

Wastewater Pathogens

By Shannyn Snyder

Bacterium in water, also known as pathogens, is a public health hazard with risk factors in nearly all parts of the world. Waterborne pathogens can occur in all types of water sources and are particularly rampant in areas where there are large amounts of untreated wastewater.

Wastewater is defined as any water that has been used, such as for domestic or industrial use and contains waste products. These waste products are most often liquid or solids and they can be biological, chemical or radioactive. In addition to having adverse health implications, wastewater contamination can also have natural and ecological affects. These may include the degradation of ecosystems such as a decrease in important aquatic plants that help preserve the condition of waterways or biodiversity loss such as loss of aquatic life like fish and crustaceans that are an important part of both animal and human diet.

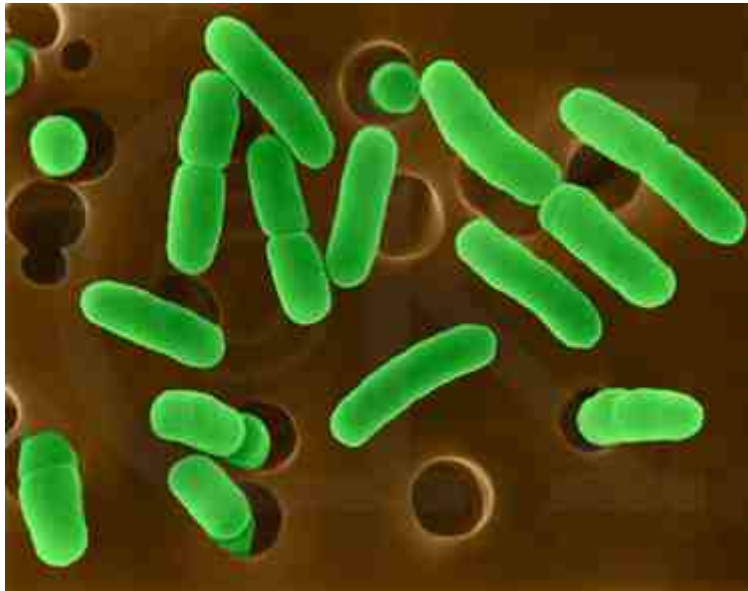
In a large waterway, such as a river or stream that has a continuous flow and a renewable source of fresh water, a small amount of contaminant may not make a considerable impact as there is a natural process of bacteria breakdown if water temperature, dilution and solar radiation are optimal. Streams and rivers, which wind through rocks, pebbles, gravel and sand also have a natural filtration system that can help to break down contaminants. In addition, a certain amount of nutrients is actually helpful in the growth process of aquatic plants, but excessive nutrients can also hasten algae growth which then leads to a decrease in dissolved oxygen. This overgrowth of algae clouds the water and prevents sunlight from permeating, leading to the destruction of important organisms, plant and animal life. Nearly half of the U.S. fresh water resources currently show a disturbance of aquatic species. (Source: 2008, EPA's *Report on the Environment: Highlight of National Trends*)



Waterway filled with "sludge." [Source](#)

Heavy, slow-moving, degraded water, filled with an excess of contaminants can also create a sludge, which may contain pathogens such as fungi, worms and toxins. Sludge can also contain

fecal bacteria and bloodborne viruses. Examples of viruses commonly found in wastewater are Hepatitis and Norwalk virus and a common fungus is *Candida*. Common bacteria, such as *Salmonella* can cause food poisoning where as *Vibrio cholerae* is the pathogen that causes cholera. Parasites such as *Cryptosporidium* and *Schistosoma* can cause diarrhea, and just about all wastewater pathogens can lead to serious gastrointestinal illness in addition to other, more specific implications, which is significant cause of death worldwide. (Source: 2005, *Wastewater Pathogens* by Michael H. Gerardi and Mel C. Zimmerman and [Rehydration Project: Focus on Diarrhoea, Dehydration and Rehydration](#))



Fecal coliform bacteria. [Source](#)

Even water that looks clear can contain pathogens, as raw waste and pollutants are sometimes discharged into relatively pristine waterways from point and non-point sources. In addition, 60% of shallow wells in U.S. agricultural areas have tested positive for pesticides, and 21% of groundwater wells exceed the federal allowance for nitrates. [Public pools, lakes and waterparks](#) are also at risk for *E. coli* and *Cryptosporidium* pathogens. Although many laws, such as the Federal Water Pollution Control Act, the Clean Water Act and the Safe Drinking Water Act are in place to protect the public from waterborne health hazards by controlling the amount of contaminants allowed in a particular water source, it is important that all persons are knowledgeable about good sanitation habits. Paying attention to boil water alerts and not drinking or swallowing water being swam in or used by others are effective ways of limiting a possibility of infection. By dumping refuse into only approved receptacles and holding individuals and entities responsible for unsafe practices, it is possible that the degradation of U.S. waterways can be slowed, and ideally, reversed. This reversal can ultimately reduce the overall occurrences of gastrointestinal illnesses associated with water contamination and may help to prevent nationwide waterborne health epidemics.