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Living Shorelines Policy: The Integration of Shoreline Management and Planning

Virginia has new a law pertaining to shorelines. Senate Bill 964 became law on July 1, 2011; so did thousands of other Bills. This Law, however, is of particular interest to those that live along, manage, plan for, earn a living from, or study Virginia's tidal shorelines and waters. Importantly, it declares that Virginia has a preference for the use of living shorelines as a management approach to shoreline erosion.

So what is a living shoreline? The law defines living shorelines as "… a shoreline management practice that provides erosion control and water quality benefits; protects, restores or enhances natural shoreline habitat; and maintains coastal processes through the strategic placement of plants, stone, sand fill, and other structural and organic materials." (Code of Virginia § 28.2-104.1).

Virginia "encourages the use of living shorelines as the preferred alternative for stabilizing tidal shorelines in the Commonwealth." This means that the conventional "hardened" shorelines (using bulkheads and onshore revetments) are less preferred.

The preferred use of living shorelines and an integrated approach to shoreline management, will be promoted through actions of State agencies and local governments as specified in the law. The actions required are:

1. The Virginia Marine Resources Commission (VMRC) shall establish a general permit for living shorelines.
2. VMRC shall develop integrated guidance for the management of tidal shoreline systems.
3. Localities shall incorporate coastal resource management guidance developed by VIMS into its comprehensive plan.

Work is underway on the mandated tasks assigned by the legislation. Here's a little more background, the various mandated elements and some of the work done at VIMS that preceded the legislation.

Living Shorelines General Permit

The VMRC is tasked with the development and implementation of a general permit regulation to promote the use of living shorelines. The effort should include the Department of Conservation and Recreation (DCR), VIMS and coordinate with the U.S. Army Corps of Engineers (Corps).

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Rivers & Coast/CCRM
P.O. Box 1346
Gloucester Pt., VA 23062
(804) 684-7380
dawnf@vims.edu

CCRM Director: Dr. Carl Hershner

Contributing Author: Pam Mason

Illustration: Karen Reay, Molly Mitchell

Photographs: Pam Mason, Karen Duhring

Layout: Ruth Hershner

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A marsh sill and planted marsh at Hull Springs Farm in Westmoreland County after three growing seasons and two major storms.

The concept of a general permit is to simplify approvals for actions considered to have little cumulative adverse environmental impact. The VMRC currently has several general permits for activities that occur within subaqueous lands, the Agency's jurisdiction. The Corps has many general permits; some that apply nationwide (referred to as nationwide permits), and some that are operational just within the local Norfolk district (called regional permits).

The Virginia Institute of Marine Science (VIMS) has been engaged in living shoreline issues for many years. One of the earliest efforts to promote the use of naturally occurring shoreline habitats for erosion protection was the Think Green brochure first produced in 1994. The brochure described the benefits of the "green" approach - using planted tidal marsh grasses for erosion control with general instructions and photographs. (The second edition of the brochure is available on-line at this address: *http://ccrm.vims.edu/publications/pubs/thinkgreen.pdf*).

Since that time, many research and outreach efforts have been directed toward living shorelines. The research and educational efforts can serve to inform the development of the general permit. Just some of the VIMS efforts on living shorelines:

Why and Where Living Shorelines?

Virginia has nearly 5,000 miles of shoreline, and even more if you count all the marsh creeks in the extensive tidal marshes. Along these shores are found marshes, beaches, tidal mudflats, and riparian buffers which provide critical habitat for a wide variety of plants and animals and essential water quality benefits. These shoreline resources are threatened due to relative sea level rise and manmade impacts.

Filling, clearing, and armoring shorelines for many different reasons have resulted in cumulative impacts to riparian areas and tidal wetlands for some time. In Virginia, an average of 16 to 18 miles of new shoreline structures were permitted each year from 2000 to 2007 and about 42 acres of tidal wetland losses were permitted from 1993 to 2003. A similar trend holds for the loss of natural riparian vegetation.

The cumulative losses of tidal wetlands and riparian vegetation are having adverse effects on the health of Virginia's tidal waters and the animals that inhabit them. Shoreline alteration linked with watershed land development has been shown to have negative effects on water quality and a wide variety of aquatic animal populations including blue crabs, finfish, marsh birds, and the communities of organisms living in the nearshore sediments underwater.

