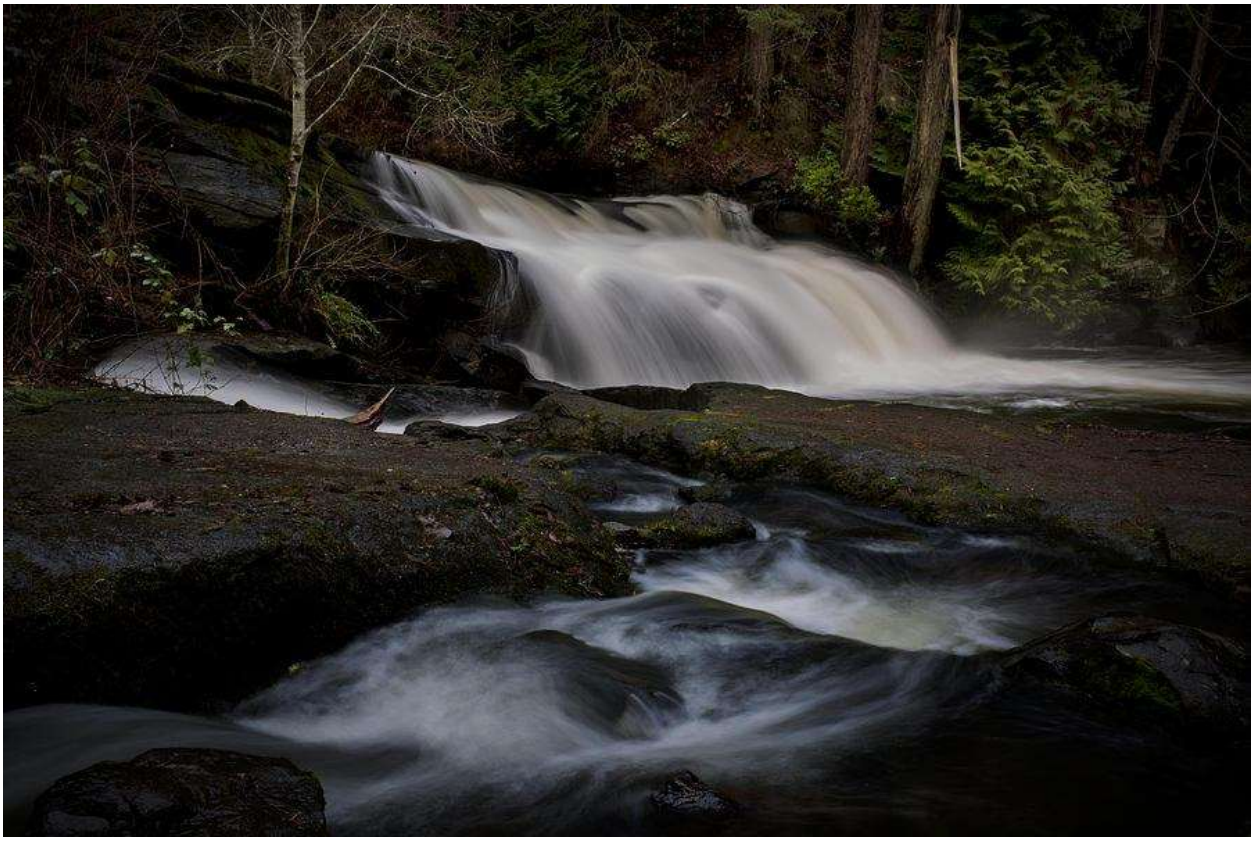
S.M.A.R.T.

Stony Brook-Millstone: Advocate, Repair, Transform



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1. Watershed Plan Introduction

1.1 Mission Statement

The Stony Brook Millstone Watershed is an important watershed in central New Jersey. The goal of SMART is to improve the overall health of the watershed and increase intersystem communication for all stakeholders. SMART will do this by improving stormwater management, reduce orthophosphate levels, and increase the partnerships with the Stony Brook Millstone Watershed Association.

1.2 Problem Statement

Aquatic life in the Stony Brook-Millstone Watershed is currently being hindered by elevated pollutant levels due to runoff (most notably orthophosphates). In addition, there is a slight lack of participation in the watershed association amongst some municipalities located within the watershed. These issues highlight both the importance and consequences of stormwater management practices.

