GEOGRAPHY In The News™

USING LANDSAT TO SAVE CHESAPEAKE BAY

Even after almost 30 years of restoration efforts, the Chesapeake Bay still is degraded. Most of the bay's problems stem from excess nitrogen, phosphorous and sediment that run off the land into the water.

Chesapeake Bay is a submerged river mouth, called an estuary. Three large rivers, the Susquehanna, Potomac and the James, plus 150 smaller streams, drain into the estuary. The total watershed is 64,000 square miles (165,760 sq. km.), draining parts of Virginia, Maryland, Delaware, Pennsylvania, West Virginia and New York.

The bay is 195 miles (314 km) long and cuts Maryland nearly in half. The northern half of the bay lies within Maryland and the southern half is located in Virginia.

Capt. John Smith explored Chesapeake Bay in 1608 and immediately recognized the value of its abundant fish and waterfowl. Native Americans had recognized its bounty centuries before and had settled there.

Today, more than 17 million people live within the watersheds of the streams draining into Chesapeake Bay. Baltimore, with a population of more than 620,000 and the country's 21st largest city, is situated near the head of the bay. Washington, D.C., the 24th largest U.S. city with about 600,000 people, is located on the Potomac arm of the Chesapeake.

Along the southern end of the bay lies Hampton Roads, the United States' largest coal-exporting port, located at the mouth of the James River in Virginia. Norfolk, Portsmouth, Hampton and Newport News surround Hampton Roads.

The Hampton Roads region itself has a population of more than 1.7 million people.

According to Peter Claggett, a research geographer with the U.S. Geological Survey working at Chesapeake Bay, the population of the bay watershed has more than doubled since 1950. Since restoration efforts began on Chesapeake Bay in the mid-1980s, the watershed has gained an additional four million people. It is this incredible growth that is impacting the bay.

Development around Chesapeake Bay's margins and within its drainage area has radically affected water quality. Urban and industrial discharges and agricultural runoff bring nutrients, silt and toxic chemicals to the bay. These nutrients and sediments mostly come from fertilizers applied to farmland and

Chesapeake Bay

Chesapeake Bay Drainage Area

0   50 mi
0   50 km

CANADA

NEW YORK

PENNSYLVANIA

NJ

OHIO

MD
Baltimore

Washington, DC

DE

WEST VIRGINIA

James R.

Newport News/Hampton Area

VIRGINIA

Portsmouth/Norfolk Area

NORTH CAROLINA

Susquehanna R.

Potomac. R.

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residential lawns. Other sources are particle pollution from car exhaust and power plants in the Ohio Valley, Claggett said.

Impervious surfaces cover many of the urban areas surrounding Chesapeake Bay, contributing to the ease at which pollutants

enter the bay's waters. Roads, parking lots, driveways and rooftops allow nutrients and sediments to run off the land into the bay unabated.

When these pollutants reach the bay, they cause degradation, some slowly and some immediately. Nutrients slowly create algae blooms in some parts of the bay, while sediments immediately cloud the water. Both of these actions decrease sunlight to the bay's bottom, killing aquatic grasses and interrupting the food chain. The result has been a continuous decline in certain species, particularly famous Chesapeake oysters and blue crabs.

Nevertheless, Claggett firmly believes that conditions in the Chesapeake Bay can be improved. He is using NASA's Earth Observing Satellite Landsat to gather data that may help inform important management decisions for the bay.

With Landsat data, Claggett and his team have mapped the Chesapeake Bay area and can monitor landscape change over time. They are watching changes to impervious surfaces in the bay's watersheds. He also monitors changes in tree canopy and other ground cover such as shrubs and grasses to determine loss of these habitats.

Claggett uses the information from Landsat to model where the nitrogen, phosphorous and sediment that enters the bay originates. He can even determine their quantities. Then the Environmental Protection Agency (EPA) and state government agencies can assign responsibility to businesses or governments for addressing nutrient and sediment sources that pollute the bay.

With Landsat data available globally, other places such as the Gulf of Mexico, Puget Sound or the Great Lakes, where activities on land also greatly affect water quality, could apply Claggett's concepts. Like in the Chesapeake Bay, tools that allow humans to better manage activities on land may help save some of our most valuable water resources.

And that is *Geography in the News™*. July 13, 2012. #1154.

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