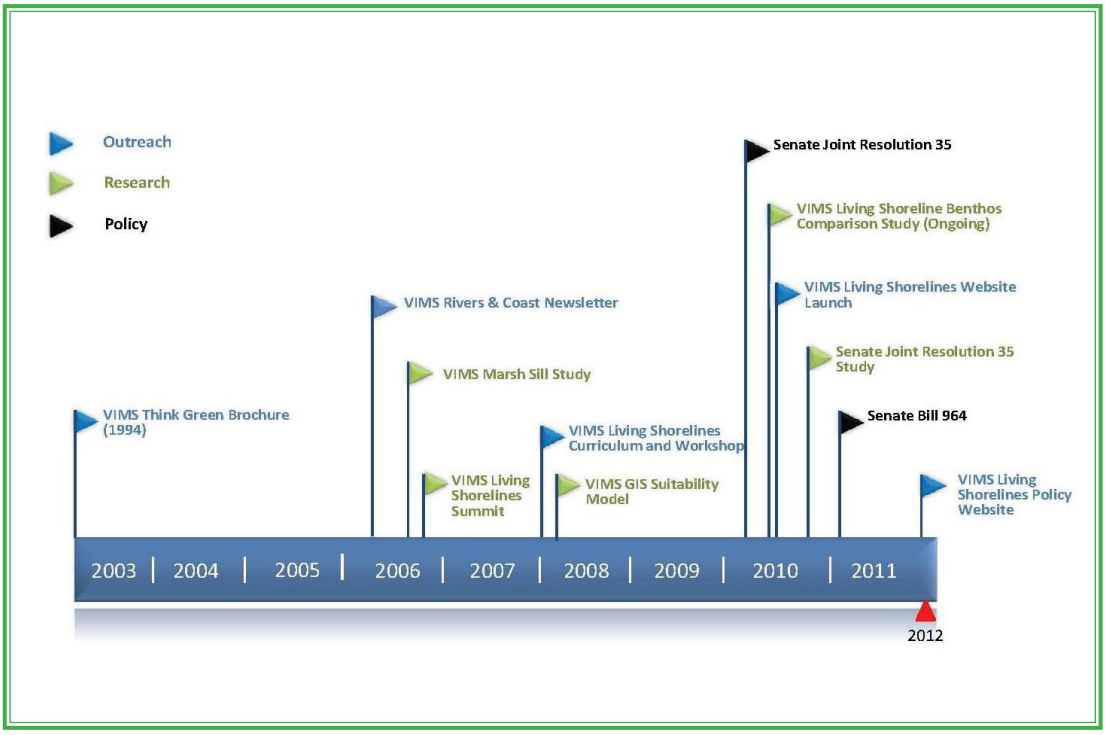
These adverse impacts can be avoided by using natural shoreline habitats, such as tidal marshes and/ or riparian buffers for erosion protection. Otherwise known as living shorelines, these systems are the preferred alternative for erosion protection rather than conventional bulkheads and on-shore revetments.

Living shorelines are suitable along much of Virginia's shoreline. **In fact, more than half of Virginia's shoreline would be suitable for a living shoreline approach.** This estimate is based on the likely success of living shoreline project along shorelines with a fetch of 2 miles or less. This means there are plenty of opportunities to avoid and even off-set much of the adverse impacts of hardened shorelines. **And yet current estimates from the last few years show that of all shoreline projects applied for, only about 1 in 10 would be considered a living shoreline.**

1. **Marsh Sill Study**. A study of the effectiveness of marsh sills for shoreline erosion control was completed in 2004 and found most of the projects provided effective erosion protection.
2. **Living Shoreline Summit**. A summit on the state of understanding of living shorelines hosted by the Chesapeake Bay National Estuarine Research Reserve in Virginia held in Williamsburg in 2006. Proceedings were published in 2008. (Available on-line at this address: *www.cbtrust.org/atf/cf/{EBEB2A714E-8219-45E8-8C3D-0EBE1847CB8%7D/2006%20LS%20Proceedings-full.pdf*).
3. **Decision Trees**. The decision trees are composed of a series of questions that leads to the identification of a preferred management option for any given shoreline. Several observations must be made about the shoreline in order to answer the questions on the tree. The trees can be used by decision-makers and the general public to identify the preferred option for management of a given shoreline.
4. **Living Shoreline Suitability Model**. A GIS model built that identifies a best option for any shoreline. The model is built to coordinate with the decision trees relying largely on the same set of natural resource and physical parameters.
5. **Living Shoreline Ecosystem Services Study**. A comparative study of aquatic animals, vegetation and other ecological parameters of living shorelines, traditionally hardened shorelines and natural

shorelines. This study is currently on-going.

6. **Training and Outreach**. There is a curriculum and on-line course for practitioners on the ins and outs of living shorelines. (*http://ccrm.vims.edu/education/ls_design_class/index.html*).
7. **Dedicated Living Shorelines website**. The site contains information, examples, pictures, and links to other relevant websites. (*http://ccrm.vims.edu/livingshorelines/index.html*)



The development of a living shoreline general permit for Virginia will prove to be a bit more complex than many existing state or federal general permits. The existing permits need only address actions which occur within the single jurisdiction under the purview of the issuing agency. The living shoreline general permit will need to address multiple jurisdictions including subaqueous lands and tidal wetlands and possibly riparian lands.

