

# “A Conversation with Greenable Woodbridge” ..... Pollution Prevention

**Introduction:** Pollution Prevention at its core is any practice or action that is undertaken to reduce, eliminate, or prevent pollution at its source. By attacking the source of the pollution, Pollution Prevention is a form of damage mitigation and results in a reduction of “waste”. As we will see over this month’s articles, “waste” can refer to a lot more than just trash or recyclables.

Part of the issue with discussing Pollution Prevention is that when most people think about it, they think of the large scale community or nationwide initiatives that are undertaken instead of what we as individuals can do to reduce the impact of pollution. As part of Greenable Woodbridge’s “12 Pillars of Sustainability”, this month will be focused on individual forms of Pollution Prevention.

Each week in July we will post topical summaries on the Pollution question. These summaries will address:

Who is ultimately responsible for Pollution Prevention?

- What are some tips for Pollution Prevention I use in my everyday life?
- Have there been updates made to cars that might be able to help reduce pollution at the source?
- What other forms of pollution have I never considered before and how can I address that?

The narrative summaries will also be supplemented by companion links to additional reference materials for those interested in more detail.

## ***Who is ultimately responsible for Pollution Prevention?***

There are two major forms of pollution, Point Source and Nonpoint Source. Point Source forms of pollution come from a particular place, whether it is a sewage facility, an industrial plant, etc. It is an identifiable source that usually has a particular discharge.

Nonpoint Source pollution is derived from when nature moves pollutants into natural resource assets. Think of it like pollutants that such as pesticides or fertilizer that is picked up by running rain water or melting snow and carried into natural bodies of water. According to one source, nonpoint source pollution is a major cause behind more than one-third of surveyed rivers, lakes, and estuaries not being clean enough to meet standards for recreational use, such as swimming and fishing. In particular run off from more densely populated areas was found to be a major impairment to the water quality of estuaries.

Once these forms of pollution are understood, we can begin to understand who in particular is having an impact on our environment and the pollutants that exist in it.

Point Source Pollution can be altered through various forms of public policy:

- Congress and the EPA develop standards from which businesses and organizations must meet to be allowed to continue to operate
  - An example of this are the Clean Air Act of 1973, which set forth standards for the air that we breath
- Nonpoint Source Pollution is a little more difficult to control because it does not have a clearly identifiable source from which the “source controls” can begin.
- However there have been laws passed that indicate which forms of pollutants can be used in everyday products, thereby removing dangerous substances from the general population and reducing the instances of that substance from reaching the natural resource assets (such as the water supply)

- One example of this is a recent piece of federal legislation signed into law by President Obama banned the inclusion of microbeads in household products like shower gels. Although the microbeads were used to exfoliate the skin while showering, it was found that the size of the microbeads would allow them to get into the waterways and pose a risk to aquatic life.
- However, this is also an area where an individual can make a great difference. Awareness of products that pose a danger to the natural habitats of the New Jersey ecosystem can be avoided so that their byproducts aren't accidentally delivered into our ecosystems.
- Intentionally or accidentally pouring pesticides down the drain, instead of safely getting rid of them, could cause serious damage to wildlife by contaminating the water supplies.

Pollution Prevention is complex because pollutants can come from a variety of sources, both intentional and unintentional. Although the policy-makers are able to address a large amount of it, the rest falls to us as individuals to look at addressing the rest. Next week, we will explore some of the ways that individuals can alter their daily routine and reduce the impact of the nonpoint source pollutants.

**To Learn More:** If interested, please check out the following websites:

**Websites and Literature:**

- <https://www.epa.gov/learn-issues/learn-about-air>
- <https://www.epa.gov/aboutepa/about-office-chemical-safety-and-pollution-prevention-ocspp>
- <http://www.p2.org/>
- <http://www.webofcreation.org/Earth%20Problems/pollution.htm>
- <http://nemo.uconn.edu/>

***What are some tips for Pollution Prevention that I can use in my everyday life?***

Last week was primarily focused on the “what” when it comes to pollution prevention. What are the various forms? This week will primarily focus on the “how” of pollution prevention. Continuing on with the nonpoint source pollutants reduction and then looping into water/energy conservation, since the development of this energy requires burning fuel and treating water, we will be providing tips that can be used for your everyday life.

