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| Senior Project Proposal |
| Water Pollution |
| Alea McDuffie |

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Introduction

The environment is the most crucial aspect of life. Without it, nothing would be able to exist as it does today and the Earth would still be the volcanic gaseous planet that it once was. Sadly, the environment is being greatly abused and needs help. My goal this year is to get my community more involved in maintaining the environment, especially waterways. Water pollution can occur anywhere. Although, it most commonly occurs around developing nations, rural areas happen to be some of the biggest contributors to water pollution. For example, the Chesapeake Bay is the major water source for most of the states that border it; yet it is the second most polluted estuary in the world. Surprisingly, most of the pollution comes from runoff from agriculture and sewage.   
The water in the Chesapeake Bay is used as a habitat for the life that lives there. These animals are dying due to excess nutrients in the Chesapeake Bay caused by nitrogen pollution that boosts the development of algae blooms which absorb the dissolved oxygen that is necessary for life in the Bay to live. This affects both the biodiversity of the Chesapeake Bay as well as the economy since there are many states, like Maryland, whose economy relies greatly on the crabs and shellfish that are fished from the Chesapeake Bay.   
 The Ganges River is one of the most sacred rivers of the Hindu religion, yet it is one of the most polluted rivers in the world. This is an extremely severe problem being that India, Nepal, and Bangladesh use the Ganges River for most of their water needs. All of these countries are developing, with India being the largest. More than 400 million of India’s 1.2 billion inhabitants live along the Ganges River and more than 57% of them are impoverished. Due to poor sanitation laws, most of the pollution comes from untreated sewage. There is also the religious aspect in which burned or cremated corpses of human and animals are dumped into the river almost daily as a religious burial. The same polluted water is used for drinking, bathing, cooking, and religious ceremonies. This spreads disease and causes thousands of deaths a year.  
In my paper, I will touch upon the cultural effects of water pollution as well as the economic effect. Through my action, I will do my part to promote cleaner, safer waters for generations to come. Hopefully though my actions the Chesapeake Bay can be as clear and beautiful as Captain John Smith once wrote about in his journals over 400 years ago, and the Ganges River could safer for religious practices and household activities. My unanswerable question is: *What is the effect of poverty as well as affluence on water pollution?* I chose this question because water is the drink of life. Rises in development as well as low-incomes negatively affect the quality of water. Hopefully through this project, I can do my part to change that.

Literary Review

The Ganges River, also known as the River Ganga, accounts for 30 percent of India’s water resources and 40 percent of its population. It also one of India’s holiest rivers as well as its most polluted. Urbanization and industrial growth pose as a direct cause to the pollution of the River Ganga. In recent years the quality of the river water has gone down significantly due to untreated sewage, industrial wastewater, agriculture, livestock, and poor solid waste management. Although 25 percent of pollution in the Ganga comes from Industrial waste, it is linked to the weak capacity of local water and wastewater utilities and in adequate environmental monitoring and regulation of point source pollution.  
On February 20, 2009 the Government of India constituted the National Ganga River Basin Authority as an approach towards cleaning the river basin. They have confirmed that by 2020, no untreated municipal sewage or industrial effluents will be discharged in the Ganges River. This will be accomplished with the requested support of the World Bank with emphasis on specific investments under the focus on the main stem of Ganga flowing through five basin states, specifically pollution abatement programs in cities on the banks of these states. This is to be achieved through several phases of substantive financing and knowledge support. The project is divided into two components: international development seeking to build the institutional capacity to effectively implement the overall NGRBA program, and priority infrastructure investments. By control the amount of waste put into the river as well as advances in sanitation, the NGRBA program should be extremely successful. [[1]](#footnote-1)

In recent years, progresses in communications and commerce have increased urbanization along the river Ganga. As a result, the river has become a channel that receives and transports urban wastes away from towns as well as a source of water. Today, 100 towns are located along the river bank. One would think that the abuse and pollution of the river would be prevented due to the fact that the Ganges River is one of the holiest rivers in the Hindu religion, but this is not the case. It has been proven that more than 80 percent of the total pollution comes from domestic sources such as settlements along the river course, irrigation, and deforestation; which is a result of topsoil erosion that has increased silt deposits which raise the riverbed leading to flood in the rainy season and stagnant flow in the dry season. Also, there are 160,000 people living along the main course of the river with about 100 major industries located directly on the river, 68 of which release massive amounts of pollution into the river. Being that the sanitation laws of India remain mostly unmonitored there is the problem of solid garbage being thrown into the river as well as domestic wastes of wastewater and industrial sewage being dumped into the river every day. In addition to this, being that the Ganges River is extremely important to the Hindu religion, animal carcasses, half-burned, and unburned human corpses are thrown into the river on a daily basis as a part the Hindu religious funeral ceremony. Another religious contribution to the pollution of river Ganga would be the massive spiritual bathing in the river. Without enforcing certain sanitation regulations, the Ganges River may be subject to being the world’s largest junkyard.[[2]](#footnote-2)

