Nanticoke River **A**ction **P**lan (NAP)

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Mission Statement

NAP's mission is to protect and develop the health of the Nanticoke river in the form of water quality and habitat rejuvenation. By the year of 2027, all Nanticoke River waters will be swimmable for people, livable for fish, and sustainable for future use by reducing sediment, bacteria, and chemical pollution.

History/Background

The Nanticokes were an indian tribe whose name means people of the tide water, and they were called the Wenekto by the Delaware indians. Although the Nanticokes settled in and around the Chesapeake, they were not descendants of this area. They were first discovered by John Smith in 1608, who was the first white man to make contact with the tribe. By 1748, most of the Nanticoke tribe was relocated up the Susquehanna to the Iroquois. The tribe members that decided to stay in the Maryland and Delaware area assimilated ideas and began to mix with the whites.

Shortly after 1608, John Smith officially founded the Nanticoke river. He felt that it was fitting to name the river after the prosperous tribe that had inhabited the area previously for many years. The Nanticoke tribe did not farm the area due to the marshy ground, so they turned to fishing and hunting. Also, the Nanticoke people were skillful canoeist which is in accordance with the origination of their name, "People of the tide water." John Smith recalled that the Nanticoke tribe did not isolate themselves, they were known as some of the best merchants of all the tribes in the region. Often, they traded commodities such as animal pelts and Roanoke beads, which were made out of clam and oyster shells.

As stated above, the Nanticoke indians were by no means farmers, they sustained life by hunting and fishing the Nanticoke river area. They caught clams, oyster, fish, crab, shrimp, and eel. The method they used to catch fish was called the weir. The weir fishing technique is extremely effective by using twigs and brush to create a v-shaped barrier for fish to swim

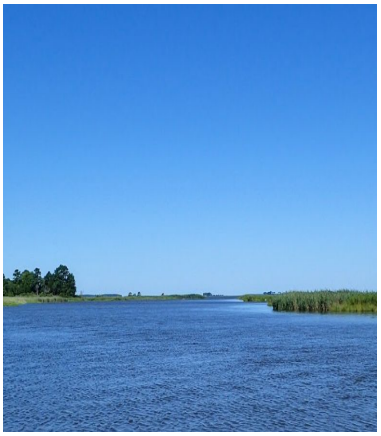
through. On the other side of the weir, fish were trapped in baskets or fencing. Nanticoke tribe members also used hunting as another source of food and clothing. Women of the tribe butchered animals and prepared skins that would be worn as garments. Along with fish and meat, corn was also a very important food for the Nanticoke people. The Nanticoke tribe was able to thrive due to their location in and around the useful Nanticoke River (*Nanticoke Indian History on the Eastern Shore, 2005*).

Today, the Nanticoke River is the largest tributary to the Chesapeake Bay meandering through farmland, forests, and marshland. The river is 64 miles from its headwaters in southern Delaware to Tangier Sound in Maryland. Overall, the Nanticoke Watershed is 530,000 acres, and 50,000 of which are tidal wetlands that make up ⅓ of the tidal wetlands in the state of Maryland. Another interesting fact about the Nanticoke watershed is it is home to the highest concentration of bald eagles in the Northeastern United States. Throughout history, the Nanticoke River has played an important role in commerce and trade by providing a critical navigable waterway from the Chesapeake Bay. The Nanticoke River has a low population density with development in only a few small towns around the area (Nanticoke River, 2019).

The primary uses for the Nanticoke River are primary recreation, secondary recreation, fishing, aquatic life and wildlife, industrial water supply, and agricultural water supply. The Nanticoke River has extremely flat lands with slight localized relief along the middle sections of the watershed, and next to the river. Soils of the area are generally sandy and porous. Also, the Nanticoke River watershed is one of the very few ones in Delaware that has bald-cypress trees(Delaware Watersheds, 2019).

Contaminated

Healthy



Although throughout history, the Nanticoke River has been a fairly healthy one, it is facing some problems. Drainage and the streamlining of the riverine area for agricultural purposes has been responsible for habitat loss. Also, the Nanticoke River has 24 sites that are listed in the Site Investigation and Restoration Section Database. Many areas along the river are responsible for pollution of various contaminants. The three main problems that NAP is setting out to confront are: sediment pollution, bacteria and chemical pollution, and habitat loss.