**Nonsource Point Pollution (Runoff) Prevention:**

- Clean your gutters
  - Litter, pet waste, leaves, debris making it into gutters and storm drains puts them directly in the path to be picked up by runoff
- Pick up and dispose of waste from pets
- Read the instructions on your garden supplies
  - Ensure that all garden chemicals are applied exceedingly sparingly and according to the instructions on the packet
- Properly dispose of household chemicals
  - More often than you think, oil, antifreeze, and paint are poured into the drains and storm sewers, putting them in the direct path to be picked up by runoff
  - Additionally, if these chemicals spill, do not hose them into the street. Ensure a proper cleaning

- Avoid soil erosion
  - Planting ground cover should effectively prevent this
  - Drought tolerant plants are the best for this (along with water conservation)
- Have your septic tank inspected and cleaned every 3-5 years at minimum
- When purchasing detergents and cleaners, look for ones that are low in phosphorus
  - Although it will be unlikely to find any without it, reducing the amount that is discharged into the water supplies with each wash will have a measurable impact

#### Every Day Water Conservation Tips:

Remember that every time you use or “draw” water, it must be treated. This treatment process draws quite a lot of energy.

- Install a toilet dam or plastic bottle in toilet
  - To ensure that water does not continue to run
  - Check for “silent leaks”
    - Pour food coloring into the tank and see if appears in the bowl
  - Look for “low-flow” models when it becomes time for a replacement
- Look to take shorter showers or draw less water for your baths
- Turn off the water when brushing your teeth and shaving
- Keep a gallon of water in the fridge rather than drink straight from the tap
- Run washing machine with full loads, while washing with warm water instead of hot and rinsing with cold water instead of warm. When weather permits, hang clothes to dry.
- When cutting grass, aim to be 3 inches high so that the roots are shaded and the grass is more drought resistant
- Water plants in either the evening or in the early morning to avoid excess evaporation
- Use a broom instead of hose to clean pavement
- Aim to wash car less often
  - If washed at home, aim to use buckets of soapy water instead of running hose
  - If taken to car wash, aim to go to place that cleans and recycles water

#### Every Day Energy Conservation Tips:

- Aim to have house heated to 68 degrees during the day and 60 degrees during the evening
- Turning the water heater to 120 degrees can result in a reduction of heating costs up to 10%
- Look to purchase energy efficient appliances, such as air conditioners
- Ensure that your house is insulated so no excess heat escapes
- Turn off unused appliances
- Replace filters regularly
- Increase use of natural light
- Carpool or increase use of public transportation

**To Learn More:** If interested, please check out the following websites:

#### **Websites and Literature:**

- “Greener Living Resources”: <https://www.epa.gov/learn-issues/greener-living-resources>
  - “Pollution Prevention Tips for Water Conservation”: <https://www.epa.gov/p2/pollution-prevention-tips-water-conservation>
  - Water Sense: [https://www3.epa.gov/watersense/our\\_water/start\\_saving.html](https://www3.epa.gov/watersense/our_water/start_saving.html)
  - “What You Can Do About Pollution Prevention”: <https://www.epa.gov/p2/what-you-can-do-about-pollution->
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### ***Have there been updates made to cars that might be able to reduce pollution at the source?***

As we discussed in the past two weeks, one can reduce pollution by increasing the efficiency of their energy and water lifestyle choices. But one area of concern, particularly if you don't live close enough to your place of employment to bike or if your job is not near a major public transportation hub would be automotive pollution.

Each and every car has "footprint" in that it creates excess carbon monoxide, nitrogen oxide (ie. smog), and other volatile organic compounds through the burning of petroleum. It goes without saying that these are not healthy for us to be breathing in and with the sheer number of cars on the road today, the volume of pollutants that cars could be putting out could be very dangerous.

However, thanks to an invention that was refined in Iselin, NJ for mass production, the volume of pollution has been greatly reduced.

The Catalytic Converter was invented in the 1950s by Eugene Houdry, a French mechanical engineer who was living in the United States. However, Mr. Houdry's invention could only be used on warehouse forklifts that ran on low grade non-lead gasoline.

Within a few years, more stringent regulatory practices removed tetraethyl lead from gasoline. For the development of catalytic converters, this was a phenomenal development because the tetraethyl lead would coat the inside of the converters, rendering them effectively useless. Seizing the new opportunity, two engineers at the Engelhard Corporation of Iselin, NJ developed the first converters available for mass production in 1973.

