Reuse of municipal wastewater has potential to augment future drinking water supplies

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With recent advances in technology and design, treating municipal wastewater and reusing it for drinking water, irrigation, industry, and other applications could significantly increase the nation's total available water resources, particularly in coastal areas facing water shortages, says a new report from the National Research Council. It adds that the reuse of treated wastewater, also known as reclaimed water, to augment drinking water supplies has significant potential for helping meet future needs. Moreover, new analyses suggest that the possible health risks of exposure to chemical contaminants and disease-causing microbes from wastewater reuse do not exceed, and in some cases may be significantly lower than, the risks of existing water supplies.

"Wastewater reuse is poised to become a legitimate part of the nation's water supply portfolio given recent improvements to treatment processes ," said R. Rhodes Trussell, chair of the committee that wrote the report and president of Trussell Technologies, Pasadena, Calif. "Although reuse is not a panacea, wastewater discharged to the environment is of such quantity that it could measurably complement water from other sources and management strategies."

The report examines a wide range of reuse applications, including potable water, non-potable urban and industrial uses, irrigation, groundwater recharge, and ecological enhancement. The committee found that many communities have already implemented water reuse projects -- such as irrigating golf courses and parks or providing industrial cooling water in locations near wastewater reclamation plants

-- that are well-established and generally accepted. Potable water reuse projects account for only a small fraction of the volume of water currently being reused. However, many drinking water treatment plants draw water from a source that contains wastewater discharged by a community located upstream; this practice is not officially acknowledged as potable reuse.

The report outlines wastewater treatment technologies for mitigating chemical and microbial contaminants, including both engineered and natural treatment systems. These processes can be used to tailor wastewater reclamation plants to meet the quality requirements of intended reuse applications. The concentrations of chemicals and microbial contaminants in reuse projects designed to augment drinking water supplies can be comparable to or lower than those commonly present in many drinking water supplies. The committee emphasized the need for process reliability and careful monitoring to ensure that all reclaimed water meets the appropriate quality objectives for its use.

Costs of water reuse for potable and non-potable applications vary widely because they depend on site-specific factors, the committee said. Water reuse projects tend to be more expensive than most water conservation options and less expensive than seawater desalination and other new supply alternatives. Although the costs of reclaimed water are often higher than current water sources, the report urges water authorities to consider other costs and benefits in addition to monetary expenditures when assessing reuse projects. For example, water reuse systems used in conjunction with a water conservation program could be effective in reducing seasonal peak demands on the drinking water system. Depending on the specific designs and pumping requirements, reuse projects could also have a larger or smaller carbon footprint than existing supply alternatives or reduce water flows to downstream users and ecosystems.

Water reuse regulations differ by state and are not based on risk-assessment methods, the report says. Adjustments to the federal regulatory framework could help ensure a high level of public health protection, provide a consistent minimum level of protection across the nation, and increase public confidence in potable and non-potable water reuse. The report notes that existing legislative tools could be applied to improve the quality of water for reuse, including updating the National Pretreatment Program's list of priority pollutants to include a wider inventory of known toxic substances. Also, it lists 14 areas of research to help guide the country on how to apply water reuse appropriately. Such research would require improved coordination among federal and nongovernmental organizations.

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