

Issue: Climate Change

Virginia Underwater

Sea-Level Rise in Virginia

The Hampton Roads area of Virginia is experiencing the highest rate of sea-level rise on the East Coast. It has the second largest number of people at risk of flooding caused by sea-level rise in the United States—second only to New Orleans. Scientists are predicting a rise of up to 7½ feet by the year 2100. Many communities in Virginia will experience chronic flooding, which means 10% or more of its land area will be flooded by high tides an average of 26 times per year (every other week). A study by Old Dominion University predicts that vast areas of Virginia will be underwater if dikes and levees are not erected.

Flooding will harm the state in a multitude of ways:

1. Homes—Hampton Roads has a population of 1.7 million people and encompasses 13 communities. The number of residents who will be displaced by flooding and lose their homes may be in the hundreds of thousands. Many are lower-income families who do not have the resources to relocate.
2. National security—Hampton Roads includes Norfolk and Newport News, which have the second largest concentration of military bases in the U.S., including major Navy, Air Force, Army, Marine Corps, and Coast Guard facilities. Naval Station Norfolk is the largest naval base in the U.S., and the shipyard in Newport News is the only shipyard in the country that builds American aircraft carriers.
3. Economy—Port activity and the import/export industry are integral to the local economy and jobs. The beach industry contributes billions to the local economy. And 46% of the local economy comes from Department of Defense spending, which would disappear if the military facilities had to be relocated.
4. Coastal environment—Chesapeake Bay is the largest estuary in the U.S. More than a dozen wildlife refuges would be affected, and hundreds of plants and animals, including endangered and threatened species, would be impacted.
5. Infrastructure—Roads, pipelines, power lines, communication systems, sewers, and other critical infrastructure would be damaged.
6. Historical sites—Jamestown and Colonial Williamsburg are threatened, where inundation would do irreparable harm.

Causes of Sea-Level Rise

Scientists agree that climate change is the major cause of sea-level rise. Burning fossil fuels (coal, oil, gas) causes global warming due to carbon emissions that scientists say are responsible for trapping heat in the atmosphere. Rising temperatures cause the ocean to swell because water expands when heated. In addition, higher temperatures melt glaciers, ice sheets, and ice caps, thereby adding more water to the ocean. As the sea level rises, the

tides claim more and more of the coastal land. To make matters worse, higher sea levels amplify the storm surge during hurricanes, causing more severe flooding; and climate change has increased the frequency and magnitude of hurricanes.

Another factor is land subsidence (the sinking of land surface). Virginia has been experiencing this phenomenon, particularly in the Southern Chesapeake Bay region. Some percentage of subsidence is caused by the movement of bedrock, but most is due to the extraction of underground water. When groundwater is pumped out of the underground aquifer system, the pressure within the aquifer decreases, the aquifer compacts, and the land sinks. Land subsidence not only causes coastal flooding, but it can also alter the flow of rivers, thereby causing flooding in low-lying inland areas. Sinking land can also damage infrastructure (roads, pipes, sewers, power lines, etc.) and harm coastal ecosystems.

Future Scenarios

The Virginia Institute of Marine Science (VIMS) at The College of William and Mary issued a report with four possible scenarios of sea-level rise for planning purposes:

1. Historic—a projection of observed long-term rates of sea-level rise over the past century without accounting for recent acceleration due to climate change.
2. Low—conservative assumptions about future greenhouse gas emissions.
3. High—based on the upper end of statistical projections of sea level and temperature.
4. Highest—combined global warming with maximum ice sheet loss and glacial melting.

Under these four scenarios, the sea level would rise by the following amounts by the year 2100:

1. Historic—1.5 feet
2. Low—3 feet
3. High—5.5 feet
4. Highest—7.5 feet

*Recent data, however, shows that sea-level rise is following the trajectory of the **high** scenario—5.5 feet by 2100.*

VIMS recommends planning for a 1.5 foot rise within the next 20 to 50 years (2033 to 2063).

Assuming just the “low” scenario of a 3-foot rise by 2100, the Hampton Roads Planning District Commission concluded that:

- 59,000 to 176,000 residents would be subject to chronic or permanent flooding
- 162 to 877 miles of roads would be subject to chronic or permanent flooding
- The cost of a 3-foot sea-level rise would range from \$12 billion to \$87 billion.

The Union of Concerned Scientists also analyzed sea-level rise and issued three possible scenarios—low, intermediate, and high. Under the high scenario, 38 Virginia communities would be subject to *chronic flooding* by 2100. The affected areas would include:

- Poquoson—30% by 2045
- Norfolk—14% by 2080
- Virginia Beach—18% by 2080
- Hampton—26% by 2080
- Joint Base Langley-Eustis and Naval Air Station Oceana Dam Neck Annex—50% by 2080

If action were taken to keep the sea-level rise at the “low” scenario, 16 to 30 of those at-risk Virginia communities could be spared from chronic flooding. The low scenario assumes that global warming can be limited to a 1.8 degree Celsius increase. The Paris Climate Accord limits warming to 2 degrees Celsius through large-scale reductions in greenhouse gas emissions from fossil fuels. However, the current Republican administration has withdrawn the U.S. from the Paris agreement.

