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Virginia Institute of Marine Science

Center for Coastal Resources Management

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# Virginia Wetlands Report



Volume 22, Issue 1

A Biannual Publication Focused on Virginia Wetland Issues and Training

Spring 2007

## Living on the Edge

“Living on the edge” implies high-risk choices. The L phrase is particularly appropriate when applied to home ownership on tidal shorelines. Wave driven erosion and storm surge damage are familiar problems for waterfront property owners. Recently, these issues seem to have taken on added significance. In part this is because the underlying driver – climate – is changing in ways that heighten the risks associated with living on the edge.

Climate change is bringing increased temperatures, rising sea level, more frequent storms and increased rainfall. These predictions are based on recent trends and evolving understanding of global climate processes. Importantly, all of these factors can increase the risks along tidal shorelines.

The edge is now clearly moving. Shorelines have always migrated across the landscape as ocean waters were stored or released from ice caps and glaciers. But in the local region, changes over the last several hundred years have generally been small enough to go unnoticed. This is no longer true.

We now have accurate records covering long enough periods to clearly show the trends in tide levels. From these records it is not only clear that water levels are rising, they appear to be rising at an increasing rate.

*“Climate change is bringing increased temperatures, rising sea level, more frequent storms and increased rainfall.”*

Historic rates of sea level rise were always estimated at approximately 1 foot per century. This does not seem like much, but a quick visit to the site occupied by colonists 300 years ago on Jamestown Island will highlight the importance of a 3 foot rise in sea level. Formerly occupied lands are submerged or washed away by rising tidal waters.

More modern rates of sea level rise are now estimated to be 1.5 to 3 times the historic rate. When one considers the proportion of shorelines in Virginia that are now occupied with structures or other uses at or very near the waters edge, the scope of the coming challenge is obvious. And the challenge is coming faster than it was a century ago.

There are not a lot of options for confronting the impacts of climate change along the coast. We can resist change by investing in ever larger defensive structures. But the costs are realized not only in escalating dollars, but also the declining ecological condition of the shoreline. The other option is to find ways to live with the change, altering our use and management of the shoreline to accommodate the inevitable.

There are several things we must accomplish to become successful at managing the consequences of climate change. First we must continue to monitor and study the trends in processes that will affect us. Second, we must identify management strategies that can effectively accommodate human use and progressive change in the system. Finally, we must begin to always consider future consequences of current decisions. Understanding and considering the increasing risks of living on the edge is the only way to succeed.

### Workshop Announcement

*Sea Level Rise & Other Coastal Hazards:  
The Risks of Coastal Living*



*Friday  
May 11, 2007  
at VIMS*

*See inside for information & registration*

**Center for  
Coastal  
Resources  
Management**

Virginia Institute of Marine Science

## Quick Reference: Sea Level Rise & Other Coastal Hazards

**Consortium for Atlantic Regional Assessment** - Website provides information on regional and local climate change and land use in the Mid-Atlantic Region. VIMS collaborated on various studies of local interest in the Hampton Roads Area of Virginia. <http://www.cara.psu.edu/default.asp>

**US Geological Service** - National Assessment of Coastal Vulnerability to Sea Level Rise: Preliminary Results for the U.S. Atlantic Coast. U.S. Geological Survey Open-File Report 99-59. The report describes an objective method to determine portions of the US coastal regions at risk and the nature of the risk (inundation, erosion, etc.). <http://pubs.usgs.gov/of/1999/of99-593/>

**Harvard - Smithsonian Center for Astrophysics** - Sea Level Home: Hazards of Sea Level Rise: An Introduction. Provides a brief description of the impacts of sea level rise. [http://cfa-www.harvard.edu/space\\_geodesy/SEALEVEL/](http://cfa-www.harvard.edu/space_geodesy/SEALEVEL/)

**Pew Center on Global Climate Change** - Sea-Level Rise & Global Climate Change: A Review of Impacts to U.S. Coasts. The vulnerability of a coastal area to sea level rise varies according to the physical characteristics of the coastline, the population size, and amount of development, and the responsiveness of land-use and infrastructure planning at the local level. [http://www.pewclimate.org/global-warming-in-depth/all\\_reports/sea\\_level\\_rise/index.cfm](http://www.pewclimate.org/global-warming-in-depth/all_reports/sea_level_rise/index.cfm)