Policies and Mandates in Place

The Nature Conservancy, a nonprofit organization, has implemented a 50-mile corridor along the western shoreline of the Nanticoke River that is permanently protected from intensive development (The Nature Conservancy). These conservation efforts allows natures forests and plants to naturally remove pollutants and help reduce erosion of the Nanticoke River. The EPA established a Total Maximum Daily Load for nitrogen, phosphorus, and sediment for the entire Chesapeake Bay Watershed. This TMDL requires reductions of 24% and 20% of nitrogen and phosphorus, respectively, from 2009 to 2025 from all the Chesapeake watersheds within Delaware, including the Nanticoke River. DNREC has set the acceptable level for total nitrogen and total phosphorus at 3.0 mg/L and 0.1 mg/L, respectively. The following figures are set by DNREC. The TDML's for the Seaford, Bridgeville, and Laurel Sewage Treatment Plants are 100 kg/day of nitrogen and 25 kg/day of phosphorus. The remaining treatment plants in the watershed have permitted loads of 586 kg/day of N and 1 kg/day of P. Nonpoint source nitrogen and phosphorus loads shall be reduced to 1723 kg/day and 36 kg/day by 2025 (DNREC).

Problem 1: Sediment Pollution

Water quality is crucial for for aquatic grasses and bottom-dwelling aquatic animals. Poor water quality due to sediment pollution - overload of sediment or invasion of foreign sediment - can leave aquatic animals such as oysters and mussels with little to no mobility. Also, it can prevent predators from finding their prey. Furthermore, many aquatic plant species have trouble surviving with excess sediment, and when these plant species die, the sediment they hold on the river bed adds to the pollution. Almost a quarter of sites in the Nanticoke River area are degraded by sediment pollution.

Goals

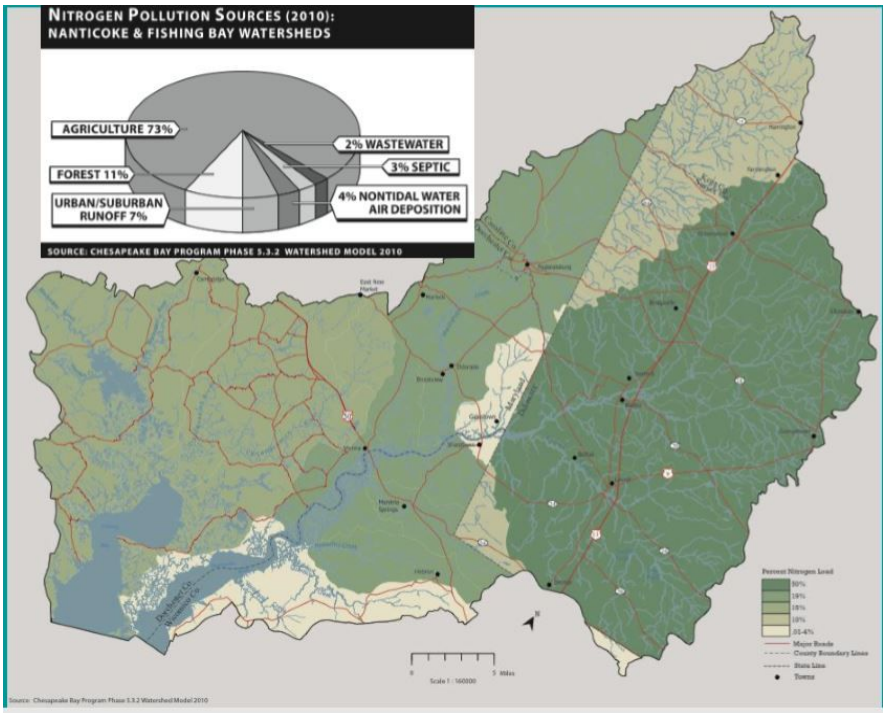
The issue of sediment pollution stems from a lack of buffer zones, the land areas lining the river banks. Because of deforestation and overdevelopment, buffer zones have been squeezed or even completed eradicated (Nanticoke Watershed Alliance). Revitalizing these buffer zones will help mitigate erosion and catch sediment before it enters the waterways. However, it is important to revitalize correctly. Inserting foreign plants can change the ecosystem for the worst. Planting native, Nanticoke trees like this American sycamore (Platanus occidentalis) pictured below is the correct way to build a buffer zone.