1.3 Goals/Objectives

1. Improve Stormwater Management throughout the watershed to improve water quality, aquatic life, and stormwater erosion.
2. Reduce orthophosphate levels so that at least 16 of the StreamWatch sites comply with the state standard by 2026.
3. Achieve partnerships between all municipalities in the Stony-Brook Millstone watershed and the Stony-Brook Millstone Watershed Association by 2021.

2. Watershed History & Information

2.1 About the River

The Millstone River Watershed is located in central New Jersey. The Millstone river is a roughly 39-mile tributary of the Raritan River, running through five different counties, and supplying drinking water to surrounding areas. It has numerous tributaries on either side, and for much of its length the Delaware and Raritan Canal runs along the side.

Factors for the quality of the water are numerous and have changed with the surrounding area. In 1930, the land use within the watershed was drastically skewed towards agriculture, forest and wetlands with 95.5% of use in these sectors. By 2002, these land uses were down to 60.4%, and urban land change was up to 36.6%. The changing land use trends are likely matching the population growth within the state.

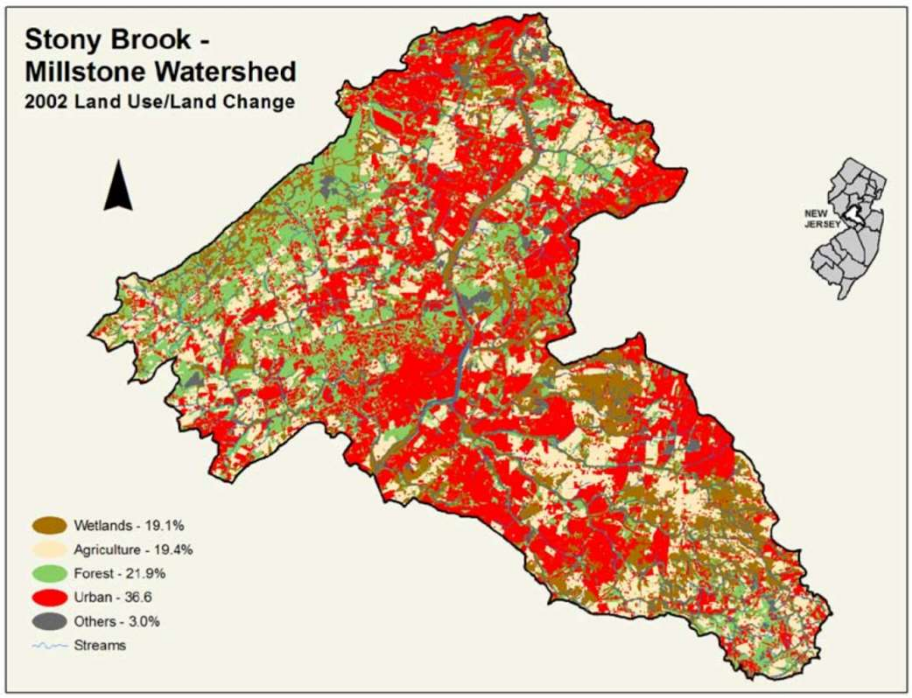

Figure 1: Land Use Map of the Stony Brook Millstone Watershed from 2002

Since New Jersey is located very close to the borders two major cities in other states, New York and Philadelphia, it has long been a spot for commuting workers and families, even outside of its own industry. As such, it is not very surprising that New Jersey is the most densely populated state. Industry and suburban development is strongly located near or between the urban city centers. The Millstone Watershed is crossed by the rail corridor that connects central New Jersey to New York city.

