flow separation can occur even in the absence of a well-defined eddy or a strong bottom convergence. Juvenile gem clams were carried, probably as bedload, to regions in the wake dominated by sediments with similar grain sizes, rather than similar fall velocities, suggesting that bedload transport was particularly dependent on particle diameter in this flow regime. Adult gem clam populations tended to be locally abundant in regions receiving transported juveniles, but clam transport on any specific flood tide was not sufficient to fully predict the adult distributions.

Coastal and Estuarine Studies. Formation and Evolution of Multiple Tidal Inlets
This publication is only available from: American Geophysical Union, 2000 Florida Avenue, NW, Washington, DC 20009, U.S.A.
Aubrey, D.G. and G.S. Giese (eds.)
American Geophysical Union, Washington, D.C., Vol. 44, 237 pp., 1993

Quantifying Dissolved Nitrogen Flux Through a Coastal Watershed
Weiskel, P.K. and B.L. Howes
Water Resources Research, Vol. 27, No. 11, pp. 2929-2939, 1991 WHOI-R-91-005
Available nitrogen loading models, commonly used to estimate subsurface fluxes of dissolved nitrogen to coastal waters, have not been quantitatively or systematically compared; nor have they generally been field-verified at regional scales. The authors employed three

published loading models, a site-specific model based upon water use data, and both Darcian and non-Darcian field approaches to obtain estimates of steady state, dissolved nitrogen flux through a permeable Massachusetts watershed. Loading models, if properly verified by field measurements at the stream tube scale, hold promise for characterizing the effects of land use on subsurface nitrogen flux through coastal watersheds.

Nitrogen Inputs to a Marine Embayment: The Importance of Groundwater
Helpful to educators and students.
Giblin, A.E. and A.G. Gaines
Biogeochemistry, Vol. 10, pp. 309-328, 1990 WHOI-R-90-012
The authors examined the importance of nitrogen inputs from groundwater and runoff in a small coastal marine cove on Cape Cod, Massachusetts. Groundwater inputs were evaluated in three different methods: a water budget, assuming discharge equals recharge; direct measurements of discharge using bell jars; and a budget of water and salt at the mouth of the Cove over several tidal cycles. The lowest estimates were obtained by using a water budget and the highest estimates were obtained using a budget of water and salt at the Cove mouth. Overall there was more than a five fold difference in the freshwater inputs calculated by using these methods. Nitrogen in groundwater appears to be largely derived from on site septic systems. Average nitrate concentrations were highest in the region where building density was greatest. Nitrate in groundwater appeared to behave conservatively in sandy sediments where groundwater flow rates were high (>11/m2/h), indicating that denitrification was not substantially reducing external nitrogen loading to the Cove. Nitrogen inputs from groundwater were approximately 300 mmol-N/m3/y of Cove water. Road runoff contributed an additional 60 mmol/m3/y. Total nitrogen inputs from groundwater and road runoff to this cove were similar in magnitude to river dominated estuaries in urbanized areas in the United States.

Geodetic Fixing of Tide Gauge Bench Marks
Only available on loan from the National Sea Grant Library
Carter, W.E., D.G. Aubrey, T. Baker, C. Boucher, C. LeProvost, D. Pugh, W.R. Peltier, M. Zumberge, R.H. Rapp, R.E. Schutz, K.O. Emery, and D.B. Enfield
Woods Hole Oceanographic Institution Technical Report WHOI-89-31 (CRC-89-5), 44 pp., 1989 WHOI-T-89-009

The Characteristics of the China Coastline
Wang, Y. and D.G. Aubrey
Continental Shelf Research, Vol. 7, No. 4, pp. 329-349, 1987 WHOI-R-87-011

An Improved Loran-C Drifting Buoy and Drogue for Coastal Applications
Burke, W.J.
Ph.D. Thesis. Massachusetts Institute of Technology/Woods Hole Oceanographic Institution Joint Education Program, 1 p. (abstract only), 1983 WHOI-X-83-002

Survey of Shoreline Structures--Popponesset Beach, Massachusetts
Only available on loan from the National Sea Grant Library
Goud, M.R. and D.G. Aubrey
Woods Hole Oceanographic Institution Technical Report WHOI-83-14, 32 pp., 1983 WHOI-T-83-001

Trace Element Enrichments in Decomposing Litter of *Spartina alterniflora*
Breteler, R.J., J.M. Teal, A.E. Giblin, and I. Valiela
Aquatic Botany, Vol. 11, pp. 111-120, 1981 WHOI-R-81-019

Our Dynamic Coastline
Helpful to educators and students.
Aubrey, D.G.
Oceanus, Vol. 23, No. 4, pp. 4-13, 1980 WHOI-R-80-019
The beaches of the United States, which include the most extensive barrier beaches in the world, constitute a valuable and delicate resource that must be managed intelligently to avoid loss of their recreational benefits, storm protection, and aesthetic appeal. Beaches are complex systems: they are forced by complex atmospheric and oceanic behavior and respond in an equally complex manner. This article discusses geological factors that control shoreline features, nearshore hydrodynamics, and beach response. The author concludes by pointing out that our scientific understanding of beaches is, in some respects, not sufficient to meet the requirements of coastal zone management in establishing beach policies and guidelines. Dr. Aubrey calls for a continuation of active research in beach processes in general, including barrier beach systems, as well as the need for the scientific community to work closely with the public to educate and communicate various scientific alternatives available for managing our beaches.

Proceedings of a Workshop on Coastal Zone Research in Massachusetts
Only available on loan from the National Sea Grant Library
Aubrey, D.G.
1979 WHOI-W-79-001

Grain Size in Laminae of Beach Sand
Emery, K.O.
1978 WHOI-R-78-009

Last updated: June 24, 2014

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