The National Environmental Health Association (NEHA) represents approximately 7,000 governmental, private, academic, and uniformed services sector environmental public health professionals in the U.S., its territories, and internationally. NEHA is the profession's strongest advocate for excellence in the practice of environmental public health as it delivers on its mission to build, sustain, and empower an effective environmental public health workforce.

Policy Statement on Onsite Wastewater Treatment Systems

Adopted: December 2024
Policy Sunset: December 2029

NEHA supports the following policies and actions:

- Investment of greater resources into research on onsite wastewater treatment systems design, construction, operation, and maintenance regulations, with an emphasis on their use as an effective and sustainable water quality management alternative to centralized sewage management.
- Implement national, state, and local policy and data standards on onsite wastewater treatment systems products, construction, operation, and maintenance.
- Provide training and workforce development opportunities to environmental public health professionals regarding best practices for constructing, designing, and operating onsite wastewater treatment systems.
- Research investments on the health, social, environmental, and economic impacts of onsite wastewater treatment system use at community and statewide levels.
- Increase the capacity for communities to support septage management, disposal, and onsite sewage maintenance requirements through inventories of systems and septage handling capabilities.
- Provide increased funding dedicated to programs to assist homeowners with repairing and maintaining onsite wastewater treatment systems.
- Invest in developing and implementing consistent and inclusive communication resources to educate current and future homeowners about onsite wastewater treatment system use and maintenance.
- Leverage existing federal funding resources provided to states to be more inclusive of supporting onsite wastewater and water recycling management operations.

Analysis

The estimated number of U.S. households relying on septic systems and other onsite wastewater management systems in 2021 was more than 32 million (Maxcy-Brown et al., 2023). Figures vary from state to state, with between 10% and 50% of households relying on onsite systems across the nation. More than simply an alternative used when no other options are available, studies over the past decade show that onsite wastewater systems—if properly designed, installed, and maintained—are highly reliable for protecting the environment. These systems are capable of removing organic wastewater compounds such as prescription medications, over-the-counter medications, personal care products, natural biological pathogens (e.g., bacteria, viruses, parasites), pharmaceuticals, and debris from entering the groundwater that feeds our lakes, streams, and rivers. Onsite systems can remove organic compounds as effectively as centralized wastewater treatment plants and systems using advanced treatment might perform better (LaFond, 2015; Schaider et al., 2017). Common organic wastewater chemicals such as over-the-counter personal care products, pharmaceuticals, and plasticizers were only within one order of magnitude higher in wastewater treatment plant effluent as compared to onsite wastewater system output. As specific examples, acetaminophen, caffeine, and triclosan (found in many antibacterial liquid hand soaps) are removed by greater than 99%. Some chemicals, however, are not removed effectively by either treatment system, such as carbamazepine (Schaider et al., 2017).

As much as a properly functioning system protects the environment, a malfunctioning onsite wastewater system can impact streams, rivers, and other watersheds far from coastal areas (Sowah et al., 2017). Existing systems that are improperly designed for their given area or exceed their design life treat wastewater less effectively and contribute to greater contamination of nearby water sources than functioning systems (Day, 2004). Additionally, owners with malfunctioning systems are more likely to use synthetic chemicals meant for system cleaning, which can further contaminate the environment (Canter & Knox, 1985).

As with centralized systems, improperly managed or failing onsite wastewater systems contaminate nearby water sources with harmful contaminants. Nitrogen and fecal matter contamination of surface waters from nearby onsite wastewater systems has been documented with harmful consequences. (Chang et al., 2011). High nitrogen contamination can cause excessive growth of algae called harmful algal blooms (HABs), which can harm water quality and habitats and lead to illness and death in large numbers of fish due to a lack of oxygen. Some algal blooms are harmful to humans and can make people and animals sick if they come in contact with the water (U.S. Environmental Protection Agency [U.S. EPA], 2024a). Fecal runoff from poorly performing onsite wastewater systems in coastal areas and estuaries has impacted local fishing industries, harmed the health of consumers, and closed entire fishing areas, which can damage the economic well-being of the region (Cahoon et al., 2006; Geary & Lucas, 2019; Ye et al., 2017). Additional resources for research, regulation, and education into system maintenance could greatly reduce the incidence of contamination from HABs and adverse health-related outcomes.

Environmental contamination from malfunctioning onsite wastewater systems affects public health at the household level in addition to the community and environmental impacts previously outlined. Many households relying on an onsite wastewater system also use a private well as their primary source for drinking water (U.S. EPA, 2020). Most states do not regulate water quality for private wells and there are no federal regulations, which makes it the responsibility of the homeowner to test their water and make sure it is safe to drink (Schneider, 2019). Wastewater from an onsite wastewater system can contaminate private wells and cause a range of health issues in family members consuming the drinking water (U.S. EPA, 2020). For instance, water contaminated from onsite wastewater systems can have higher nitrate concentrations, which can be especially harmful to infants and young children and has been connected to colorectal cancer risk in adults (Mathewson et al., 2020; Schullehner et al., 2018). If onsite wastewater systems are not operating correctly, private wells can also be contaminated with organic wastewater compounds and other chemicals in the waste stream from a home or business (Schaider et al., 2016). Also, well water contaminated with fecal matter can lead to various health issues, including diarrheal illnesses caused by norovirus, *Campylobacter*, and *Salmonella* (Alexander et al., 2008; Borchardt et al., 2003).

Justification

History has proven that properly maintained onsite wastewater systems can be a reliable solution for the treatment of domestic wastewater. The importance of using onsite systems as a treatment strategy is highlighted by aging infrastructure and the high cost of centralized wastewater treatment. The reliance on onsite sewage systems for community growth can present challenges as there are few regulations beyond those related to the initial construction of onsite wastewater systems (U.S. EPA, 2024b). Research has shown that more information is needed to better formulate guidance and regulations for all life cycle stages of an onsite wastewater system, including construction, operation, and maintenance. While many states and local jurisdictions have construction and siting requirements for new onsite wastewater systems, current research needs to be applied to regulations and planning, and further research is needed to ensure onsite wastewater system design matches the given environment. Onsite wastewater systems might contribute to greater contamination of nearby water sources if they are unsuitable for the surrounding environmental factors, such as climate and soil moisture, in addition to proximity to nearby bodies of water (Jayarathne et al., 2010). Additionally, large onsite wastewater systems, such as those for restaurants or small office buildings, must be constructed considering the increased effluent and contaminant loads to avoid the potential contamination of drinking water sources (Alexander et al., 2008).

Inadequate onsite wastewater system management and regulation encompassing the full system life cycle can give rise to significant problems in nearby watersheds, becoming chronic sources of pollution. A lack of uniformity in local regulations for onsite wastewater systems—in addition to a lack of data or inventories that include siting, design, age, and maintenance practices—makes it more difficult to measure the impact of onsite wastewater systems on nearby bodies of water. Including this type of data collection and maintenance practices in local and state regulations can aid communities in evaluating contamination risk in nearby ecosystems and protecting the health of their residents (Withers et al., 2012, 2014).

Lastly, residents need to receive education on their onsite wastewater systems to learn more about their systems and change how they maintain their systems. Despite increased access to educational materials, many residents do not change their maintenance practices, even when the system includes advanced treatment products due to high-risk waste or sensitive environments. This lack of change can lead to increased rates of onsite wastewater system failure and greater contamination of surrounding areas (Silverman, 2005). Creating and implementing local operation and maintenance regulations, public education support, and infrastructure for managing septage disposal can ensure that onsite wastewater systems operate more efficiently for longer periods, protecting the surrounding environment, water supplies, and the public health of nearby communities.

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