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## Chemical Pollutants Causing Water Pollution

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**ABSTRACT:** Chemical pollutants include heavy metals such as mercury, lead, cadmium, etc., solvents from industries, pesticide run-offs, oil spills from ships, etc. They are poisonous to aquatic life forms and cause infertility and death. The metal wastes are dangerous to humans as well when they get absorbed in our body. This widespread problem of water pollution is jeopardizing our health. Unsafe water kills more people each year than war and all other forms of violence combined. Meanwhile, our drinkable water sources are finite: Less than 1 percent of the earth's freshwater is actually accessible to us. Without action, the challenges will only increase by future, when global demand for freshwater is expected to be one-third greater than it is now.

**KEYWORDS:** chemical, pollution, water, health, dangerous, heavy metals, death, infertility

### I.INTRODUCTION

Not only is the agricultural sector the biggest consumer of global freshwater resources, with farming and livestock production using about 70 percent of the earth's surface water supplies, but it's also a serious water polluter. Around the world, agriculture is the leading cause of water degradation. In the United States, agricultural pollution is the top source of contamination in rivers and streams, the second-biggest source in wetlands, and the third main source in lakes. It's also a major contributor of contamination to estuaries and groundwater. Every time it rains, fertilizers, pesticides, and animal waste from farms and livestock operations wash nutrients and pathogens—such bacteria and viruses—into our waterways. Nutrient pollution, caused by excess nitrogen and phosphorus in water or air, is the number-one threat to water quality worldwide and can cause algal blooms, a toxic soup of blue-green algae that can be harmful to people and wildlife.<sup>1</sup>

Used water is wastewater. It comes from our sinks, showers, and toilets (think sewage) and from commercial, industrial, and agricultural activities (think metals, solvents, and toxic sludge). The term also includes stormwater runoff, which occurs when rainfall carries road salts, oil, grease, chemicals, and debris from impermeable surfaces into our waterways<sup>2</sup>

More than 80 percent of the world's wastewater flows back into the environment without being treated or reused, according to the United Nations; in some least-developed countries, the figure tops 95 percent. In the United States, wastewater treatment facilities process about 34 billion gallons of wastewater per day. These facilities reduce the amount of pollutants such as pathogens, phosphorus, and nitrogen in sewage, as well as heavy metals and toxic chemicals in industrial waste, before discharging the treated waters back into waterways. That's when all goes well. But according to EPA<sup>3</sup> estimates, our nation's aging and easily overwhelmed sewage treatment systems also release more than 850 billion gallons of untreated wastewater each year.

Big spills may dominate headlines, but consumers account for the vast majority of oil pollution in our seas, including oil and gasoline that drips from millions of cars and trucks every day. Moreover, nearly half of the estimated 1 million tons of oil that makes its way into marine environments each year comes not from tanker spills but from land-based sources such as factories, farms, and cities.<sup>34</sup> At sea, tanker spills account for about 10 percent of the oil in waters around the world, while regular operations of the shipping industry—through both legal and illegal discharges—contribute about one-third. Oil is also naturally released from under the ocean floor through fractures known as seeps.<sup>4</sup>

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Radioactive waste is any pollution that emits radiation beyond what is naturally released by the environment. It's generated by uranium mining, nuclear power plants, and the production and testing of military weapons, as well as by universities and hospitals that use radioactive materials for research and medicine. Radioactive waste can persist in the environment for thousands of years, making disposal a major challenge. Consider the decommissioned Hanford nuclear weapons production site in Washington, where the cleanup of 56 million gallons of radioactive waste is expected to cost more than \$100 billion and last through future. Accidentally released or improperly disposed of contaminants threaten groundwater, surface water, and marine resources.<sup>5</sup>

## II.DISCUSSION

Eighty percent of ocean pollution (also called marine pollution) originates on land—whether along the coast or far inland. Contaminants such as chemicals, nutrients, and heavy metals are carried from farms, factories, and cities by streams and rivers into our bays and estuaries; from there they travel out to sea.<sup>33</sup> Meanwhile, marine debris—particularly plastic—is blown in by the wind or washed in via storm drains and sewers. Our seas are also sometimes spoiled by oil spills and leaks—big and small—and are consistently soaking up carbon pollution from the air. The ocean absorbs as much as a quarter of man-made carbon emissions. Waterborne pathogens, in the form of disease-causing bacteria and viruses from human and animal waste, are a major cause of illness from contaminated drinking water.<sup>6</sup> Diseases spread by unsafe water include cholera, giardia, and typhoid. Even in wealthy nations, accidental or illegal releases from sewage treatment facilities, as well as runoff from farms and urban areas, contribute harmful pathogens to waterways.<sup>32</sup> Thousands of people across the United States are sickened every year by Legionnaires' disease (a severe form of pneumonia contracted from water sources like cooling towers and piped water), with cases cropping up from California's Disneyland to Manhattan's Upper East Side.<sup>7</sup> Meanwhile, the plight of residents in Flint, Michigan—where cost-cutting measures and aging water infrastructure created a lead contamination crisis—offers a stark look at how dangerous chemical and other industrial pollutants in our water can be. The problem goes far beyond Flint and involves much more than lead, as a wide range of chemical pollutants—from heavy metals such as arsenic and mercury to pesticides and nitrate fertilizers—are getting into our water supplies. Once they're ingested, these toxins can cause a host of health issues, from cancer to hormone disruption to altered brain function. Children and pregnant women are particularly at risk.<sup>8</sup>

Even swimming can pose a risk. Every year, 3.5 million Americans contract health issues such as skin rashes, pinkeye, respiratory infections, and hepatitis from sewage-laden coastal waters, according to EPA estimates.<sup>9</sup>

