



## Why Wastewater Treatment Matters: An Example from Haiti

*By the Water Quality & Health Council*

One of the most important functions of water infrastructure is to prevent the contamination of water that may be used for drinking or recreation. Limiting human exposure to wastewater helps protect human health by shielding people from the pathogens shed in feces. Whereas diseases such as cholera and typhoid fever—transmitted through contaminated drinking water and food—are no longer serious threats in the developed world thanks to modern drinking water and wastewater treatment methods, we need only look to Haiti to understand the repercussions of poor or absent wastewater treatment. In Haiti, the majority of people have no adequate means of human waste or wastewater disposal. The result is that any gastrointestinal disease is rapidly disseminated throughout the country until a sufficient percentage of the population has developed immunity.



*Haiti's Artibonite River*

*Photo courtesy of E. Wesley Laine*

### *An Earthquake Response Turns Deadly*

On January 12, 2010, a magnitude 7 earthquake rocked the island of Hispaniola, comprising Haiti and the Dominican Republic. Aftershocks of magnitudes 5.9 and 5.5 followed. Many Haitian structures, constructed without building codes, collapsed. At least one million people were displaced, and the death toll was estimated at more than two hundred thousand, according to the Centers for Disease Control and Prevention. Basic services, such as food, water, sanitation and electricity were seriously compromised. Tragically, the suffering of Haitians intensified when cholera broke out ten months later in October, 2010.

Haiti had not experienced cholera in nearly a century and its people had no immunity to the disease. Since the ongoing epidemic began, more than 10,000 have died and hundreds of thousands have been sickened. Furthermore, there are uncounted effected populations and victims in rural hamlets. The source of the outbreak was traced to a base camp of UN peacekeepers from Nepal. Ironically, the soldiers were sent to Haiti to assist with relief efforts.

### *The Role of Wastewater*

According to the 2011 report<sup>1</sup> of an independent panel of experts, sanitation conditions at the UN base camp were “not sufficient to prevent contamination of the Meye Tributary System with human fecal waste.” The Meye Tributary System flows into the main river in Haiti, the Artibonite River. Artibonite River water is widely used for washing, bathing, drinking and recreation. *Vibrio cholera*, the bacterium that causes cholera, infiltrated this critical waterway, launching a cycle of infection that continues today. Molecular analysis<sup>2</sup> of the bacterium demonstrated a close similarity to that responsible for a concurrent cholera outbreak in Nepal. Additionally, the 2011 report notes the rate of infection of people along the river during the initial outbreak was consistent with streamflow velocities.

### *Prevention*

Preventing the spread of cholera depends upon the interruption of all of the fecal-oral transmission routes and must include the assurance of access to safe drinking water, adequate sanitation and waste disposal, and adequate hygiene, especially handwashing. The chlorination of drinking water is a key factor in the prevention of cholera. Patient management (especially prompt and adequate rehydration) and proper disposal of the patients' excrement is also an essential component of preventing the spread of the disease.

The panel of experts made several recommendations in the 2011 report for preventing future cholera outbreaks. Our comments on some of these recommendations follow.

- **Do no harm.** Emergency responders traveling from cholera endemic areas should be screened before travel. Prophylactic use of antibiotics by emergency responders, however, an additional measure recommended by the panel, may have the unintended consequence of stimulating antimicrobial resistance rather quickly in epidemic situations. For that reason, we disagree with the recommendation of the panel to provide prophylactic doses of antibiotics to emergency responders.
- **Pathogen destruction is key.** Fecal waste in emergency response installations must be treated by qualified professionals using on-site systems that inactivate pathogens before disposal.
- **Water infrastructure saves lives.** Investment is needed in piped, treated drinking water systems and improved sanitation that isolate drinking water from waste water and human excreta. Drinking water treatment without disinfection as a barrier is also not adequate.
- **Until water infrastructure is constructed, interim measures are needed.** Programs that treat water at the household or community level with chlorine or other effective systems are critical. So is attention to proper handwashing techniques and safe disposal of fecal wastes, especially in areas of high population density, such as spontaneous settlement camps.

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<sup>1</sup> Cravioto, A. et al., 2011. Final Report of the Independent Panel of Experts on the Cholera Outbreak in Haiti. On-line, available: <http://www.un.org/News/dh/infocus/haiti/UN-cholera-report-final.pdf>.

<sup>2</sup> Hendriksen, R.S. et al., 2011. Population genetics of *Vibrio cholerae* from Nepal in 2010: Evidence on the origin of the Haitian outbreak. *mBio* 2(4):e00157-11. doi:10.1128/mBio.00157-11.

- **Vaccines reduce cholera caseloads and the spread of the disease.** Greater use of oral cholera vaccines is another strategy to help control the disease, but vaccines are only partially effective; the best achieve only about 65% proven immunity.

Exposure to wastewater, no matter the circumstances, represents an unacceptable risk to public health. Reflecting on the situation in Haiti, E. Wesley Laine, the founder of [Haiti Philanthropy](#), noted, "A commitment of resources and expertise is needed to rebuild Haiti's water and sanitation infrastructure in order to protect vulnerable populations from waterborne diseases, and help them live a full life of dignity." We agree. The technology is available to end the scourge of what should be ancient diseases. We just need to find the way forward.