Engineering and the Chesapeake Bay

How local engineers are making a difference to restore life to a vital resource

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The Chesapeake Bay's health is starting to turn a corner, after heavy investments in operational upgrades from municipalities, conservation districts, wastewater and sewer authorities, agriculture businesses, and even power plants.

That's the good news. The bad news is that, according to the Chesapeake Bay Foundation, there's still a long way to go. Engineering companies throughout the midstate are guiding businesses and organizations through the right steps to help heal the Chesapeake Bay.

Stormwater

As rain flows across our streets, parking lots, and building rooftops, it collects pollutants such as automotive fluids, oil and sediment. If left untreated, the pollutant-laden water soaks into the ground or makes its way to local waterways, and from there feeds into major rivers, eventually reaching the bay.

Much of the responsibility for managing stormwater falls on municipalities. And a key part of their responsibilities includes the Municipal Separate Storm Sewer System program, known as MS4. This program dictates that areas must manage stormwater to improve water quality (reducing the pollutants) through alternative methods such as infiltration or evaporation. This program features several components: public education and outreach, public involvement, and illicit discharge detection and elimination. It also includes maintaining municipal facilities and property to reduce stormwater runoff and limiting runoff through ordinances. New guidelines also require municipalities to develop a Chesapeake Bay Pollution Reduction Plan that identifies baseline conditions, as well as a series of action steps to reduce sediment, nitrogen, and phosphorous discharges into local waterways.

Wastewater

As a part of updates to the Clean Water Act and mandates by the Environmental Protection Agency and its affiliated state agencies, many wastewater treatment plants have needed to significantly upgrade their operations. The upgrades aim to reduce nutrients like phosphorous and nitrogen in the wastewater leaving the treatment plants. Too much of those substances cause algae to grow faster than water ecosystems can manage, decreasing the oxygen for fish and other aquatic life.

Environmental engineers have been providing design and permitting services for these treatment plants, helping many midstate wastewater treatment facilities to meet (or exceed) the Pennsylvania Department of Environmental Protection's (PADEP) limits on nitrogen and phosphorous discharge.

Upgrading a wastewater treatment plant can include steps such as conducting feasibility studies to determine viable designs and cost options to meet the mandates. Design upgrades RETTEW has managed have included oxidation ditches with anaerobic selectors, which biologically remove phosphorous and nitrogen from the wastewater, as well as chemical feed systems to add a carbon source, which helps in removal of the minerals by precipitation. These plants now emit extremely low levels of the nutrients

Streams

The Chesapeake Bay Cleanup is partially guided by a Total Maximum Daily Load (TMDL) baseline established by state and federal agencies. The baseline is a calculation of the highest level of a pollutant that body of water can receive and still meet established water quality standards. Both the bay and the streams and rivers feeding into it have TMDLs, which then require Watershed Implementation Plans to serve as restoration roadmaps. Environmental scientists like those at RETTEW assist nonprofit organizations or conservation groups to design plans concentrated on a particular waterway. These plans and their implementation often include design and permitting for the restoration of streams and wetlands, as well as riparian buffers, stream bank fencing, channel stabilization, and fish habitat structures.

Agriculture

Central Pennsylvania's agricultural community also has a role in reducing pollution to the bay, by installing best practices to reduce nitrogen, phosphorus, and sediment pollution to nearby rivers and streams. Environmental scientists can also assist agricultural landowners to undertake measures such as stream buffers, cover crops, and rotational grazing to have an impact and lower pollution. Interestingly, these measures are also the most cost-effective way to reduce nitrogen and phosphorous discharges to the bay, and would make the largest difference to the cleanup as a whole. Agriculture practices are estimated to affect more than 60 percent of the bay's pollution levels.

Power Plants

In response to a 1990 update to the Clean Air Act, the EPA imposed regulations on power plant emissions, aiming to reduce the potency of acid rain through lowering nitrogen oxide pollution. Many power plants changed practices and completed upgrades to meet those regulations, and as a result, the amount of nitrogen oxide particles landing within forested areas around the Chesapeake Bay was significantly lessened. This, in turn, lessened pollution of nitrogen in the bay. .

The Future

While Pennsylvania and surrounding states are making a dent in improving our pollutant levels into the Chesapeake Bay, much ground must still be covered as government agency deadlines approach. Engineers are playing a key role in making those changes throughout the midstate

Commonwealth of Pennsylvania

Governor's Office

PROCLAMATION

ENGINEERS' WEEK
February 22-28, 2015

WHEREAS, Engineers are highly trained professionals who utilize their scientific knowledge and technical skills in creative and innovative ways to fulfill the essential needs and specific interests of our society; and

WHEREAS, these dedicated professionals readily face the major technological challenges of our time – from rebuilding towns devastated by natural disasters to cleaning up and reclaiming our environment, and assuring safe, clean and efficient sources of energy; and

WHEREAS, professional engineers remain dedicated to investing in our future, from designing information systems that promise to propel our nation to unprecedented success in the 21st century to encouraging young math and science students to realize the practical power of their knowledge; and

WHEREAS, citizens and communities look to our knowledgeable and skilled engineers to meet the challenges of tomorrow as the vast possibilities of the future unfold before us.

THEREFORE, In special recognition of the tremendous contributions that engineers have made, and will continue to make to our Commonwealth, I, Tom Wolf, Governor of the Commonwealth of Pennsylvania, do hereby proclaim February 22-28, 2015 as ENGINEERS' WEEK in Pennsylvania.

GIVEN under my hand and the Seal of the Governor, at the City of Harrisburg, on this twenty-sixth day of January in the year of our Lord two thousand and fifteen, and of the Commonwealth the two hundred and thirty-ninth.

TOM WOLF
Governor