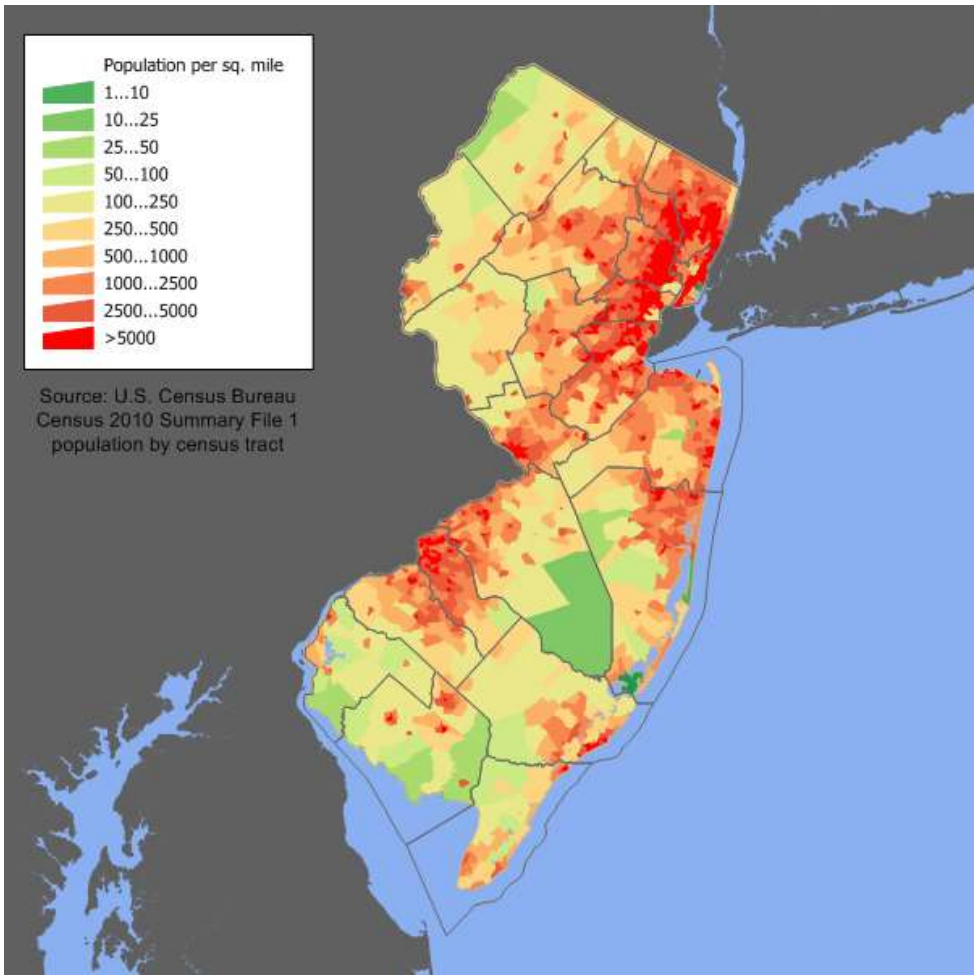

Figure 2: Population Density Map of New Jersey

As discussed in class, watersheds very rarely follow our governmental boundaries. The Millstone watershed boundaries cross multiple inner-state lines: Somerset, Middlesex, Hunterdon, Monmouth, and Mercer counties. It also encompasses the municipalities of Franklin, Hillsborough, East Amwell, Montgomery, North Brunswick, Rocky Hill, West Amwell,

Hopewell, Pennington, Hopewell Borough, Princeton, Lawrence, West Windsor, South Brunswick, Plainsboro, Robbinsville, Cranbury, Monroe, East Windsor, Millstone, and Manalapan.

Figure 3: Stony Brook Millstone County and Municipality Map

2.2 Environmental Concerns

There are specific concerns within the Watershed, those of water quality and those of environmental policy. Within the Millstone Watershed, water quality concerns include bacteria, total suspended solids, nitrates, orthophosphate, aquatic life, and dissolved oxygen levels. Most of the watershed violates the NJ Department of Environmental Protection standards for bacteria levels and evaluations of aquatic life. Orthophosphate levels are marginal, while the total suspended solids, nitrates and dissolved oxygen values are almost all acceptable within the watershed.

The environmental policies are less exact as each region, municipality, and county need coordination to ensure consistency. The Project for Municipal Excellence only involves about half of the counties in the watershed; North Brunswick, South Brunswick, Plainsboro, West

Windsor, and Robbinsville are all not enrolled in the Project for Municipal Excellence. Similarly, about half of the watershed have poor ordinances protecting areas around streams, and most counties are in poor standing to support state regulations regarding septic ordinances. While the forest ordinance protections are good in every county in the watershed except within Princeton. The policy and ordinance decisions are crucial to effect significant change to the watershed water quality.

2.3 Existing Laws, Programs and Organizations

The Stony Brook-Millstone Watershed Association is the main organization responsible for maintaining and investigating the health of the watershed, amongst other things. The association helps the watershed through advocacy by interacting with local governments, suggesting new planning and zoning requirements and by challenging any plans to develop land that would be harmful to the watershed. They provide education to thousands of both adults and children through training programs, programs in schools, and teacher workshops to improve environmental literacy for educators in the region's schools. The program that is most essential to the health of the watershed is the StreamWatch program. StreamWatch involves many volunteers going out and sampling the area's waterways to monitor how pollen, fertilizers and other pollutants are affecting the watershed.