Although Bangladesh is a water rich country, the water resources management in Bangladesh faces the immense challenges of flooding in the wet season and scarcity of water in the dry season, economic growth as well as population growth, supply of safe drinking water and sanitation, arsenic problems, water pollution, massive river sedimentation, and river bank erosion. They are currently facing the challenges caused by developments of a global nature, such as climate change and sea level rise. There is also the issue of the competitive demand for various water uses.  
Traditionally, water resources system management in Bangladesh is based on interventions in flood control, drainage and irrigation. Recently, there has been an increasing emphasis on other kinds of management interventions including flood warning systems, flood proofing and adopting responses to hazardous conditions.  
Being that water is a crucial element for the survival of living organisms as well as the survival of the economy of Bangladesh, initiative of regional cooperation for sustainable water infrastructures must be made. Sadly, no efficient initiative of regional cooperation for sustainable eco-efficient water infrastructures has been found between Bangladesh and India even though there is still water sharing and water withdrawing infrastructures.[[3]](#footnote-3)

The major sources of pollution to the Chesapeake Bay include agricultural nitrogen loads and agricultural phosphorous loads.  
Although nitrogen and phosphorous are essential for the growth of life in the Chesapeake Bay, the excessive amounts of nitrogen and phosphorous being dumped into the bay as waste, for example nitrogen pollution provided by sewage treatment plants and large-scale animal operations, pollute the water and degrade the water quality.  
The most sever pollution to the animal life in the Chesapeake Bay is nitrogen pollution because it causes algae blooms that consume oxygen which lower dissolved oxygen levels to the point where fish and shellfish die.  
Yet another cause for the increased pollution in the Chesapeake Bay is haphazard development which stripped the watershed of buffers that once absorbed and filtered nutrients. Without these wetlands and resources lands, pollution can flow undiluted into waterways. The sources of the pollution mostly derive from farms, factories, cities, and suburbs that have replaced the natural filters and altered water quality so severely that the Chesapeake Bay is now on the EPA’s “dirty waters” list. This is a severe downgrade from what the water quality of the Chesapeake Bay in the 1600s when it was rated 100 out of 100 according to the CBF’s State of the Bay Report. Today, the same report gives the once perfect Chesapeake Bay watershed a rating of 28 out of 100.  
In an effort to limit the amount of nitrogen being dumped into the bay, the Chesapeake Bay Foundation suggests upgrading sewage treatment plants, using nitrogen removal technologies, and decreasing fertilizer applications to lawns. They are also making an effort to reduce the amount of agricultural runoff by helping farmers to implement nutrient management plans, control pollution from manure, plants cover crops, install buffer strips along farm fields, and set and implement a new riparian forest buffer goal. [[4]](#footnote-4)

The pollution in the Chesapeake Bay has the potential to affect the public’s health. Most of the pollution is caused by nutrients, sediments, toxic chemical contamination, air pollution, and landscape changes in addition to population growth.  
Population growth in addition to major development is the main causes of the environmental changes in the Chesapeake Bay over the past 400 years, impacting every pollution concern throughout the Bay. There are four major sources of pollution impacting the Chesapeake Bay, all of which are human produced. For example, the increased water use and wetlands loss as a result of residential pollution.  
Excess nutrients are a source of pollution that has a direct, as well as an indirect, impact on the health of the public. The nutrient overloads in waterways lead to increased growth in algae blooms that block sunlight which, combined with decomposition, leads to lower amounts of dissolved oxygen that creates a poor living environment for the animal life in the bay and ideal living conditions for invasive species. This affects the people that feed upon the finfish, shellfish, and crabs in the Chesapeake Bay.[[5]](#footnote-5)

