

A Look at the Pollution Affecting the Potomac River and Watershed and the Efforts
at Restoration

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Introduction

Growing up in DC metropolitan area, I have experienced the richness that the Potomac River and its watershed have to offer. The small tributary creek in my backyard provides not only beautiful scenery but also an escape. Sitting by the creek, watching the water trickle through, and listening to the surrounding wildlife creates an air of peace and serenity. I know how important the creek is not only to me, but to others as well. The wildlife depends on the creek for water. They rely on the surrounding valley for habitat and shelter. It's the center of life for many.

But this creek is only one of hundreds of tributaries of the Potomac watershed that lead into the Potomac River. The Potomac watershed (also known as a basin) is an area of land that extends into four states: Pennsylvania, West Virginia, Virginia and Maryland. The contributing tributaries from these states converge at the mouth of the Potomac River, which empties into the Chesapeake Bay. The watershed consists of about 14,600 square miles divided into five distinct geologic landscapes, each with its own unique features. Over 57% of the watershed consists of forest, 5% is urbanized, wetlands comprise another 5%, and the rest is used for agriculture. (ICPRB 2012)

While most live in rural areas, 80% of the 6.11 million Potomac watershed residents live in the DC metropolitan area. Some major cities include Waldorf, Maryland; Gettysburg, PA; Alexandria, VA; Charles Town, WV; and of course,

Washington, DC. The Potomac River itself runs from Fairfax Stone, WV and ends 383 miles away at Point Lookout, Maryland. The Occoquan River, Anacostia River, Shenandoah River, Antietam Creek, and Senaca Creek are all major contributors to the Potomac River. (ICPRB 2012)

The Potomac is a major source of water for the surrounding watershed and its residents. Almost 500 million gallons of water is withdrawn daily in the Washington area for use in many facets of our life. About 80% of withdrawn water is used to generate power, 2% is for industry, less than 1% is used in mining, 0.20% goes toward agriculture, and about 19% of Potomac water is used for drinking water and other domestic uses. In addition, 100 million gallons of groundwater from the Potomac Watershed is used for domestic and public uses, especially in rural areas. As the population continues to rapidly increase, the demand for clean water also rises. (Cummins et al. 2011)

However, the quality of the water in the Potomac River has been questioned for quite some time. Its discovery in the 1600's deemed the river a haven, noted for its clean water and rich aquatic and terrestrial biodiversity. Yet human population growth and introduction of sewage systems took a toll on the Potomac and the watershed. In the 1900's, the Potomac's residents and the government began to take notice of the poor water quality. Ever since the River was deemed unsafe for public swimming in the 1950's, conservation, restoration, and pollution abatement actions have been put in place to restore the Potomac to a place of its former good health and quality. (ICPRB 2012)

However, the Potomac River and watershed still face a crippling pollution problem and poor water quality today. Just last year, the Potomac River received a “D” from the National Oceanic and Atmospheric Administration due to its poor water quality, grass distribution, and water clarity. This was a decline from 2009 when the Potomac received a “C”. (Skalac 2011)

As an environmental science student, I have recently learned of the desperate conditions of the Potomac River and the watershed. For this study, I personally explored parts of the river and watershed to see with my own eyes the types and sources of pollution that are plaguing the Potomac. Along the way, I found that others are just as concerned as I am about the health of our river, and they are taking action. I will outline the pollution that is destroying the quality of the Potomac River and watershed and the actions that one group are taking to conserve, protect, and restore the Potomac.

Pollution on the Potomac

There are two types of pollution: nonpoint source and point source. Point source pollution has an identifiable source, usually effluent or gas emissions from a pipe or smokestack at a facility. Factories and sewage treatment plants are the most common sources of point source pollution. Conversely, nonpoint source pollution does not have an identifiable source. Nonpoint source pollution usually occurs as runoff when rain or snow pick up and carry sediments, chemicals, trash, oil, waste,

etc. The runoff usually ends up in a stream, creek, river, or other water source where it collects in the environment. (NOAA 2011)

In the Potomac, nonpoint source pollution is the major type of most of the pollutants that end up in the watershed and ultimately the river.

Litter and Trash Pollution

For one, the most obvious pollutant is litter and trash. Personally, trash and litter were the first pollutants I noticed when exploring Lake Accotink, a lake, wetland, and stream in the center of Springfield, VA. Everything from plastic bottles, to beer cans, candy wrappers

and even a flip-flop were floating in the water and collecting at the dock (Picture 1). I asked a man fishing off of the dock what he thought of all the trash and litter in the lake.



Picture 1. A goose swims amongst debris at Lake Accotink.