Recommended Action

Recommended steps to address rising sea levels include:

1. Slow the pace of climate change by reducing carbon emissions from fossil fuels and by developing renewable energy such as wind and solar.
2. Limit coastal development.
3. Update building codes and infrastructure plans to reflect sea-level rise projections.
4. Reform flood insurance premiums and policies.
5. Enhance emergency preparedness and emergency response/evacuation programs.
6. Fund a large-scale home buyout program.
7. Retreat from risk areas; invest in economic development and new infrastructure in safer locations where businesses and people can relocate.
8. Adopt policies to preserve natural ecosystems and protect cultural heritage sites.

Steps to address land subsidence:

1. Reduce the withdrawal of groundwater.
2. Pump groundwater in areas away from the coast.
3. Recharge the aquifer system.

Because the recommended actions will take many years to implement, experts warn that state and local governments must take proactive steps now. Otherwise, chronic flooding will be a matter of crisis response instead of problem solving.

Republican Denial and Inaction

The Republican-controlled General Assembly has done almost nothing to address the threat of sea-level rise in Virginia. The little they have done has been mostly *reactive* (response after flooding occurs) rather than *proactive* (prevent flooding from occurring by addressing underlying causes). Republicans repeatedly defeated bills designed to slow climate change, which would slow the rate of sea-level rise and prevent future flood damage to coastal communities. In fact, Republicans have introduced legislation to actively obstruct any efforts to limit fossil fuel emissions.

For the past three years, bi-partisan sponsors have introduced legislation that would have allowed Virginia to join the Regional Greenhouse Gas Initiative (RGGI), a group of nine East Coast states from Maine to Maryland who participate in a market-based cap-and-trade program to reduce carbon emissions. Member states set carbon caps (how many pollution allowances to offer for sale per year), and the states gradually lower the cap each year. Utilities purchase allowances for every ton of carbon pollution they emit. The revenue from the sale of allowances goes back to the states to fund climate adaptation projects. In the bills introduced to the Virginia General Assembly, the revenue generated through membership in RGGI would have gone to coastal communities to help them adapt to sea-level rise, to programs for developing solar and wind power, to programs promoting energy efficiency, and to economically depressed communities in southwest Virginia for education and retraining of workers.

Since RGGI began in 2008:

- Member states have reduced carbon emissions 2.7 times faster than non-RGGI states.
- Electricity prices in RGGI states have dropped by 8%, while prices in non-RGGI states have risen by 6%.
- The GDP grew 3% more in RGGI states than in non-RGGI states.

Republicans, however, have defeated all three attempts for Virginia to join the RGGI:

2015—Virginia Coastal Protection Act

SB1428—killed by 8-to-7 party-line vote in Senate Agriculture, Conservation and Natural Resources Committee.

HB2205—killed by unrecorded voice vote in House Commerce and Labor Special Subcommittee on Energy, with 77% of members in the Republican majority.

2016—Virginia Coastal Protection Act

SB571—defeated on party-line vote in Senate Agriculture, Conservation and Natural Resources Committee.

HB351—killed by unrecorded voice vote in House Commerce and Labor Special Subcommittee on Energy.

2017—Virginia Alternative Energy and Coastal Protection Plan
SB1471—defeated in Senate by 8-to-7 party-line vote.

HB2018—killed by unrecorded voice vote in House Commerce and Labor Special Subcommittee on Energy. Republican state legislators have also tried to block the implementation of the Clean Power Plan (Federal Environmental Protection Agency regulations to limit carbon pollution from power plants). In 2015 Republicans introduced into the Virginia General Assembly nine bills attacking the Clean Power Plan; all but one failed. In 2016 Republicans passed legislation that gave the General Assembly veto power over the state's plan for meeting the Clean Power Plan regulations, but the Democratic governor vetoed the bill. A similar bill was introduced but failed in 2017.

While the state battle was going on, the power industry and 24 states challenged the Clean Power Plan in federal court. The Supreme Court stayed the implementation of the regulations until the appellate court could decide the case. But since then, the Secretary of the Environmental Protection Agency announced that the Trump administration will withdraw the federal Clean Power Plan altogether.

As in other states across the country, however, the Democratic governor has proceeded with a state-level version of the clean power plan called Clean Energy Virginia. In June of 2016, he issued Executive Order 57 directing Virginia's Secretary of Natural Resources to formulate recommendations for reducing carbon emissions from electric power utilities and for developing clean energy. Then in May of 2017 he issued Executive Order 11 ordering the director of the Virginia Department of Environmental Quality to develop carbon emission regulations based on those recommendations and participation in a multi-state cap-and-trade program. DEQ is required to present its proposed regulations by the end of 2017, which is after the November election, so the fate of Virginia's clean power plan depends on who is elected to be the next governor of Virginia.

The Republicans did pass two bills related to sea-level rise:

2015

SB1443—Plan to Combat Sea-Level Rise

Requires the Hampton Roads Planning District to include strategies for addressing sea-level rise and recurrent flooding in all of its future comprehensive plans which shifts the responsibility to local government. The reason behind the bill was to fulfill a federal requirement for a flood mitigation plan so that Virginia would continue to qualify for FEMA's National Flood Insurance Program.

2016

SB282—Virginia Shoreline Resiliency Fund

Established a low-interest loan program for residents and businesses needing to rebuild after flood damage, yet no funds have been allocated to this program.

Finally, and not surprisingly, a six-point action plan issued by Republican gubernatorial candidate Ed Gillespie on the topic of sea-level rise and recurrent flooding never once mentions climate change which scientists almost universally agree is the cause. Instead his plan calls for “flood-proofing” communities and military installations without providing any coherent details on how he would accomplish this or on his plans for the significant funding sources required.

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