American Sycamore (Platanus occidentalis) near stream in late Fall (Nanticoke Watershed Alliance).

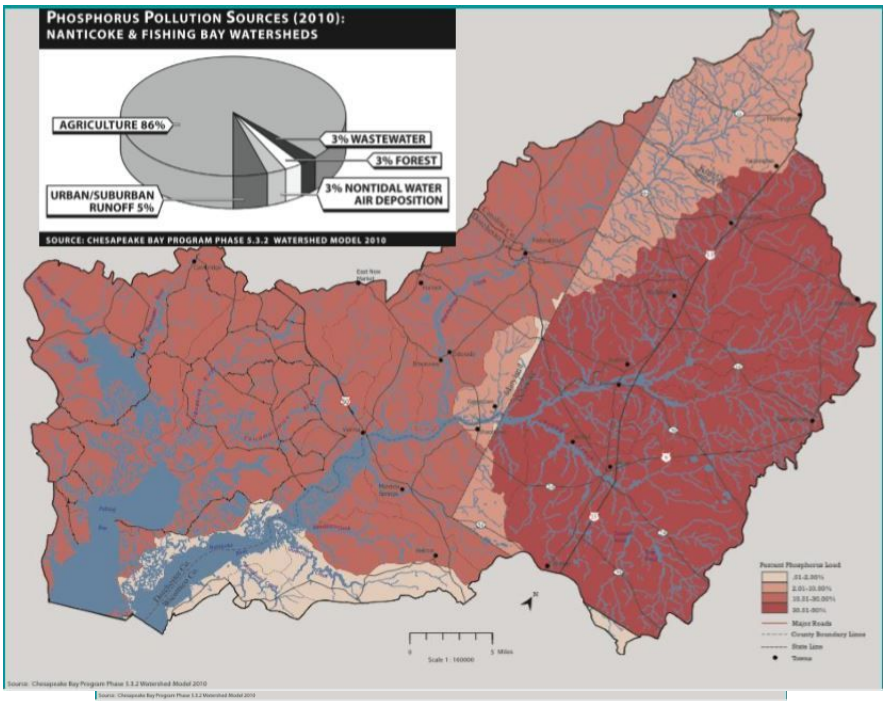
Trees provide shade and cool surrounding waterways and land. Additionally, their deep roots absorb nutrients and hold sediment in place, serving as hosts for a number of pollinators and insect species (Nanticoke Watershed Alliance). Strategically positioning native trees and shrubs along the sides of the Nanticoke sites struggling with sediment pollution will minimize the current problem.

Problem 2: Bacteria and chemical Pollution

Bacteria levels in the Nanticoke River are of high concern with the public. People are disturbed to see that bacteria levels are high greater than 60% of the time samples are taken between Memorial Day and Labor Day (Murray). This is the whole summer when kids want to play in the river, and parents are concerned of the high bacteria levels. Nitrogen levels in the Delaware headwaters, such as the Marshyhope and Broad creeks, are consistently high and transfer the nitrogen from septic systems and runoff into the Nanticoke (Murray). TMDLs for the Nanticoke watershed nonpoint sources require reductions of 30% of nitrogen loads, 50% of phosphorus loads, and 3% of bacteria loads from the 1992 baseline (Nanticoke River).This problem has a list of source contributors which include the following: The Seaford Sewage Treatment Plant, The Laurel Sewage Plant, Poultry farms, non-urban septic tank systems, and Groundwater use. The figures below show that agriculture dominates as the pollution source of both nitrogen and phosphorus; however, septic and wastewater contribute also.



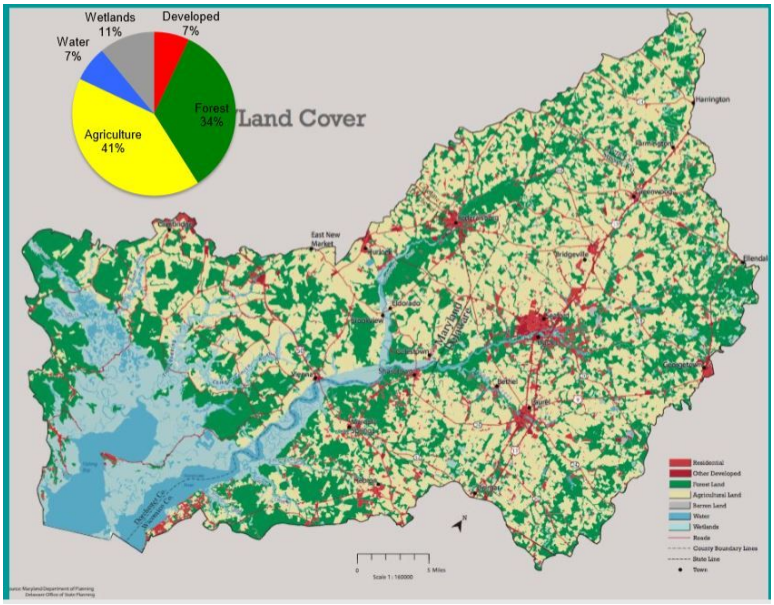
Nitrogen pollution sources and loads for the Nanticoke River Watershed (Nemazie)