The Borough of Pennington is where the Stony Brook-Millstone Watershed Reserve is located. There are several measures adopted in the Code for the borough that result in protection and maintenance of the health of the watershed. The Pennington Environmental Commission has the power to conduct research into possible uses of open land areas within the borough. They obtain information on the proper use of open land areas (marshlands swamplands and other wetlands) to recommend to the Planning Board plans for the development and use of such areas. An application for development is also needed if the open land is going to be changed in any way. The Borough of Pennington also finds that riparian

lands provide an important benefit. The Code states that it is necessary to protect and maintain these zones by implementing specifications for establishment, protection, and maintenance of vegetation along the surface of water bodies within the borough. Some of these specifications include: no clearing/cutting of vegetation except for dead vegetation and pruning for reasons of public safety; no altering watercourses; no dumping trash, soil, dirt, fill or other debris. Lastly, the Code states that if there is any disturbance to these zones, it must be offset by improvements and stabilization against erosion.

3. SMART Solutions

Table 1: Problem Matrix for the SMART Plan

Problem	Result	Solution
P.1 Poor Stormwater Management	Impaired aquatic life, poor water quality, and sediment erosion	Improve stormwater management practices
P.2 Orthophosphate Pollution	Reducing water quality and aquatic life	Reduce fertilizer use through policy and education
P.3 Poor Partnership between Municipalities and watershed association	Important water quality and watershed policies are not implemented	Build a strong relationship with each municipality and develop partnerships with all areas by 2021.

P.1 Stormwater Management improvements are important for maintaining proper water quality levels, reducing sediment erosion, and protecting aquatic life in the watershed. Some areas in the watershed violate the allotted amount of Total Suspended Solids (TSS). TSS is a measurement of the amount of particles suspended in the water, such as silts, clays, algae, and bacteria. High TSS levels can be harmful to aquatic life and plant life. Better stormwater management practices could reduce runoff issues that contribute to higher TSS levels.

The majority of the watershed have been labeled as “impaired” due to the health of the aquatic life. Aquatic life includes aquatic insects, crustaceans, and clams. Unhealthy macroinvertebrates are a warning sign of inadequate aquatic life because they are an important

food source for all fish and are at the base of the food chain. The types of macroinvertebrates living in a stream indicate how healthy a watershed is. Because of the low amount of macroinvertebrates living in the watershed, it is impaired. The New Jersey Department of Environmental Protection estimates that stormwater runoff accounts for 60% of pollution in surface waters. To improve the pollution that runs off into streams, people need to reduce waste from entering the stormwater drains by picking up waste and using less fertilizer.

The SMART watershed plan will aim at improving stormwater management practices within the watershed. More rain gardens will be used to help stormwater soak into the ground instead of an underwater drain. Stormwater drains cause more pollution to enter the water. More native plants and trees will reduce runoff. By upgrading the existing stormwater practices to be more environmentally conscious, runoff will be reduced and therefore pollution will be reduced into the streams. This will bring back the macroinvertebrate population and improve the overall health of the watershed.

