



Tidewater Current | Fall 2012

Transmitting news and information about sustainable endeavors in Coastal Virginia and beyond. Updated Weekly.

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Features:

The Rising Tide: Research and Planning

Posted 9.23.12 - By Carol Brighton

With studies indicating that sea level rise (SLR) rates are accelerating in the region, scenes like the flooding depicted below in Norfolk's Larchmont neighborhood are likely to become more widespread and increase in frequency and duration. USGS research published this summer in the [Journal Climate Change](#) reports evidence that SLR is 3-4 times higher than the global average in the mid-Atlantic and suggests that changes in ocean currents may be the cause. Another study from scientists at Old Dominion accepted for publication in [Geophysical Research Letters](#) supports the USGS findings.



Using a new technique to analyze sea level data from 8 points in the Chesapeake Bay, ODU's Tal Ezer and William Bryce Corlett, confirm that sea level rise is accelerating at rates much higher than the global average. One phenomena thought to be responsible for at least some of the observed acceleration rate supported by both research teams: a weaker Gulf Stream. According to Tal Ezer, "the fast flowing currents [of the Gulf Stream] keeps our coastal sea level lower relative to the rest of the southeastern North Atlantic." So a slower flowing Gulf Stream results in a local increase in sea level. Ezer and colleagues suspect that a disruption of an important oceanic dynamic pattern known as the Meridional Overturning Circulation may be the underlying cause of the problem. Ezer explains "cold dense waters from the Arctic and the Labrador Sea sink and move south at great depths, while warm currents such as the Gulf Stream return the flow northward near the surface. Global warming of the Arctic Ocean and melting ice cause the waters in polar region to be less dense, so they don't sink as fast and thus the circulation of the entire Atlantic Ocean is slowing down, including the Gulf Stream."

The map below illustrates linear trends in sea level rise, meaning, the level of sea rise recorded over a specific time frame is projected to occur at the same rate into the future. Even though accelerated rates of future sea level rise are therefore not reflected in the map, the anomaly of heightened sea level rise in the mid-Atlantic is obvious. Click on the image below for a link to the NOAA website and a larger interactive map.

SEARCH:

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RESOURCES/LINKS:

[ODU's Climate Change and Seal Level Rise Initiative Website](#)

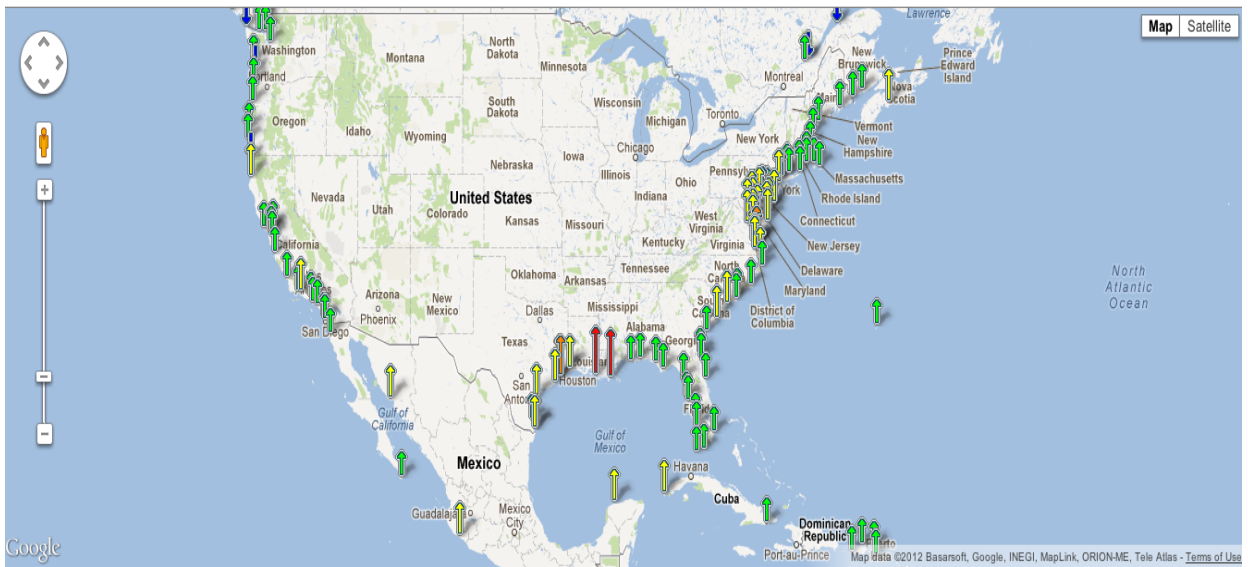
[VIMS Initiative for Coastal Climate Change Research](#)

[NOAA - Sea Levels Online](#)

[Sailing Into a Sustainable Future - Sustainable Shipping Initiatives](#)

[Fishing for Sustainable Seafood - Successful Solutions to Feed the Future](#)

[Green Building](#)



The map above illustrates regional trends in sea level, with arrows representing the direction and magnitude of change. Click on an arrow to access additional information about that station.