Phosphorus pollution sources and loads for the Nanticoke River Watershed (Nemazie)

Goals

As the figure below demonstrates, agriculture is the dominant land use of the Nanticoke River Watershed. Runoff carrying excess nitrogen, phosphorus, and bacteria from chicken farms that use manure as fertilizer can be reduced by planting deep rooted plants along the ditches and streams that lead to larger bodies of water such as the Nanticoke. These plants will absorb and filter runoff (15 Ways to Reduce Nutrients). This method can also be applied to other forms of agriculture such as farms of feed crops and corn. Residents can use no phosphorus fertilizer on their lawns to reduce the amount of phosphorous entering Nanticoke tributaries (15 Ways to Reduce Nutrients). Implementing controlled drainage systems will allow nutrient (and bacteria) rich water to stay on the land longer and reduce the amount entering streams, resulting in reduced pollution to the watershed (Hein). Stricter biological nutrient removal (BNR) processes can be implemented for the Seaford and Laurel Sewage Plants to reduce their contribution of nutrients to the watershed.



Nanticoke River Watershed Land Cover (Nemazie)

Problem 3: Habitat loss and overfishing

Overfishing has caused near disappearance of atlantic sturgeon from Maryland waters. Recently though, biologists were able to catch and tag over two dozen of them in the Nanticoke (The Nature Conservancy). Overfishing also has decreased the amount of oyster beds. It is known that only a few small patches remain (Nemazie). Oysters are important to the Chesapeake Bay area as they filter nitrogen out of the water, and the bay has a large nitrogen

pollution problem. In the past, the Nanticoke and other rivers in the Chesapeake Bay region provided for a prosperous fishing industry; now only blue crabs are plentiful enough to catch. Even so, with sea levels rising, the salt water eats away more and more at marshes where blue crab and fish retreat to mate and spawn (Nemaize).

Goals

Obviously, the overfishing problem can end by stopping fishing, but in order to get the sturgeon and oysters back to healthy levels in the Nanticoke, action must be taken by the community to help these species make a comeback. For the sturgeon, they are particularly sensitive to sediment pollution, so developing buffer zones near where the sturgeon live should be priority. For the oysters, the main factors affecting oyster population in the bay are 1) waste and toxins from industry and 2) over-sedimentation. Reducing waste and toxins starts with regulations on waste in waterways. Better buffer zones would help not only with industrial waste but also agricultural and residential runoff and sediment. Furthermore, community clean ups of beaches and waterside communities helps. One organization based in Maryland, Save the Bay, has started to rebuild the oyster reefs around the small patches that still exist. Simply stopping the fishing cannot solve the habitat loss - there must be a rehabilitation movement for the sturgeon and oysters to rebound.

Oysters on the left, Atlantic Sturgeon on the right (Nemazie)

NAP Summary of Goals

NAP aims to improve the water quality and habitats of the Nanticoke River Watershed to provide a clean and safe environment for both people and nature. This plan focuses on three main problems: Sediment pollution, Chemical and Bacterial pollution, and Habitat loss and Overfishing. NAP takes practical steps to achieve the goals set for each of these problems and aims to complete these goals by 2027.
A summary of the goals listed in this plan can be found here:

- Rebuild the buffer zone using native plants and trees
- Plant deep rooted plants to try to reduce runoff from agricultural fields

- Implementing controlled drainage systems to reduce runoff and allow more water to be absorbed by crops and plants
- Using non-phosphorus fertilizer
- Enforcing stricter biological nutrient removal processes for treatment plants
- Regulations on waste and toxins entering waterways

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