Initial efforts on the general permit have focused on presentations by the VMRC staff to local Wetlands Boards on the new legislation. In addition to seeking feedback from the presentations, the VMRC has also distributed a survey to garner input from the Boards on recommendations and concerns going forward with the permit development.

Integrated Guidance

The VMRC, along with the DCR and VIMS, is tasked with the development of integrated guidance for tidal shoreline management. The need for integrated guidance stems from two primary and comparable issues: 1) the complexity of the shoreline system, and 2) the complexity of the shoreline management system.

Tidal shorelines are the site of complex interactions between terrestrial and aquatic systems. These areas have values that far outweigh their relative size in the larger ecosystem. On tidal shorelines, each section of the shoreline is managed independently. The result of this piecemeal shoreline management is that tradeoffs in public and private benefits are frequently not optimized for the entire shoreline system. To reduce the cumulative and secondary impacts of activities within the multiple jurisdictions and management programs affecting the littoral and riparian zones, better coordination and integration of policies and practices is necessary.

The various shoreline management programs share the mission of maintained or improved environmental condition, mainly water quality and habitat. Integrated Guidance would be a set of guidance that is developed from that common perspective and integrates the critical elements of each program. The guidance would allow for improved coordination among shoreline management

agencies. Efficiencies can be found by addressing gaps and overlaps in the collection of program regulations and guidance that impact permitting decisions. This can achieve time and cost savings while at the same time improving the integration of decisions.

When making decisions, it is important to optimize ecosystem services, specifically water quality and habitat functions, across the entire cross-shore environment. This means weighing the risks and benefits of impacts to all the shoreline resources from the riparian buffer to the nearshore shallow waters. This process requires consideration of the trade-offs in impacts to all the ecosystem services to select the least adverse or most beneficial approach. The "big picture" perspective also builds in the ability to consider the sustainability of tidal wetlands as sea level rises and wetlands are converted to open water.

CCRM has been working for many years on the development and delivery of tools and guidance for implementation of integrated shoreline guidance. Specifically, we have developed an Integrated Guidance Model that incorporates aspects of the entire cross-shore environment, from upland development to subaqueous habitats. The model calculates the relative value of shoreline segments for water quality and habitat ecosystem services. So it can be used to identify existing positive attributes of the shoreline and potential areas for improvement. In this way, the model can inform decision makers regarding the adverse and beneficial effects of shoreline management approaches. When applied on a slightly larger scale, the model can show the ecosystem services for a waterway. This enables planning for restoration and long-term management of shoreline resources.

The law specifies certain elements be contained in the guidance. The four required elements are:

1. Communicate to stakeholders and regulatory authorities that it is the policy of the Commonwealth to support living shorelines as the preferred alternative for stabilizing tidal shorelines.
2. Identify preferred shoreline management approaches for the shoreline types found in the Commonwealth.
3. Explain the risks and benefits of protection provided by

*The diamondback terrapin (*Malaclemys terrapin*) is the only fully estuarine species of turtle in North America and is considered a keystone species of tidal marshes. Terrapins rely on open water, intertidal wetlands, and adjacent uplands at various stages of their life-cycle, so the quality and connectivity of these habitats is critical to the turtle's survival.*

various shoreline system elements associated with each management option.