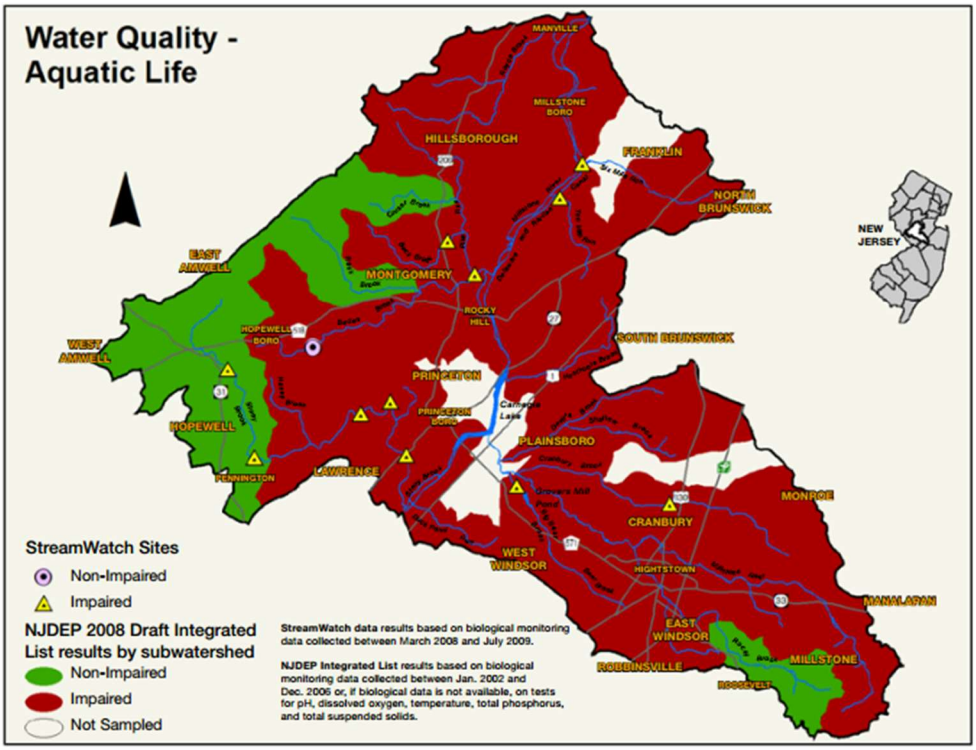

Figure 4: Water Quality map of the watershed showing impaired aquatic life

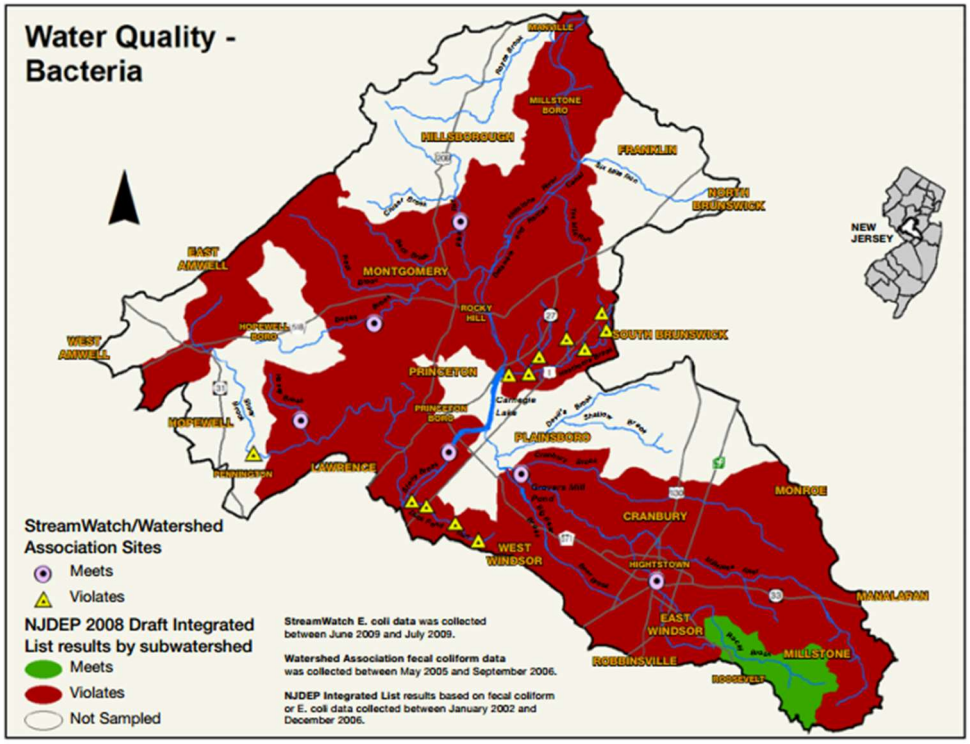

Figure 5: Water Quality map of the watershed showing bacteria violations

P.2 Orthophosphates are a serious problem in the Stony Brook Millstone Watershed. Only 2 of the 31 StreamWatch sites meet the standards. This problem is due to over-fertilization across the watershed. Because the soil has higher levels of phosphate, excess phosphate enters the stream when unnecessary fertilizer is added to fields. Phosphate can also occur from cleaning products and industrial uses entering the waterways. Excess amounts of orthophosphate hinder aquatic life. To combat this issue, more regulations need to be set on how much fertilizer is used. SMART will add an education program to the Watershed Association's existing programs to educate citizens on the dangers of fertilizer, their effects on waterways, and to suggest reducing the amount of fertilizers used.