“People come here all the time: for picnics, to going walking or

running, to fish, or to just feed the geese,” he responded. “It’s a bit of a tourist attraction. But I guess that’s the problem. The more people that come here, the more trash there seems to be.” In addition to litter and trash being dumped directly

into the river, the surrounding area also contributes to the pollution. A densely populated residential area surrounds the lake. When a large rainstorm hits this area, the water washes away any trash that is on the street or on people's property and carries it to the Accotink, where it eventually ends up into the Potomac.

When I went to a secluded area of the Occoquan River a few days later, I remember what that local man at Lake Accotink had said. The stretch of the Occoquan that I explored was secluded and not heavily traveled by other people, compared to Lake Accotink, which was a local hotspot. This comparison illustrated the relationship between human interaction and the quality of the local watershed. Laura Chamberlain with the Potomac Watershed Cleanup, told me that, "human interaction and how it impacts the Potomac is really important." She said, "most trash and litter are generated by everyday people dumping their waste out of their car windows or just tossing it on the ground." In addition, "trash from vehicles and unsecured loads contribute to the litter pollution. For example, if a waste truck doesn't have a properly secured load, it could fall off and just land in the street. So every piece of trash on the street or ground is going to most likely get dumped directly into the river." Therefore, it's thought that most litter and trash pollution is seen in urban areas, like the DC metropolitan areas due to the large population. Yet, because of the movement of water, trash and litter can be carried downstream to rural areas and even to the coast and into the Chesapeake.

Nutrient Pollution

Another issue plaguing the Potomac River and watershed is nutrient pollution. Nutrient pollution occurs when nutrients, mostly nitrogen and phosphorous, cause an excess amount of algae to grow in a body of water in a process called eutrophication. During eutrophication, the increase in nutrients causes a growth in phytoplankton population and also algal blooms. When the algae die off, it starts decomposing at the bottom of the water and uses up oxygen. Dissolved oxygen levels in the water can drop dangerously low and start to kill off the aquatic life, including fish, crabs, and plants. Ultimately, water quality declines along with species richness. Eventually, the entire ecosystem collapses. (NOAA 2011)

Unfortunately, there are several sources of nutrient pollution along the Potomac River and in the watershed. I stumbled upon one source while walking under the Fairfax Boulevard Bridge, which crosses over Accotink Creek. Dog waste



Picture 2. Dog waste (lower left) next to the Accotink Creek in Fairfax, VA.

left by a careless owner was right next to the water (Picture 2). As soon as a strong rain hits the area, the dog waste will be washed into the creek where the nutrients in the waste will become food for phytoplankton. Thus starting eutrophication. In addition to dog waste, livestock manure can be washed into the

watershed. I live in a private community in Clifton, VA, a suburb of DC. We house two horses on seven acres of land; however, the local government requires us to fence off the horse pen far from the tributary so that it is harder for the manure to make its way into the creek. Although measures like these are put in place, a large amount of animal waste still finds its way into the Potomac. A study done by the USGS found that almost 30% of all nitrogen and 45% of all phosphorous in the Potomac came from agricultural manure. (Ator et al. 1998) Human waste management is strictly monitored and regulated; yet there are no effective steps taken to control animal manure.

But animal waste isn't the only source of nutrient pollution. Fertilizers also contribute to the problem. The application of artificial fertilizer on lawns to achieve an aesthetically pleasing yard has its disadvantages. Again, the nutrients in the fertilizer can get into runoff and end up in the watershed. For example, when I

walked into a residential area next to Accotink Creek, I noticed fertilizer in the form of an organic waste dump (Picture 3). Why good in theory, the organic waste dump is only a few yards away from the creek. The decomposition of the organic



Picture 3. The Accotink Creek Park organic waste dump.

waste makes it rich in nutrients. Again, rain will wash it right into the creek, where it will then go into the Potomac.

Chemical Pollution

Lastly, chemical pollution is a serious problem in the Potomac River and watershed. Chemical pollutants are seriously detrimental to the water quality and have a tremendous impact on the environment. In the past decade, chemicals found in pesticides, herbicides, plastics, flame-retardants, oil, and grease have all been found in the Potomac River. Since many chemicals have a tendency to remain in the environment for long periods of time, they are picked up as runoff and eventually deposited into the Potomac River where they can affect the ecosystem. One group of toxic chemicals that are generating concern is called endocrine disruptors. Endocrine disruptors are known to disrupt proper development and normal reproductive, neurological, and immune functions. These chemicals are found in pesticides, herbicides, plastic, and oil. Fish are particularly vulnerable to toxic effects from endocrine disruptors. In the early 2000's, residents were finding intersex smallmouth Bass in the Potomac. The USGS did a subsequent study in 2003 and saw that all collected fish samples contained at least one endocrine disruptor, even in those fish that were not intersex. (Chambers 2007) Knowing this information, I kept an eye out for potential sources of endocrine disruptors during my research.

