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Water Pollution

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Water pollution refers to the contamination of water by chemicals, pathogens, litter, and other waste materials. Most water pollution originates from *anthropogenic*, or human-caused, activities on land. Pollution can contaminate drinking water supplies to the degree that they become dangerous for human consumption, and polluted water can seep into the soil or run off into nearby waterways. In addition to reducing the amount of fresh water available for drinking, cooking, bathing, and irrigation, water pollution also degrades the health of aquatic and coastal ecosystems.

All water sources have been impacted to some extent by different types of pollution from industrial, agricultural, municipal, and household origins. Water pollution has a critical and detrimental impact on the world's finite supply of drinkable water. More than 97 percent of the planet's water is salt water, which is not drinkable or usable by humans without *desalination treatment*, a process that removes minerals from salt water. Of the planet's fresh water, over two-thirds remains in glaciers, snow, and permafrost. The rest comes from freshwater lakes and rivers, underwater reserves or aquifers, and rainfall. According to the World Health Organization (WHO), about two billion people around the world were using a contaminated drinking water source in 2017, and over half of the global population will live in water-stressed areas by 2025.

Although developing countries are particularly affected by polluted waters, even prosperous countries have struggled to protect their water resources in the twenty-first century. In the decades following the 1972 passage of the Clean Water Act (CWA) and other significant environmental legislation, the United States made significant progress in reducing water pollution. However, federal investment in water system infrastructure has been minimal since 2000, and political challenges have attempted to weaken CWA regulations, leading environmentalists to express increasing concern over the quality of drinking water in the United States.

Main Ideas

- Contamination of fresh water by chemicals, pathogens, litter, and other waste can pollute water to a degree where it is dangerous for both humans and marine life. Most water pollution is caused by human activity.
- Water can be polluted by industry and manufacturing, including chemical and oil plants; wood, pulp, and paper mills; factory food processing; and textile, metal, and other factories.
- Fracking—a technique for extracting natural gas from underground sources—has been determined to have a detectable impact on the quality and quantity of local water sources.
- The Clean Water Act (CWA) was enacted by Congress in 1972 and helped to significantly reduce water pollution in the United States. The Safe Drinking Water Act of 1974 gave the federal government the authority to regulate disease-causing agents in drinking water.
- The Environmental Protection Agency (EPA) enacts federal rules and regulations to enforce laws related to water pollution. Critics charge that the EPA's penalties are inadequate to effectively regulate polluters and protect drinking water.

Types of Water Pollution

Water resources fall into two broad categories. *Ground water* flows through geological formations beneath the earth's surface and is accessed by wells. *Surface water* includes oceans, rivers, lakes, wetlands, ponds, streams, and *estuaries*, or areas where fresh and salt water meet. Pollutants are classified as originating from either *point* or *nonpoint* sources. Point sources are those that dump or discharge a harmful substance directly into water. An oil tanker that ruptures and spills oil into the sea and a factory that releases industrial waste directly into a nearby river are examples of point sources of water pollution. These have been the main targets of federal pollution regulators under the CWA. A nonpoint source is a human-caused environmental change or development that indirectly contributes to water pollution, such as when oil slicks and other pollutants that collect on streets and highways are washed off by the rain and into watersheds and rivers. Most of the pollution in US streams and lakes comes from nonpoint sources, which can

be more difficult to identify and regulate than point sources.

About 20 percent of all fresh water is used for industrial purposes. *Industrial pollution* refers to pollutants from plants, factories, and other businesses. Many water pollution problems are created by manufacturing centers, including chemical and oil plants; wood, pulp, and paper mills; factory food processing; and textile, metal, and other factories. In some cases, water pollution creates serious problems. An analysis published in 2020 by the watchdog group the Environmental Working Group (EWG) warned that the contamination of US drinking water with perfluoroalkyl substances (PFAS) was much worse than it had previously estimated. PFAS are sometimes called "forever chemicals" because they resist breaking down in the environment, and some PFAS have been linked to liver damage, cancer, and low birth rate, among other health problems. According to the EWG, nearly 1,600 locations in forty-nine states are known to have PFAS contamination as of May 2020.

The natural gas industry has been identified as a major source of water pollution. As the industry has expanded, increasing numbers of homeowners have reported contaminated well water near fracking sites. *Fracking* is the practice of forcing a mixture of water, sand, and chemicals deep underground between layers of shale to help extract natural gas. A 2016 study published by the Environmental Protection Agency (EPA) reported that fracking has a detectable impact on the quality and quantity of local water sources. This includes depletion of water in areas where there is already low water availability, chemical contaminants in groundwater resulting from fracturing fluids, and the discharge of inadequately treated wastewater into surface waters. A 2020 report released by the nonprofit conservation group the Center for Western Priorities indicated that oil and gas companies in Colorado, Wyoming, and New Mexico were responsible for over 2,800 spills in 2019—23,600 barrels of oil and 170,223 barrels of toxic wastewater.

