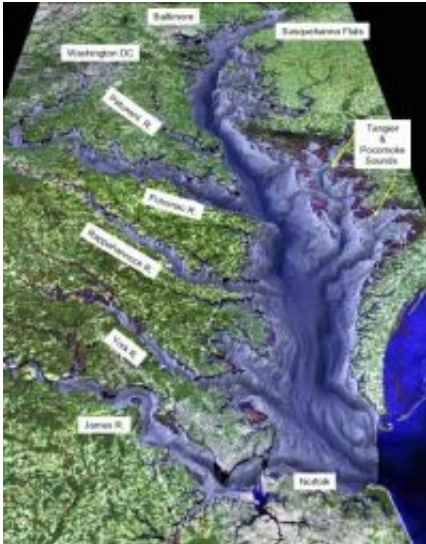


Sea level rise alters bay's salinity

November 20 2008



This is a map of the Chesapeake Bay estuary. Credit: NOAA

While global-warming-induced coastal flooding moves populations inland, the changes in sea level will affect the salinity of estuaries, which influences aquatic life, fishing and recreation.

Researchers from Penn State and the University of Maryland Center for Environmental Science are studying the Chesapeake Bay to see how changes in sea level may have affected the salinity of various parts of the estuary.

"Many have hypothesized that sea-level rise will lead to an increase in estuarine salinity, but the hypothesis has never been evaluated using

observations or 3-D models of estuarine flow and salinity," says Timothy W. Hilton, graduate student in meteorology at Penn State.

"The Chesapeake is very large, the largest estuary in the U.S. and it is very productive," says Raymond Najjar, associate professor of meteorology. "It has been the site of many large fisheries and supported many fishermen. A lot of money has gone into cleaning up the bay and reducing nutrient and sediment inputs. Climate change might make this work easier, or it could make it harder."

The Chesapeake is naturally saltier near its mouth and fresher near the inflow of rivers. The researchers, who also included Ming Li and Liejun. Zhong of the University of Maryland Center for Environmental Science, studied the Chesapeake Bay, using two complementary approaches, one based on a statistical analysis of historical data and one based on a computer model of the bay's flow and salinity.

They looked at historical data for the Susquehanna River as it flows into the Chesapeake Bay from 1949 to 2006. The flow of this fresh water into the bay naturally changes salinity. After accounting for the change in salinity due to rivers, the researchers found an increasing trend in salinity. The researchers reported their results in a recent edition of *Journal of Geophysical Research*.

The team then ran a hydrodynamic model of the Bay using present-day and reduced sea level conditions. The salinity change they found was consistent with the trend determined from the statistical analysis, supporting the hypothesis that sea-level rise has significantly increased salinity in the Bay. However, the Penn State researchers note that historical salinity data is limited and sedimentation reshapes the bed of the Bay. There are also cyclical effects partially due to Potomac River flow, Atlantic Shelf salinity and winds.

"Salt content affects jelly fish, oysters, sea grasses and many other forms of aquatic life," says Hilton. "The Chesapeake Bay is a beautiful place, used for recreation and for people's livelihoods. It is a real jewel on the East Coast and changes in salinity can alter its uses. Our research improves our understanding of the influence of climate change on the Bay and can therefore be used to improve costly restoration strategies."

Source: Penn State

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