When water pollution causes an algal bloom in a lake or marine environment, the proliferation of newly introduced nutrients stimulates plant and algae growth, which in turn reduces oxygen levels in the water.<sup>31</sup> This dearth of oxygen, known as eutrophication, suffocates plants and animals and can create "dead zones," where waters are essentially devoid of life. In certain cases, these harmful algal blooms can also produce neurotoxins that affect wildlife, from whales to sea turtles.<sup>10</sup>

Chemicals and heavy metals from industrial and municipal wastewater contaminate waterways as well. These contaminants are toxic to aquatic life—most often reducing an organism's life span and ability to reproduce—and make their way up the food chain as predator eats prey. That's how tuna and other big fish accumulate high quantities of toxins, such as mercury.<sup>11</sup>

Marine ecosystems are also threatened by marine debris, which can strangle, suffocate, and starve animals.<sup>30</sup> Much of this solid debris, such as plastic bags and soda cans, gets swept into sewers and storm drains and eventually out to sea, turning our oceans into trash soup and sometimes consolidating to form floating garbage patches. Discarded fishing gear and other types of debris are responsible for harming more than 200 different species of marine life.<sup>12</sup>

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Meanwhile, ocean acidification is making it tougher for shellfish and coral to survive. Though they absorb about a quarter of the carbon pollution created each year by burning fossil fuels, oceans are becoming more acidic. This process makes it harder for shellfish and other species to build shells and may impact the nervous systems of sharks, clownfish, and other marine life.<sup>13</sup>

## III.RESULTS

We're all accountable to some degree for today's water pollution problem. Fortunately, there are some simple ways you can prevent water contamination or at least limit your contribution to it:<sup>29</sup>

- Learn about the unique qualities of water where you live. Where does your water come from? Is the wastewater from your home treated? Where does stormwater flow to? Is your area in a drought? Start building a picture of the situation so you can discover where your actions will have the most impact—and see if your neighbors would be interested in joining in!<sup>14</sup>
- Reduce your plastic consumption and reuse or recycle plastic when you can.
- Properly dispose of chemical cleaners, oils, and nonbiodegradable items to keep them from going down the drain.
- Maintain your car so it doesn't leak oil, antifreeze, or coolant.
- If you have a yard, consider landscaping that reduces runoff and avoid applying pesticides and herbicides.<sup>15</sup>
- Don't flush your old medications! Dispose of them in the trash to prevent them from entering local waterways.<sup>28</sup>
- Be mindful of anything you pour into storm sewers, since that waste often won't be treated before being released into local waterways. If you notice a storm sewer blocked by litter, clean it up to keep that trash out of the water. (You'll also help prevent troublesome street floods in a heavy storm.)<sup>16</sup>
- If you have a pup, be sure to pick up its poop.<sup>27</sup>

One of the most effective ways to stand up for our waters is to speak out in support of the Clean Water Act, which has helped hold polluters accountable for five decades—despite attempts by destructive industries to gut its authority. But we also need regulations that keep pace with modern-day challenges, including microplastics, PFAS, pharmaceuticals, and other contaminants our wastewater treatment plants weren't built to handle, not to mention polluted water that's dumped untreated.<sup>17</sup>

Tell the federal government, the U.S. Army Corps of Engineers, and your local elected officials that you support water protections and investments in infrastructure, like wastewater treatment, lead-pipe removal programs,<sup>26</sup> and stormwater-abating green infrastructure. Also, learn how you and those around you can get involved in the policymaking process. Our public waterways serve every one of us. We should all have a say in how they're protected.<sup>18</sup>

## IV.CONCLUSIONS

The U.S. EPA has set standards for more than 80 contaminants that may occur in drinking water and pose a risk to human health. The contaminants fall into two groups according to the health effects that they cause.<sup>19</sup>

Acute effects occur within hours or days of the time that a person consumes a contaminant. People can suffer acute health effects from almost any contaminant if they are exposed to extraordinarily high levels (as in the case of a spill). In drinking water, microbes, such as bacteria and viruses, are the contaminants with the greatest chance of reaching levels high enough to cause acute health effects.<sup>25</sup>

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Most people's bodies can fight off these microbial contaminants the way they fight off germs, and these acute contaminants typically don't have permanent effects. Nonetheless, when high enough levels occur, they can make people ill, and they can be dangerous or deadly for a person whose immune system is already weakened.<sup>20</sup>

Chronic effects occur after people consume a contaminant at levels over EPA's safety standards over the course of many years. The drinking water contaminants that can have chronic effects include chemicals (such as disinfection byproducts, solvents and pesticides), radionuclides (such as radium), and minerals (such as arsenic). Examples of these chronic effects include cancer, liver or kidney problems, or reproductive difficulties.<sup>24</sup> Pharmaceuticals, personal care products (PCPs) and endocrine disrupting compounds (EDCs) are among the prime examples of emerging contaminants. Up to 90% of oral drugs pass through the human body and end up in the water supply. Personal care products (soaps, cosmetics, fragrances, etc.) also find their way into our water. Endocrine disruptors are substances that may interfere with the function of hormones in the body. Trace amounts of these contaminants are being discovered in water throughout the country. The U.S. EPA is working to improve its understanding of several emerging contaminants, including perchlorate,<sup>23</sup> pharmaceuticals,<sup>21</sup> PCPs and EDCs. To feel confident you are protecting yourself against contaminants, you should seek devices that have been rigorously tested and certified to independent standards. Experts in testing are constantly working to develop new standards to meet emerging threats. To find options, explore WQA's directory of certified products or find a local professional who will take you through the steps to treat your water.<sup>22</sup>

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