At Lake Accotink, I saw something even more alarming than trash in the water. A plastic container of motor oil was dumped just inches away from the shoreline and was leaking its content into the water (Picture 4). After I picked it up,



Picture 4. Bottle of motor oil leaking into Lake Accotink.

I noticed a glossy sheen on top of the water that was immediately recognizable as a mini oil slick. The chemicals in that motor oil were

contaminating the water right in plain view. As previously mentioned, some chemicals in oil are known to be endocrine disruptors. Therefore, this oil was leaking harmful chemicals into the water and will possibly negatively affect the aquatic ecosystem and taint our water supply. Although there are traces of chemicals still found in water even after wastewater treatment, large quantities of untreated chemical leakage, as seen in the situation above, can cause a serious problem, especially since a large portion of the DC drinking water supply comes from the Potomac.

The Approach to Restoration by the Trash-Free Potomac Watershed Initiative

As I previously said, local residents have begun to take notice of the impaired water quality and the pollution affecting the Potomac River and the watershed. Organizations that protect and cleanup the watershed have formed, people are lobbying for stricter pollution abatement policies and government agencies like the EPA are implementing these new policies, and local residents are going out and cleaning up litter and trash.

I personally decided to volunteer with Potomac River Watershed Cleanup program. The Potomac River Watershed Cleanup is a program under the Trash Free Potomac Watershed Initiative, which is headed by the Alice Ferguson Foundation, a nonprofit, Maryland-based organization. Laura Chamberlin, the general manager of the Trash- Free Potomac Watershed Initiative, told me a little bit about the origins of the cleanup program. “The cleanup started in 1989 at the Alice Ferguson Foundation’s 330 acre farm on the river shoreline. We run an environmental education program there and we would take the kids to the shoreline and you could see the trash flowing in from up-stream,” she said. “After a couple years, we realized that the trash was still coming in so we started cleanups upstream, which has grown to over 600 cleanup sites in the entire Potomac watershed today.”



Picture 5. Debris in Giles Run Creek.

To get involved and volunteer at a cleanup site along the Potomac watershed, you can visit their

website and find when and where cleanups are occurring in your area. I chose to sign up for the Giles Run cleanup site. Giles Run is a creek located in Laurel Hill Park in Lorton, VA not far from Mason Neck National Wildlife Refuge. When I arrived at the cleanup sites, the volunteers were handed gloves and trash bags and led down to the creek. I asked our site leader why this area of the creek warrants a cleanup. He told me, “there used to be a residential area not far from here and many people used this back area near the creek as a dump site. Also, during Hurricane Irene, this whole area was flooded. A lot of debris further up on the plateau was washed down into the creek.” Sure enough, the creek was littered with debris usually found in households. Car tires, pieces of crap metal, pieces of machinery, rusty pipes, and even parts of a washing machine and oven were found (Picture 5). Some areas along the bank of the creek were so congested with debris that it affected the creek’s water flow. We also found plastic bottles, wires, cups, and food wrappers.

I wanted to know why other people wanted to volunteer and get rid of trash and litter. Fellow volunteer Allyson Lohr simply stated, “I’m tired of seeing the trash and pollution. I’ve seen litter all over the side of roads, washing up on the shore of my favorite nature retreats, and collecting in the nearby woods. I guess if you want to see change, you’ve got to do it yourself.” Her opinion seemed to be shared by other volunteers. Plain and simply,



Volunteer Allyson Lohr removes debris from Giles Run Creek.

Potomac residents are tired of seeing their community riddled with litter and trash and having their water supply impaired with chemical and nutrient pollutants. They are joining nonprofit organization like the Alice Ferguson foundation to stop the pollution and restore the watershed. But strength and change seem to be seen in numbers.

Organizations with a substantial volunteer base like the Alice Ferguson Foundation are working tirelessly to restore the Potomac and they are making a difference. They approach the issues from different angles in order to achieve the most effective change. For example, Ms. Chamberlin introduced me to something called the “five pronged approach”.

In short, the five-pronged approach is a collection of five strategies, each of which are play a vital role in the restoration and improvement of the Potomac River and Watershed. They are public education, policy, regulation, enforcement, and market-based approach.