**Environmental Protection Agency** - Climate Change – Health and Environmental Effects. This section of the site provides information on Coastal Zones and Sea Level Rise. Includes links to maps, reports and other studies. <http://epa.gov/climatechange/effects/coastal/index.html>

**Maryland Sea Grant** - Chesapeake Quarterly, Vol. 5, No. 3. Global Warming and the Bay. This issue follows the imprint of climate warming on the Chesapeake watershed. They also offer us some predictions for what we might expect to see in the future. (Maryland Sea Grant magazine). <http://www.mdsg.umd.edu/CQ/index.html>



## Tidal Wetlands and Sea Level Rise: Where's the Marsh?

Sea level is rising. It's been rising since the last Ice Age. Historic streams and river valleys drowned by sea level rise have become coastal bays, coves and tidal marshes.

As sea level rose, fine grained sediments settled in the low energy coves and bays creating tidal flats. One particular marsh plant, Smooth cordgrass (*Spartina alterniflora*), invaded the flats. The dense cordgrass stems, which are very effective at slowing water movement as well as trapping and accumulating sediments, created new flats that were then invaded by more *Spartina*, and thus the marsh was created.

The same processes of marsh creation are those processes necessary for marsh persistence. *Spartina* has an elevation requirement, growing from about mean sea level to mean high water. With rising sea level, marsh vegetation must trap sediment to maintain the proper growing elevation. Survival of the marsh also depends upon the ability of the marsh to move landward over time where the leading edge of the marsh becomes submerged. Under certain conditions, the marsh may expand both seaward over newly created flats and landward in response to sea level rise.

Marshes have largely kept pace with the relatively constant rate of sea level rise of the last several thousand years. Currently, the rate of sealevel rise is increasing. This means that marshes need to trap more sediment and retreat landward to survive. However, coastal erosion defenses have reduced sediment supply and development has prevented landward retreat. Those fringing marshes channelward of shoreline structures along Virginia's shorelines are destined to disappear, as are large expansive marshes where the accumulation of sediment and organic material is not sufficient to keep pace. One remaining option for the persistence of Virginia's tidal wetlands is marsh retreat. Planning to ensure that adjacent uplands remain undeveloped will allow marshes to persist and continue providing important ecological services valued by society.

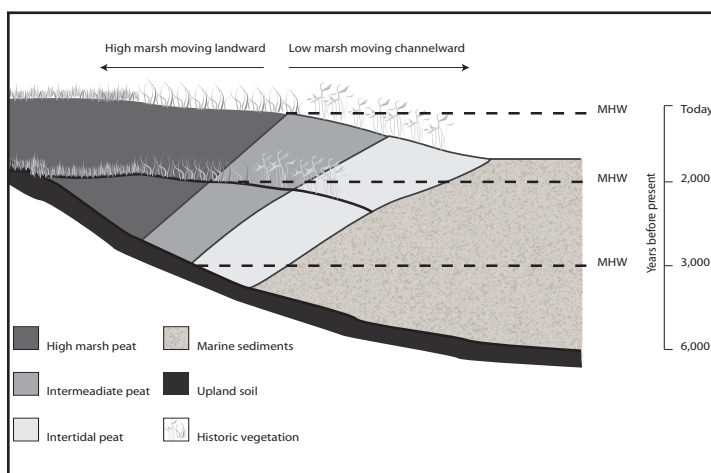


Fig. 1. Hypothetical cross-section of a salt marsh showing its development over time. As sea level rises, sediments, roots and rhizomes build up at the same rate to form peat. As the marsh rises, it expands out over mud flats toward the water, and also landward. Adapted from R. Scott Warren, *Evolution and Development of Tidal Marshes*. <http://www.conncoll.edu/ccrec/greennet/arbo/publications/34/CHP2.HTM>



