
Taking vital resources for granted: water and how toxic waste changes its properties

Covering seventy-one percent of the Earth's surface and around fifty-seven percent of the average human body, water exists all around us. Water is one of the most important aspects of people's daily lives. Every day we drink water, cook with water, bathe in water, and participate in many other activities pertaining to water. While water is so important to people's lives, very little people obtain knowledge on this resource. The amount of water we have on earth is always the same. However, clean water, is getting rarer because of pollution. According to the United States Environment Protection Agency, sustainability can be simply defined as everything that we need for our survival and wellbeing depends on, whether indirectly or directly, on our natural environment. This is exactly where water comes in because it is one of our most sustainable resources. While it is so important, things such as radioactive waste, industrial waste, and sewage and wastewater can affect something so vital.

With the amount of consumption and experimenting the human population does there is bound to be waste. The big question is where does it all go? One major cause of water pollution is radioactive waste. Nuclear waste is produced from industrial, medical, and scientific processes that use radioactive materials. Waste is also produced in the nuclear fuel cycle, which is the progression of nuclear fuel through differing stages. This nuclear waste can have extremely harmful effects on marine habitats. There are two levels of waste disposal, being high-level and low-level. According to the United States Nuclear Regulatory Commission (U.S.NRC), there are currently only three existing low-level waste disposal facilities in the U.S. but the state is responsible for the disposal of the waste. While this is to be disposed of in safe places to follow the safety hazards, high-level waste is disposed of underground. The Nuclear Waste Policy Act of 1982 specifies that the waste is to be disposed of underground, in a deep geologic repository. When water from rain and melting snow runs off roofs and roads into rivers and streams, it picks up toxic chemicals, dirt, trash, and disease-carrying organisms along the way. To prevent this, something as simple as creating a safety disposal plant, such as the ones for low-level waste disposal, would prevent the surface runoff from occurring. While it seems simple to fix this form of pollution there are other types of pollution which seem impossible to eliminate.

Industrial activities occur in major cities, and in these activities industrial waste is formed. Industry is a huge source of water pollution, producing pollutants that are extremely harmful to people and the environment. Asbestos was a major product created in industries and used many years ago. Pollutants such as these were used in everyday homes and could cause illnesses such as lung and/or intestinal cancer. This is one of the many pollutants formed by industry that can cause many illnesses that could lead to death. Also, things such as oils do not dissolve in water, but instead forms a thick layer on the water's surface. Products such as Dawn have even advertised this issue showing the harmful effects on wildlife this substance poses. This can also stop marine plants from receiving enough light. Every ecosystem has a structure to itself; it needs all of its parts to function productively. As described above, with the plants and animals not being able to perform its necessary functions for its environment, it disrupts its ecosystem. The Natural Resources Defense Council points out that many of our water resources lack basic protections, making them vulnerable to pollution from factory farms, industry plants, and activities like fracking. While it not only talks about the harms of industry to

water it discusses the tie between rainwater, industry remains, and sewage waste. It simply says that heavy rain can overwhelm sewage systems, forcing raw sewage directly into coastal waters, bypassing treatment plants. And as rainwater washes over land, it picks up pollutants and carries them directly to coastal waters.

Households, industrial and agricultural practices produce wastewater that can cause pollution in many lakes and rivers. Sewage is the term given for waterwaste that often contains feces, urine and other wastes. Because there are billions of people in the world, sewage is a major priority to be treated. While in the U.S. sanitary facilities are provided to dispose of waste, developing countries do not thus also not having access to clean water. Untreated sewage water in areas such as this passes diseases more easily, rather in developed countries such as the U.S. sewage is carried away from homes and hygienically through sewage pipes. With these sewage pipes, the sewage is then treated in water treatment plants and then disposed of in the sea. Like the low-level waste explained above, why are there not safer places to dispose of this waste. While they are being sent to treatment plants, not all treatment plants are as affective as they should be. Sewage carries harmful viruses and bacteria into the environment causing health problems. Why would anyone want that released back into nature? The Natural Resources Defense Council states that sewage overflows cost Americans billions a year in medical treatment, lost productivity and repairs. The only difference with this issue from the other sources of pollution is that there is an effort to decrease the severity of it. The Bush administration policies had even begun to compound the issue.