Although interconnected, policy, regulation, and enforcement all play their role in protecting the Potomac. Because policy and regulation are most effective at preventing pollution before it even enters the river, many organizations are turning to lobbying and even forming government partnerships to facilitate change. Chamberlin states, “developing good policy is crucial in pollution reduction. Elected officials have the power to make change happen faster.” Local organizations have also partnered with EPA. “We work with EPA to make sure that trash is being upheld as a pollutant and being treated as such under the Clean Water Act”, explains

Chamberlin. The EPA has also set regulations and enforced actions to remove pollution from heavily polluted areas. One such example is the Anacostia River. Chamberlin said, “the EPA put the Anacostia River on a pollution diet, so there is a certain amount of trash they have to remove from the river. That means if they don’t do it, the jurisdiction (DC, Prince George and Montgomery Counties) will be fined by the EPA.” Not only does this directly remove trash from the river, but it can also serve as a warning to other counties or local governments that have impaired and polluted waterways. Chamberlin elaborated, “other jurisdictions are seeing that it’s a possibility that they could be put on this same type of diet or pollution restriction, so they are taking preventative actions to avoid getting hit with fines.”

Laura also told me that April is litter enforcement month, “we try to get police officers and officials in the region thinking and focusing on litter, so they make a conscious effort to do something about it and discourage people from littering in the first place.” So, by going through the local government, we can locally enforce policies and regulations to control littering. By enforcing laws and regulations, residents, companies, and even entire jurisdictions are striving to take preemptive action to avoid negative consequences. In conclusion, through collaborations at the state and local level, organizations are along with the government and its agencies are using policy, regulations, and enforcement to abate the pollution problem.

In addition, market based approaches have proved to be effective in deterring the pollution problem. Market- based solutions are policies or regulations that rely on the economy to force producer and consumer behavior modification.

One example of such is the 5-cent plastic bag tax that was introduced in Montgomery County, Maryland and DC. “The bag fee in DC and Montgomery results in source reduction which results in less trash available to become litter,” Chamberlin explained. Because many people do not want to pay an additional five cents per plastic bag at the grocery store, it forces them to use reusable cloth bags. So by using reusable bags, there is a reduction in plastic bags being thrown away or recycled and potentially becoming litter. Not to mention, the county gets a little extra revenue and helps the environment at the same time: a win-win situation all around. I believe that the establishment of more market-based approaches or even incentives would be beneficial to the Potomac, especially during this poor economic time.

Lastly, as Laura Chamberlin said, “if I had to choose the most important aspect, I would say it’s public education.” Public education and awareness play a tremendous part in protecting and restoring the Potomac River and watershed. There are a number of ways organizations and citizens like ourselves can get involved, raise awareness, and teach others about the issues affecting the Potomac and what they can do to restore it. For one, “volunteering is a great way to engage citizens in the pollution problem and help them understand it better”, says Chamberlin. Through volunteer work, one can gain knowledge about the environment, human interaction, the relationship between both, and the negative effects of that relationship. One can also learn how to modify their actions in order to decrease their impact on the environment. “Environmental education leads to

behavior change. Raising awareness about waste and trash in general will then lead to source reduction and therefore litter reduction,” Chamberlin adds. Many people are uninformed on a lot of issues. For example, during my research I learned how much of an impact animal waste has on the aquatic ecosystem. I didn’t know before the importance of proper animal waste management and the need for personal responsibility for ones animals waste, even if there aren’t formal laws or regulations in place. In addition, when I was walking the trails around Lake Accotink, I stopped a few people jogging or walking and asked them if they could name three pollutants in the Potomac. All of them gave me some type of debris or litter. When asked if they could name a nutrient or chemical pollutant, most did not even know that nutrients and chemicals were considered pollution problems in the Potomac. As the examples above illustrate, it is crucial to raise public awareness and education so that citizens know the problems the environment faces so they can resolve them using appropriate knowledge and course of action.

So in summary, the “five pronged approach” is an effective way to encompass the government, the economy, everyday citizens, and nonprofit organizations to beat the Potomac pollution problem and restore our watershed. While the Trash-Free Potomac Watershed Initiative specifically utilizes this approach, many other nonprofit organizations concentrate their efforts and base their programs around similar strategies.

Conclusion

Our Potomac River and watershed face dire conditions due to pollution, such as litter and chemical and nutrient pollutants. While the health of the ecosystem and the quality of our drinking water are failing, there is still time to make a difference! I've seen first hand what normal, everyday people just like you are doing to restore and protect our river and watershed. State and local governments, officials, nonprofit organizations, and everyday citizens are joining the fight to protect the Potomac. Volunteer, lobby, or just educate yourself and you can be part of the change.



Volunteers with the debris collected from the cleanup at Giles Run Creek.