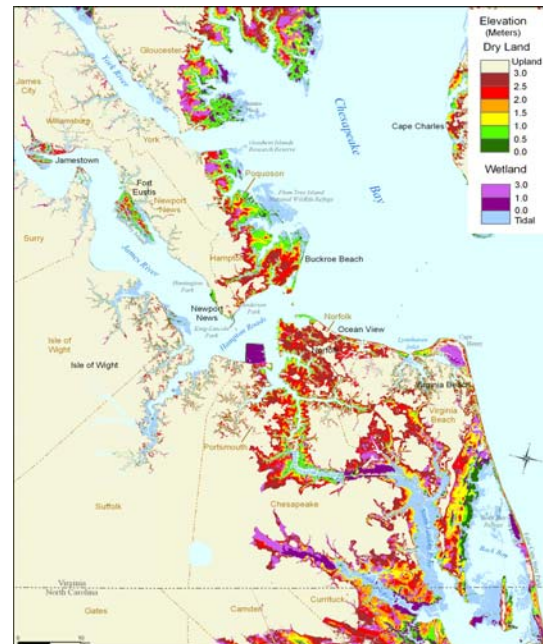
In addition to a rise in sea level caused by the slowing of the Gulf Stream, the thermal expansion of sea water, and **melting of ice sheets**, which was unprecedented last summer, the population in Coastal Virginia must also contend with terrestrial subsidence. The combined effects of sediment compaction and groundwater withdrawal is causing land in the region to sink and alone this factor could contribute to half of the relative sea level rise already recorded. As a result, the region is second only to New Orleans, for rates of relative sea level rise. And, according to the Governors Commission on Climate Change, the Norfolk/Virginia Beach MSA ranks 10th in the world for assets at risk from increased flooding caused by rising seas. As the map below illustrates, a significant proportion of property lies at low elevations.

Planning for the Rising Tide

Old Dominion University, the Virginia Institute of Marine Sciences and the University of Virginia, among others, are conducting ongoing research related to sea level rise. A recently released report prepared by the UVA School of Architecture explores the challenges that future sea level rise may pose for the City of Virginia Beach. The Virginia Sea Grant funded study advocates planning strategies that can be employed to accommodate and adapt to expected changes. Its no surprise, areas at high risk include the Oceanfront hotel district, North Beach, the Shore Drive corridor, Sandbridge and Dam Neck.

As sea level rise is non linear and expected to accelerate over time, researchers recommend planning for a 1 meter SLR over the next century. This is a fairly conservative estimate, and other cities, like Miami, Houston and New Orleans are preparing for a comparable if not greater rate of rise. With a one meter rise in sea level, close to 30% of the City would be inundated. If the City fails to plan for a rising tide, severe economic impacts are expected. The report suggests that the City may need to identify areas to protect and those to retreat from. A fairly extensive list of planning and land use management recommendations are put forward and those that are particularly relevant are highlighted below. The full report is available [here](#).

Future development needs to be managed to limit growth in areas at risk and critical infrastructure needs to be moved from low lying areas and sited in strategic growth areas. Sea level and Shoreline conservation districts should be created which would respectively ban development in areas less than 3 feet in elevation and along waterways. Green infrastructure practices that trap and reduce storm water runoff need to be encouraged. Examples include, green living roofs, rain water harvesting, rain gardens and bioswales and use of permeable pavers and pavement. To preserve wetland areas and allow their natural migration, incentives should be provided to existing waterfront homeowners that construct living shorelines and armored shoreline stabilization devices should be banned. In rural



areas, upland agricultural land should be preserved while lowlands may be converted to aquaculture. With limited sand resources, it is also suggested that beach replenishment projects be reserved for urban beaches and that a dune system be created at the Oceanfront hotel district.

UVA was also involved in more regional research. UVA's School of Environmental Negotiation has held several public meetings throughout the region to raise awareness about sea level rise and gauge public opinion while landscape designers looked at the potential of building islands off of Norfolk's Willoughby beaches to reduce erosion and potential flooding issues. With a proximity to numerous waterways and low elevations throughout much of the City, Norfolk is looking for federal assistance in the battle against encroaching high water. The City is investigating **large barrier projects** in several areas including the Hague and Pretty Lake to stem frequent flooding.

There are upcoming opportunities to learn more. Both ODU and VIMS area involved in or sponsoring events related to sea level rise, which are highlighted below.