# WORKSHOP ANNOUNCEMENT

## Sea Level Rise & Other Coastal Hazards: The Risks of Coastal Living

Friday, May 11, 2007

8:00 am - 9:00 am Registration

9:00 am - 4:00 pm Workshop

Virginia Institute of Marine Science, Gloucester Point, VA

Workshop Web Site: [ccrm.vims.edu/spring2007](http://ccrm.vims.edu/spring2007)

This workshop will provide opportunities to explore issues related to sea level rise, coastal storm surges, flood plain development & other coastal hazards from a global and national scale to the local perspective. The keynote speaker will be Dr. John Wells, Dean & Director of VIMS, who was recently appointed to a national committee charged with exploring the impact and ecological implications of Hurricane Katrina in Louisiana. Other invited speakers will address sea level hazard trends & issues in the Chesapeake Bay. The workshop is designed to provide useful information to local government planners and environmental program staff. The timely and important subject matter may be of interest to a wide range of individuals from wetland board members to resource managers to the general public.

### Morning Session

#### Background & Ecological Implications

- National Issues & Implications for Virginia
- Recent Sea Level & Tide Trends in Chesapeake Bay
- Response of Coastal Natural Resources to Sea Level Rise. How are these systems affected by climate change and what does it mean for the health of the ecosystem?

### Afternoon Session

#### Community Planning & Policies

- Consortium for Atlantic Regional Assessment (CARA) Hampton Roads Project
- Coastal Hazard Management Plans
- Local Planning Tools
- Interactive Breakout Discussion Session

## Registration

Name	_____
Affiliation	_____
Address	_____
Phone	_____
Fax	_____
Email	_____

**Registration - \$25 (includes lunch).** Please make checks payable to: **VIMS Tidal Wetlands Workshop**

If paying by VISA/Mastercard, please return the registration form by email ([dawnf@vims.edu](mailto:dawnf@vims.edu)) or fax (804-684-7179) AND call Dawn at 804-684-7380 with credit card information.

**Deadline for payment & registration: May 1, 2007**

Please mail form and registration payment to  
Tidal Wetlands Workshop/CCRM  
P.O. Box 1346  
Gloucester Pt., VA 23062

The Virginia Wetlands Report is a biannual publication of the Wetlands Program at the Virginia Institute of Marine Science of the College of William and Mary. To subscribe to this newsletter, please contact:

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## Tidal Wetlands News & Events

**Environment Virginia 2007.** April 10-12. Virginia Military Institute, Lexington, Virginia. The theme for the meeting is Leadership, Strategies, Action. For more information visit. <http://environmentva.org/>

**VIMS Marine Science Day.** May 19, 2007. Gloucester Point, VA. The event will take place on VIMS' main campus in Gloucester Point, rain or shine. Parking and admission are free. Visitors will be able to tour laboratories, examine high-tech equipment, attend mini-lectures, watch cooking demonstrations and learn about wetlands in the VIMS' Teaching Marsh. For more information call 804-684-7846 or see more at <http://www.vims.edu/events/>

**Wetlands 2007. Watershed Strategies to Protect and Restore Wetland's Ecological and Social Services.** August 27-29, 2007. Colonial Williamsburg Lodge and Conference Center, Williamsburg, VA. In recent years, scientific and engineering studies have documented the value of ecological and social services provided by headwater wetlands and streams. Protecting and restoring these areas is critical to sustaining the ecological and social services provided by broader aquatic resources including larger riverine and coastal systems. The loss of these critical resources results in threats to human health and safety, and higher costs for drinking water, storm water control, flood protection and recreation. However, federal, state and local programs have encountered numerous challenges in efforts to restore and maintain these critical resources. The purpose of this symposium is to identify opportunities and integrated strategies for protecting and restoring headwater wetlands, streams and related waters. <http://www.aswm.org/index-alt.htm>

**Wetlands and Chesapeake Bay Preservation Act Forum.** The Forum is structured to allow Wetlands and Chesapeake Bay Preservation Act board members and staff from across coastal Virginia to exchange questions, ideas, or general comments regarding Tidal Wetlands and Chesapeake Bay Preservation Act issues. For more information visit [http://ccrm.vims.edu/wetlands\\_forum/wetlands\\_forum.html](http://ccrm.vims.edu/wetlands_forum/wetlands_forum.html)

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