While these pollutions exist, the government is in charge of the safety and wellbeing of others and therefore has to provide some way of trying to regulate the issue. Before raw sewage can be safely released back into the environment, it needs to be treated correctly in a water treatment plant. In a water treatment plant, sewage goes through a number of chambers and chemical processes to reduce the amount and toxicity of the waste. Water world Magazine has many articles describing this water process. It states the following:

“The sewage first goes through a primary phase. This is where some of the suspended, solid particles and inorganic material is removed by the use of filters. The secondary phase of the treatment involves the reduction of organic; this is done with the use of biological filters and processes that naturally degrade the organic waste material. The final stage of treatment is the tertiary phase; this stage must be done before the water can be reused. Almost all solid particles are removed from the water and chemical additives are supplied to get rid of any left-over impurities.”

While this process may be affective, industries just need to go the extra mile and comply to follow these steps provided.

Another important process that could be done to improve conditions is called denitrification. Denitrification is an ecological approach that can be used to prevent the leaching of nitrates in soil; this in turn stops any ground water from being contaminated with nutrients. Fertilizers contain nitrogen, and are often applied to crops by farmers to help plant growth and increase the yield. Bacteria in the soil convert the nitrogen in the fertilizer to nitrates, making it easier for the plants to absorb. Immobilization is a process where the nitrates become part of the soil organic matter. When oxygen levels are low, another form of bacteria then turns the nitrates into gases such as nitrogen, nitrous oxide and nitrogen dioxide. The conversion of these nitrates into gas is called denitrification. This prevents nitrates from leaching into the soil and contaminating

groundwater. Water World Magazine talks about the Earle B. Phelps Award, established in 1964, honors outstanding treatment plants in Florida that have maintained the highest removal of pollutants. The Fiesta Village Advanced Wastewater Treatment (AWT) Plant in Lee County, FL, has received the 2006 Earle B. Phelps Award for Best AWT facility in the state. Advance wastewater treatment plants with Tetra filters for denitrification have won the Phelps Award in the last nine of thirteen years. Denitrification is considered to be one of the most affective processes to help prevent contamination of local waters.

An important method that is important to water treatment and is increasing in popularity is ozone wastewater treatment. An ozone generator is used to break down pollutants in the water source. The generators convert oxygen into ozone by using ultraviolet radiation or by an electric discharge field. Ozone is a very reactive gas that can oxidize bacteria, molds, organic material and other pollutants found in water. Using ozone to treat wastewater has many benefits. This includes: killing bacteria effectively, oxidizing substances such as iron and sulfur so that they can be filtered out of the solution, no nasty odors or residues produced from the treatment, and ozone converts back into oxygen quickly, and leaves no trace once it has been used. While these advantages exist like everything there are some disadvantages. The disadvantages of using ozone as a treatment for wastewater are: the treatment requires energy in the form of electricity; this can cost money and cannot work when the power is lost, it cannot remove dissolved minerals and salts, and the ozone treatment can sometimes produce by-products such as bromate that can harm human health if they are not controlled.

An important question, when all this is brought up, is what you can do to help. If you want to help keep our waters clean, there are many things you can do to help. You can prevent water pollution of nearby rivers and lakes as well as groundwater and drinking water by following some simple guidelines in your everyday life. Conserve water by turning off the tap when running water is not necessary. This helps prevent water shortages and reduces the amount of contaminated water that needs treatment. Be careful about what you throw down your sink or toilet. Don't throw paints, oils or other forms of litter down the drain. Use environmentally household products, such as washing powder, household cleaning agents and toiletries. Take great care not to overuse pesticides and fertilizers. This will prevent runoffs of the material into nearby water sources. By having more plants in your garden you are preventing fertilizer, pesticides and contaminated water from running off into nearby water sources. Don't throw litter into rivers, lakes or oceans. Help clean up any litter you see on beaches or in rivers and lakes, make sure it is safe to collect the litter and put it in a nearby dustbin.

The Safe Drinking Water Act of 1974 put into motion a new national program to reclaim and ensure the purity of the water we consume. Under the Act, each level of government, every local water system, and the individual consumer have well-defined roles and responsibilities. Since then, regulations such as the National Interim Primary Drinking Water Regulations have been created to specify maximum levels of drinking water contaminants and monitoring requirements for public water supply systems. Without this acts and regulations being put together, the water that is so vital to the lives of humans and nature could be destroyed. Imagine a life without water. No water to quench your thirst, to swim in on warm summer days, or to bathe in after a long days work. Water is an important aspect to the healthy lives we live. It is not much to ask people to take those extra steps discussed in order to ensure that water remains in our lives. This is where people are taking advantage of the luxuries we have, when they could be taking the time to appreciate our surroundings. The message to be brought throughout this paper is not to join groups and hold protests on the contamination of water, but

to do your part and be more conscious of the water being used. Doing your part could make the difference as to whether or not our future has healthy water or water at all.

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