Concerns about water contamination are not limited to the manufacturing sector; the agricultural industry has also been identified as a major source of water pollution worldwide. *Agricultural water pollution* is a byproduct of farming practices. About 70 percent of fresh water is used for agricultural activity. Many of the chemicals farmers use on crops, including fertilizers, pesticides, and herbicides, run off from the soil to contaminate rivers, lakes, and groundwater supplies. Industrial or factory farming of livestock, poultry, and fish has also been identified as a significant source of water pollution, as rainfall can cause runoff from animal waste products into groundwater and other water systems.

Municipal and household waste, such as untreated sewage and improperly disposed consumer products, are also sources of water pollution. In the United States, most of the population has access to improved or treated water and public sanitation, yet thousands of spills of raw sewage occur every year due to overburdened or poorly maintained treatment plants. Water quality researchers have raised concerns over the lack of investment in maintaining and updating the nation's water supply systems, of which there are over 150,000. Though 92 percent of those systems are safe, experts underscore that the remaining 8 percent translates into as many as 209 million unsafe glasses, or 2.3 billion gallons, of water per day.

Government Regulation and Enforcement

In the twentieth century, concerns about water pollution led to changes in policy and the creation of government agencies tasked with monitoring and addressing the issue. Two years after passing the CWA in 1972, Congress passed the Safe Drinking Water Act, which allows the federal government to regulate disease-causing agents in the nation's drinking water supplies. In both acts, the EPA was authorized to enact federal rules and regulations to establish national standards for clean water or allow individual states to implement these standards. According to a 2018 study published in the *Proceedings of the National Academy of Science* that analyzed data collected at 240,000 US monitoring sites, the CWA had a significant impact on improving water pollution between 1962 and 2001. The study showed increased oxygen concentrations, decreased presence of fecal bacteria, and a 12 percent increase in the share of rivers that were safe for fishing.

Despite these gains, the EPA's ability to effectively regulate polluters and protect drinking water has been called into question in the twenty-first century. In 2017 current and former residents of Flint, Michigan, filed a class action lawsuit against the EPA alleging negligence for not taking appropriate action against illegal water management practices. Lawyers for the federal government attempted to argue that the EPA had immunity from the residents' claims, but a federal judge ruled against the EPA in 2019 and denied its request for an appeal. As of June 2020, lawsuits against the EPA, private water contractors, and former local and state officials remained ongoing.

Many environmentalists and water-quality experts argue that EPA penalties are inadequate and fail to deter major industrial and agricultural polluters. Because EPA penalties pale in comparison to the offending companies' profits, critics contend, companies can view them as a cost of doing business. For example, following its accidental contamination of the Dan River in 2014, Duke Energy was fined \$6.6 million by North Carolina state regulators, settled with the state of Virginia for \$2.5 million, and received a federal fine from the EPA for \$102 million. Though these penalties total over \$110 million, clean water advocates point out that they amount to less than one-half of 1 percent of the company's annual profits, which exceed \$2 billion.

Critical Thinking Questions

- For what reasons are nonentry point water pollution sources more difficult to regulate than entry point pollution sources?
- Do you agree that the Navigable Waters Protection Rule of 2020 degrades the water protections established by the Clean Water Act of 1972? Why or why not?
- In your opinion, does the EPA have sufficient statutory and enforcement power to ensure clean drinking water for all Americans? Explain your answer.

Legal and Political Challenges

In addition to concerns over EPA enforcement, water experts and environmentalists fear that the political influence of large industrial and agricultural polluters has weakened environmental policy under the presidential administration of Donald Trump. Prior to Trump's election, the EPA and the US Army Corps of Engineers (USACE) implemented the 2015 Waters of the United States rule under the presidential administration of Barack Obama. Commonly referred to as the Clean Water Rule, this provision expanded what qualified as "waters of the US" to bring the majority of the nation's streams and rivers under the protection of water quality regulations. The US Supreme Court ruling in *Army Corps of Engineers v. Hawkes Co. Inc.* (2016) enabled landowners, including corporate landowners, to file appeals against the EPA and go through the federal courts to determine whether waters on their properties were subject to the CWA.

In October 2019 the Trump administration repealed the 2015 Clean Water Rule, arguing that it represented federal overreach. In April 2020 the EPA and USACE filed the Navigable Waters Protection Rule to replace the Clean Water Rule. Based on the original language of the CWA, which directs the EPA to protect "navigable waters," the new rule explicitly exempts the types of waters that had come under protection of the CWA with the 2015 rule. The rule limits the bodies of water that are subject to federal regulations to "traditional navigable waters" and "core tributary systems." According to environmental and natural resource experts at the nonprofit advocacy group the National Resource Defense Council (NRDC), the 2020 rule should be called the "Dirty Water Rule." The NRDC argues that the new rule is the most drastic attempt to degrade US water protections since the CWA was first passed because it excludes millions of miles of rain-dependent streams and millions of acres of wetlands from CWA oversight. In conjunction with a number of other state and regional environmental groups, the NRDC filed a lawsuit challenging the Navigable Waters Protection Rule in April 2020.

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