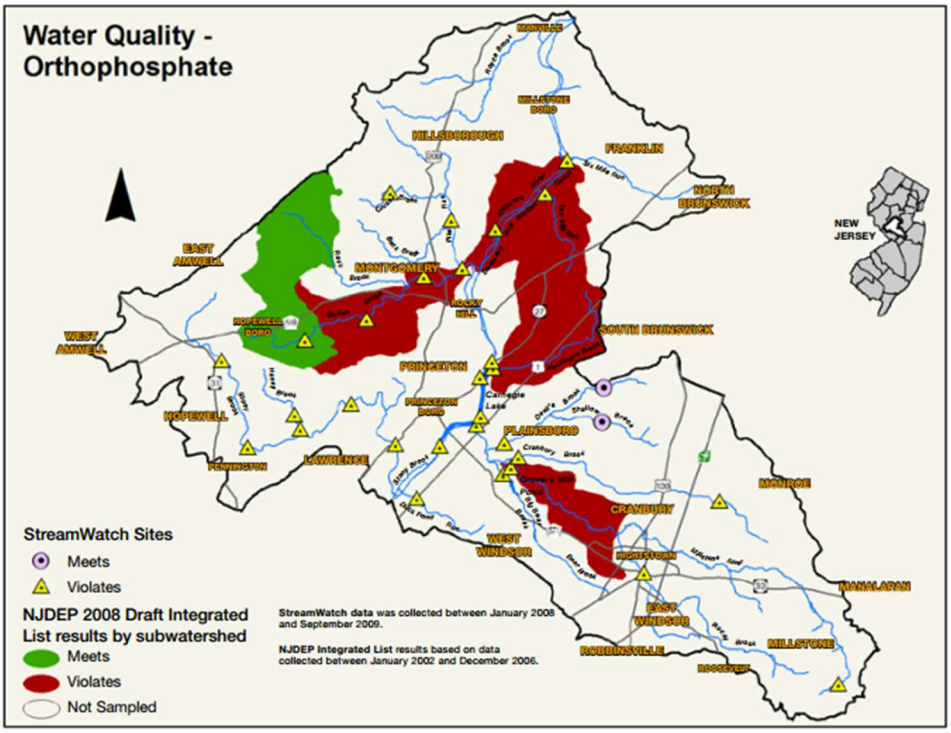

Figure 6: Water Quality map of the watershed showing elevated levels of Orthophosphate

P.3 Currently, on 16 out of the 26 municipalities in the Stony Brook Millstone watershed have partnered with the Watershed Association. It is the goal of SMART to achieve 100% participation for all the municipalities by the year 2021. The Stony Brook Millstone Watershed Association has created The Project for Municipal Excellence, which is a program that establishes partnerships between local governments to improve water quality and watershed practices. Through this project, the Watershed Association provides recommendations for each municipality in the program and then assist local officials to implement the recommendations. It is important that all municipalities partner with the Watershed Association because local governments need to understand the importance of protecting the natural world. By joining together, local officials and the Watershed Association could successfully implement important water quality practices to protect the watershed.

To accomplish this goal, the Watershed Association will visit each municipality and learn what policies are best for that specific area. We will also work closely with the local governments of the municipalities to provide the best recommendations and solutions for the

future. The Watershed Association will also strengthen the already established partnerships with the municipalities to improve on policy initiatives. By making proper recommendations and building a strong relationship with each municipality, all municipalities will have a partnership with the Watershed Association by 2021.

4. Conclusion

The Stony Brook-Millstone Watershed is important to central New Jersey, as it spans numerous municipalities and provides environmental services to thousands of people. Overall, the watershed is in fair condition, but there is still room for improvement. There are already several organizations and laws in effect that do a lot of work to preserve the watershed. For example, the education programs for both adults and kids improve environmental literacy for thousands, and the codes in place in the Borough of Pennington clearly establish that the watershed provides important environmental services. The StreamWatch program in place through The Watershed Association is essential to illustrating the Watershed's water quality. By improving stormwater management through the increased use of raingardens and native plant species, the SMART plan strives to improve upon levels of TSS and the health of aquatic life in waterways. Additionally, the SMART plan will take measures to drastically decrease the levels of orthophosphates in waterways. Through education and regulations, all StreamWatch sites can meet the standard levels for the state. Lastly, it is important to increase municipality participation in the Watershed Association. By doing so, SMART's other goals could more easily be achieved.

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http://thewatershed.org/pdf/State%20of%20the%20Watershed_FINAL.pdf

Figure 2:
https://www.worldofmaps.net/en/north-america/new-jersey-usa/map-population-density-new-jersey.htm

Figure 3:
http://thewatershed.org/about-us/what-is-a-watershed/