How the Catalytic Converter works:

- The converter actually rearranges the molecules of the pollutants to change the chemical composition and reduce the harmful effects
- Most of today's cars are equipped with a modern Three-Way Catalytic Converter that uses three steps
  - o In the first stage of the converter's process is the Reduction Catalyst
    - § When the car is blowing out Nitrogen Oxide and Nitrogen Dioxide, the catalyst captures the Nitrogen molecules, effectively ripping them from the Oxygen
    - § It then allows the Oxygen to pass through while holding back the Nitrogen
      - The Nitrogen atoms bond together
  - o The second stage is the Oxidation Catalyst
    - § In this stage, the converter burns the remaining hydrocarbons and carbon monoxide to set off reactions relative to the remaining oxygen atoms
  - o The third stage of the process is the Control Systems stage
    - § In this process, the converter monitors the how much oxygen is in the exhaust with a sensor so that when it is too high or low, changes can be made to ensure that it is oxidizing the hydrocarbons and carbon monoxide at the most efficient levels
- Think of it like a filter that catches only certain molecules from the exhaust
  - o In doing so, the molecules that make it through the converter then reattach themselves as nonthreatening substances or are burned on their way out

***To Learn More:*** If interested, please check out the following websites:

#### **Websites and Literature:**

- <http://auto.howstuffworks.com/catalytic-converter.htm>

- <https://www.catalyticconverters.com/history/>
- <http://www.explainthatstuff.com/catalyticconverters.html>

***Week 4: What are other forms of pollution that I haven't considered before and how can I address them?***

Over the past three weeks, we have covered the major forms of pollution prevention that one would expect to see such as source point pollution, non-source point pollution, and airborne automotive pollution. However, there exists another form of pollution that should be considered, even though most of people probably don't think of it when pollution comes to mind. That is light pollution.

Light pollution is brightening of the night sky caused by street lights and other man-made sources, which has a disruptive effect on natural cycles and inhibits the observation of stars and planets. It is estimated that due to the glow of manmade light, one-third of the world's population cannot see the Milky Way with that number jumping to an absurd 80 percent when factoring in only Americans.

Of those 80 percent of Americans who cannot see the Milky Way Galaxy due to light pollution, it is fair to guess that a number of them might not care or understand why that is a problem. The problem is not that we can't see our own galaxy but instead that the light pollution which blocks out our galaxy is also impacting us and our environments. But before considering that, we need to quickly go over the four types of light pollution:

- Urban Sky Glow- The illumination of the sky over inhabited areas
- Light Trespass- Light illuminating areas it is not intended to
- Glare- Excessive brightness which causes visual discomfort
- Clutter- Bright, confusing and excessive groupings of light sources

In particular Light Trespass and Clutter contribute to sleep disruption. When light from street lamps and other sources creeps into personal dwellings, it can disrupt the body's ability to create melatonin (the chemical that induces sleep). Blue light can be especially disruptive.

Urban Sky Glow contributes to the inefficiencies discussed in previous weeks. This is particularly startling when one considers that while Urban Sky Glow illuminates increases visibility and mobility capabilities on the ground as intended, its very name alludes to the fact that it also illuminates the sky above the area. It wastes energy. Some estimates suggest that 40 percent of a city's electric bill will go towards street light, and about half of that light is wasted as previously described.

Additionally, Glare goes beyond the point of the light being useful and directly into harmful. It reduces the visibility it was intended to increase and because of the amount of light necessary to achieve a glare, it too acts very inefficiently.

For one final detriment, Light Trespass, Glare and Clutter can impact wildlife and disrupt migration patterns, navigation and mating. These dangers and their impact on humans can be very succinctly described with the following example:

If lighting can disrupt zooplankton and harm their ability to eat algae, it can reduce the quality of our drinking water.

So what can we do about this:

- Turn off the light- It sounds simple, but reducing this sort of pollution at its source can prove beneficial

- Check with your power company to see if you're paying for outdoor lighting- it is usually \$5-\$10 a month and can be canceled with a simple ask
- Replace your outdoor lights with low glare alternatives
- Place motion sensors on essential outdoor light fixtures
- Replace conventional light bulbs with energy efficient CFL and LED floodlights

**To Learn More:** If interested, please check out the following websites:

**Websites and Literature:**

- <http://www.vox.com/2016/6/10/11905390/light-pollution-night-sky>
- <http://www.darksitiesawareness.org/faq-what-is-lp.php>
- <http://darksitefinder.com/map/>
- <http://www.globeatnight.org/light-pollution.php>
- <http://ngm.nationalgeographic.com/2008/11/light-pollution/klinkenborg-text>
- <http://www.sciencedirect.com/science/article/pii/S030147971100226X>
- <http://www.health.harvard.edu/staying-healthy/blue-light-has-a-dark-side>
- [http://www.nytimes.com/2014/08/15/us/firefly-population-science-in-a-twinkle-of-nighttime-in-the-south.html?\\_r=3](http://www.nytimes.com/2014/08/15/us/firefly-population-science-in-a-twinkle-of-nighttime-in-the-south.html?_r=3)
  
- <http://www.mnn.com/your-home/remodeling-design/stories/5-ways-you-can-reduce-light-pollution>