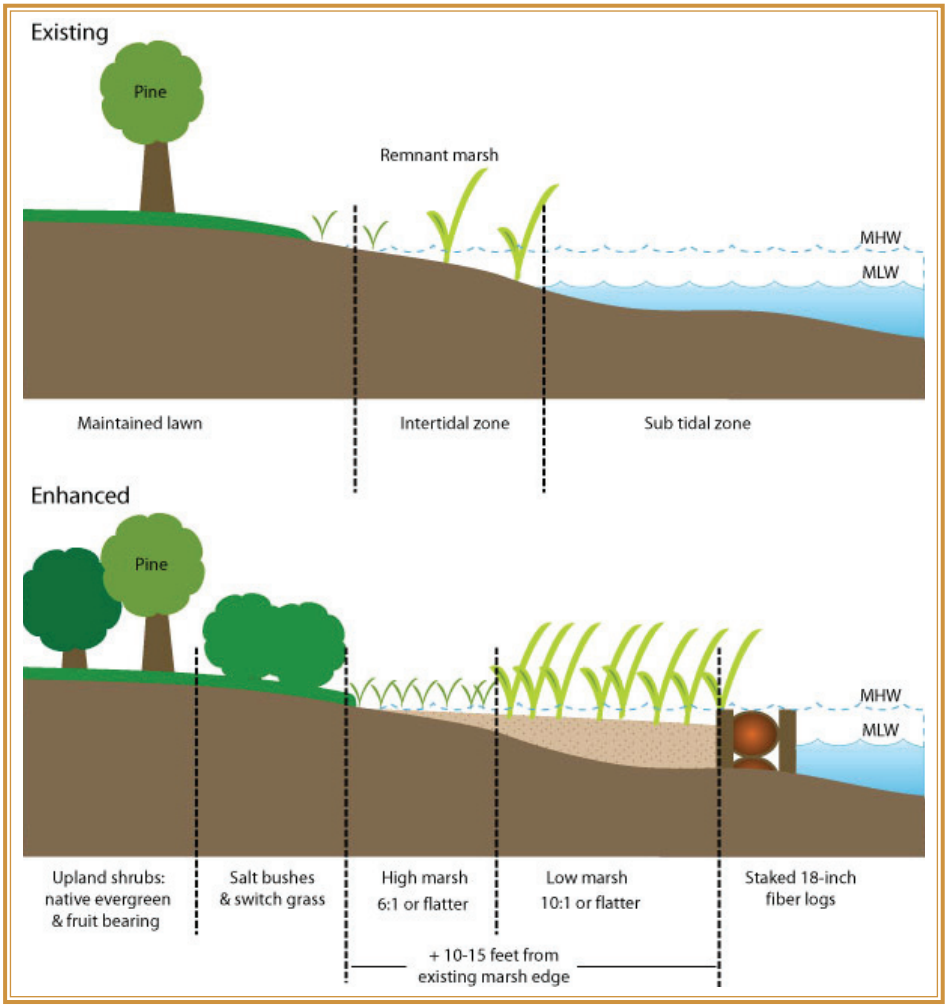
4. Recommend procedures to achieve efficiency and effectiveness by the various regulatory entities exercising authority over a shoreline management project.

The intent is for all shoreline regulatory authorities and the advisory agencies to use the guidance from local government to state agencies. In this way, the guidance should enable better coordination and improved consistency in permit decisions. So, collective use of the guidance will achieve the desired efficiency and improved environmental outcomes in management of the Commonwealth's resources.

Coastal Resource Management Guidance

VIMS is assigned the responsibility for development of guidance to be usable by local government in their comprehensive plans. The guidance should identify preferred options for shoreline management taking into consideration the resource condition, priority planning, and forecasting of the condition of the Commonwealth's shoreline with respect to projected sea-level rise.

The need for a planning and forecasting element to the shoreline guidance is critical due to natural and human pressures on shoreline resources. These pressures include



Living shoreline design cross section.

the effects of shoreline hardening losses due to erosion, and land conversion and marsh drowning from relative sea level rise. Current trends suggest tidal marshes will not be able to maintain themselves at present and projected future rates of sea level rise. In fact, estimates of tidal wetland, beach and riparian land loss in Virginia due to sea level rise are in the thousands to tens of thousands of acres. As such, the sustainability of tidal and riparian shoreline resources will largely depend upon the capacity of the resources to move landward. In Virginia, this capacity is increasingly at risk. In a recent study conducted by VIMS, development was estimated to cover about 27% of tidal shorelines, and about 500 miles of Virginia's shorelines are now hardened.

Maintaining the capacity of Virginia's tidal shoreline resources to provide valuable services will require planning to minimize or eliminate losses through the permit process and accommodate their need to migrate on the landscape. Plans of this sort would be necessarily comprehensive allowing for both well informed permit decision-making in the moment as well as future planning.

The format for this guidance will be Comprehensive Coastal Resource Management Plans (CCRMPs). A CCRMP is a guidance document that offers an eco-system based approach to managing coastal resources. A CCRMP will be generated for and provided to each Tidewater locality. The CCRMPs target riparian lands management; tidal lands including wetlands, beaches, and dunes; subaqueous lands such as SAV and oyster reefs; and non-tidal wetlands.

The Plans draw information, strategies, and recommendations from a vast array of resource management tools and assessment methodologies developed by CCRM as well as tools and models available from others. Pulling from many resource inventories, models and the scientific literature, a CCRMP addresses a suite of environmental issues, evaluates trends and conditions, and presents options for management.

The guidance is to be incorporated into local comprehensive plans over time as part of the 5 year comprehensive plan update process.

DunePlanting - Saltmeadow hay (Spartina patens) *planted on a restored dune at Yorktown, Virginia.*

What's Next?

The new law has only been in place for several months and there is already much work being done, but much more yet to do. The VMRC has started a conversation with the Wetlands Boards about the process of developing the general permit. And work is underway at CCRM on the Comprehensive Coastal Resource Management Plan guidance building upon all the previous and on-going research, models, tools and webpage development. We will be using our training offerings, website, email and print publications to share information on these efforts.

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Calm water in the lee of a marsh sill on the Rappahannock River in Middlesex County.