There are economic consequences to the banning the land application of animal waste in the Chesapeake Bay watershed, but one must keep in mind the consequences of pollution within the Bay. In this article, Lynton S. Land lays out the undisputed facts that most seem to ignore.   
Half of the Chesapeake Bay’s nutrient pollution comes from inefficient agricultural fertilization practice. Also, the land application of animal waste causes half of agricultural pollution; the same amount of pollution in the Bay is caused by all of the wastewater treatment plants in the watershed. Lastly, the water quality in the Chesapeake Bay is not improving.[[6]](#footnote-6)

Research Design

Field of Study: Environmental

Goal of your project: (include why your research/project is important to your field; how is it going to enhance you as an individual)

For this project, I will be conducting a study comparing polluted waters in developed countries versus the waters in over-populated developing countries. Hopefully this study will provide information as to how affluence can affect the quality/cleanliness of water based on the type of consumers and what exactly the water is used for.

Potential Committee Members: (Who would help enhance your project?)

My main focuses will be the Chesapeake Bay, the second most polluted estuary in the world, and the Ganges River in India, one of the most polluted bodies of water in the world.

With that being said, my Tallwood mentor would most likely be Mrs. Greer, the AP Environmental Science teacher.

Research Question: (What are you trying to prove, or contribute to your field?)

How does poverty and affluence effect water pollution?

Action: (event, internship – where, why?)

I would like to possibly have an internship with the Chesapeake Bay Foundation and host a community cleaning of the bay. Hopefully during this activity, we may find some of the items that everyday people contribute to the pollution of the water.  
I am also considering doing something with Water Aid America, for clean waters in India.

Target Date: (when and why then?)

I will set my target date for May 20 because the weather will hopefully be ideal for the event.

Action’s Connectivity to Research:

This activity and my research go hand in hand because the cleaning of the bay will only add to the theory that sometimes affluence can have a major impact on water pollution and that there may be a ways that we can clean this pollution or hopefully prevent more pollution.

Beneficiaries: (Who, besides you, will benefit from your project?)

I think the Chesapeake Bay community will benefit from my project because they can see the beauty of the bay and hopefully help restore it to the clear, beautiful waters the John Smith once wrote about.

Support: (What organizations might you seek out for support or to benefit?)

The Chesapeake Bay Foundation, Water Aid America, Alliance for the Bay

Publicity/Marketing: (How will you specifically market your event, or market yourself to get an internship?)

I will call available internship providers and inform them of my project and why I’ve chosen to do it.

Cost Analysis: (What do you specifically need to buy to make your action happen? How much will it cost you?)

Cost may vary depending on what is needed to do the action.

Community Service Element: (In what additional ways will you contribute to your community?)

I will be leading an activity to clean the Chesapeake Bay.

Sustainability: There can be a monthly cleaning of the bay rather than making it an annual event

Reflection: I will make a video documentary of my experience.

**Instructor’s Signature: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_Date:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

Plan of Study Form

Student Name: Alea McDuffie\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Field of Study: Environmental

Grade 9 Coursework

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| --- | --- |
| Global Issues | Volunteered at Aquarium |
| Spanish II | Freindable Prom with Noble Teens [Prom put together by Noble Teens] |
|  | Spanish Club |
|  |  |

Grade 10 Coursework

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| --- | --- |
| Global Cultures | Noble Teens [Collected canned food for impoverished children in Virginia Beach] |
| World Religions | Noble Teens [Friendable Prom] |
| Oceanography | Noble Teens [ Helped collect money for a student with cancer called “Shelby Penny Mile”] |
| Spanish III | Rock Solid [Helped built a rock wall for a playground that would be given to a child with cancer] |

Grade 11 Coursework

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| --- | --- |
| Global Systems | One Lens Project [Creating a PSA raising awareness about homlessness with students from Indonesia] |
| Spanish IV | Noble Teens [Sold bracelets to raise money for a Tallwood student with cancer] |
| Russian I | Noble Teens [Friendable Prom] |
|  | Spanish Club |

Grade 12 Coursework

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| --- | --- |
| AP Environmental Science | One Lens Project |
| Global Connections | Noble Teens |
| Russian II | Environmental Club |
| AP Government and Politics | William and Mary High School Model UN Conference |

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| **Committee Member** | **Signature** | **Job Title** |
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Student Signature: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Date: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  
  
GCS Advisor Signature: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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