CONTAMINANTS IN THE ENVIRONMENT

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Since the Industrial Revolution (1760-1840), there has been a fight for the balance of economic growth and environmental protection in the United States. As the economy and job market grew due to the expansion of industrial jobs, there was little governmental regulation on the by-products leaving these factories and energy production plants. After environmental disasters like the Cuyahoga River fire in Illinois (1952) and the release of Rachel Carson's book *Silent Spring* (1962), the United States began creating laws and regulatory agencies to protect its natural resources from misuse (Land and Water Conservation Act 1965, The Wilderness Act 1964, Clean Air Act 1970, Clean Water Act 1972). As technologies continue to improve through the 21st century, society has been able to reduce the number of contaminants that enter our environments to meet these governmental regulations.

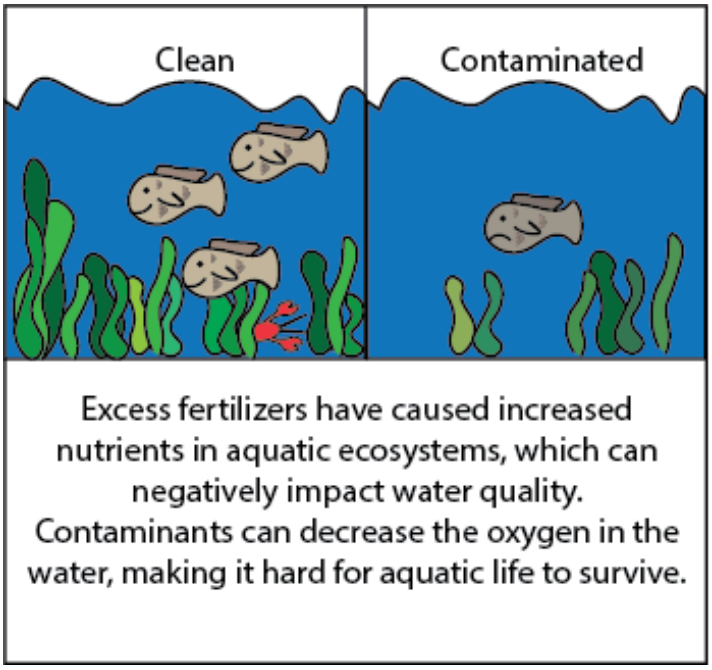
There are multiple environmental and human exposure pathways an individual can experience while living in Burke County. It is important to recognize the multiple sources of contamination in our environment and understand the roles individuals play in the use and release of these contaminants. For example, in the early 1950s, there was little regulation on industry and its use of natural resources. This led to environmental disasters such as the Cuyahoga River fire in Illinois and the exposure of humans and wildlife to pesticides like DDT. We also used to do things like play with mercury from thermometers and use lead paint. Through research studies, we know that unregulated industrial contaminants are what caused the Cuyahoga River to catch fire, mercury can cause nerve damage, and lead is a harmful neurotoxin, especially to children. Through the pathways discussed in this lesson, like soil and water, heavy metals and radionuclides can either be remediated or become a health hazard.

There are two categories that contaminants fall in: point source and non-point source. Point source pollution (top three images below) are contaminants that are released from a specific point, like a pipe, factory, or sewage treatment plant. These sources are easily regulated by state and federal agencies to protect environmental and human health because they are easy to measure and monitor. Non-point sources (bottom three images on the left) are combinations of contaminants from many sources, like cities, gardens, parking lots, or construction sites. These sources are often much more difficult for state and federal agencies to regulate because there is more than one location

contributing to the contaminants in the environment. Regulating these sources relies on individuals making choices, like reducing fertilizer use, instead of industries.

It is important to understand the pathways contaminants can enter the human body. These pathways include ingestion, dermal, inhalation, and direct. In some situations, we can mitigate our exposure to contaminants in the food that we eat through washing produce and ensuring good pesticide and fertilizer application. For drinking water, there are special filters that can help reduce contamination from heavy metals. There are also air filtration systems that can be installed in homes to improve air quality inside homes. However, for large sources of contaminants in the environment, governmental regulation of manufacturing and energy industries are the main safety mechanisms in place to protect human health.

While humans can be exposed in similar ways, age, health, and gender can play a role in how contaminants affect your life. Young children and older adults can experience different responses to environmental contamination than healthy adults. When young children were exposed to high levels of radiation, they had a higher risk of contracting brain cancer at 60 years of age than adults at 40 exposed to the same level of radiation. In healthy adults, reducing the concentration of air pollution by 10 $\mu g/m^3$ increased mean life expectancy by about 2 years. However, this value wouldn't hold for individuals who smoke or who live below the poverty line. Heavy metals like lead, mercury, and copper are considered some of the main threats to human health. Additionally, in organisms like fish that bioaccumulate contaminants, it is important for women of childbearing age and pregnant women to reduce their intake of that organism to decrease the risk of negative health effects to herself and the baby. Contamination of our environment from human-made byproducts is a responsibility and concern for all citizens because not just one person or organization can reduce our use of these products. Environmental sustainability that includes maintaining a high-quality lifestyle as well as protecting environmental resources is the next step.



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