

“It’s time to close the loop of water, energy, and resources education,” says CH2M Hill’s Chief Reuse Technologist **Linda Macpherson**, who argues that new language and more knowledge can help reframe the public’s views on water reuse, leading to greater acceptance of the renewable water resource.

Resource recovery transition requires new words and ideas

Water scarcity is the single greatest threat to human and environmental health facing the world in the 21st century. According to a United States intelligence report, acute water shortages will cause water in shared basins to be used increasingly as leverage. Governments – and perhaps even terrorists – could use water as a weapon, as competition for scarce water could fuel instability. In addition, the depletion of readily available phosphorus by the end of the century poses a new threat to global food security. Unless a replacement for mined phosphate rock fertilizer is found, declining supplies and higher prices of phosphate will diminish the ability to produce agricultural goods on a sustainable basis. By then, the global population may have reached a level that cannot be fed on a sustainable basis. Both water and food security issues threaten political stability and raise the specter of widespread famine and/or conflict.

Nonetheless, water professionals continue to act in ways that increase vulnerability to those critical problems. Public rejection of municipal potable water recycling projects has been attributed to the disgust often elicited by the thought of drinking water that has had contact with human waste, an effect referred to in the water reuse literature as the “yuck factor” or the inability of the public to take the “ick” out of the water. Unfortunately, that reaction is a result of the failure of water professionals to provide the public with a clear understanding of the physical context and history of current familiar raw water supply sources. It isn’t conducive to starting the discussion at the point in the water cycle involving the use of water as a conveyance for human waste to a wastewater treatment plant because this can create mental models that frustrate rational consideration of reuse strategies. Public resistance to “drinking treated sewage” is understandably absent a reframed understanding of the context of water use and reuse. Attitudes can change once people understand the reliance upon effective and reliable water treatment to produce high quality drinking water from raw supplies that include treated and untreated wastewater.

Two research projects from the WaterReuse Research Foundation (WRF 07-03 and WRF

09-01) have shown that public acceptance is profoundly affected by water use/reuse terminology and the way in which the urban context of water is presented. In addition, the National Research Council’s report, “Water Reuse: Potential for Expanding the Nation’s Water Supply Through Reuse of Municipal Wastewater Treatment,” shows that the use of defacto – or, in this author’s opinion, “unacknowledged” use of treated wastewater effluent as a water supply source – is common. However, most of the public is unaware of that fact. It is unsurprising that stigmatizing terms, such as “treated wastewater for drinking,” have helped to explain why reuse projects elicit negative responses from the public.

Nonetheless, water professionals have failed to heed the impact of words used to explain projects, in terms of the proportion and priority to the risk they impose. Consequently, the public has been lulled into a sense of complacency about water supplies that are far less “pure” than those from reuse projects. Pure untouched water is a marketing myth used by bottled water suppliers and drinking water purveyors who fail to mention that most drinking water systems are downstream of others. Acceptance can be further strengthened if the reuse scheme involves providing information about high levels of water treatment/purification.

More sustainable solutions could be created if water professionals begin thinking and talking about water, including water supply and wastewater treatment, as a closed cycle of use and reuse, as a loop system of resources – that is, a means to recover water, energy and nutrients. The absence of critically important context has contributed to the origination and preservation of the irrational fear that is the “yuck factor.” Water systems are portrayed as linear from use (that has been branded to the toilet) to away (out of sight/out of mind), but this is a detrimental way of thinking. It’s crucial that valuable resources stop being branded as waste.

Survey after survey has shown that people do not want to drink water that is being reused; however, effluent from wastewater treatment plants is a common source of water supply. Why is the issue only discussed in projects

Water Reuse Six Steps for Change

1. **Describe** water quality by its use – not all water reuse is the same quality.
2. **Identify** the source of the water without stigmatizing.
3. **Emphasize** resource recovery by naming wastewater treatment plants to reflect its new function.
4. **Talk about** the urban water cycle and water as a reusable resource.
5. **Share** information about what people put in water and its removal.
6. **Don’t stigmatize** water and water reuse by referring to it as treated wastewater. We reuse the effluent – wastewater is the raw material and resource from which we create water, energy, and nutrients.

when a community’s own treated (wastewater) discharge may be considered for placement above its drinking water intake and ignored when a neighboring community’s treated discharge is upstream?

The WaterReuse Research Foundation examined that issue when researchers Shane Snyder from the University of Arizona and the author conducted a study. Results showed that public acceptance of drinking water reuse, referred to by water professionals as direct potable reuse, increased immediately after subjects learned that drinking water often comes from rivers containing effluent from wastewater treatment plants and agricultural runoff.

Survey respondents preferred water that had been treated at a wastewater treatment facility and then received unconventionally high levels of treatment at a water purification plant rather than conventionally treated drinking water drawn from a river containing treated wastewater. Water purification was simply defined as additional treatment to produce water that meets or exceeds drinking water standards. Specific treatment technologies were not identified. A total of 23 percent of Australian survey respondents and 28 percent

of US survey respondents preferred direct drinking water reuse when compared with the other three hypothetical scenarios.

That research shows that it is time for innovative thinking, courage, and candor instead of subjecting the fate of water resource management to the vagaries of eye- and ear-catching sound bites, such as yuck factor, toilet to tap, drop to crop, or field to fork. More effective communication is needed to close the water cycle. Can a broader focus on the real context of water use and reuse enable informed and dispassionate consideration of water reuse as the important and necessary element of sustainable water management? Or, will the public remain mired in images of waste that shapes the discussion in out-dated views instead of present and future possibilities available through proven technologies? Failing that challenge is far from trivial, as it threatens the future of many communities and some countries.

Diminishing global supplies of readily available phosphorus, a critical component in fertilizer, is a less immediate, but equally important, emerging threat. The wastewater industry can play a role in helping to extend critical supplies through phosphorus recovery at wastewater treatment plants. To meet that challenge, the industry must broaden its function and role from wastewater treatment to water resource management, a transition that also changes the value of wastewater to a resource stream that requires management.

How water professionals think and talk about that subject will also shape the course of action, which will in turn have a fundamental bearing on sustainable management of those critical resources. Earlier research titled "Talking About Water," conducted by Co-Principal Investigators Dr. Paul Slovic from Decision Research and Linda Macpherson from CH2M HILL, showed that words and images can stigmatize and prevent sustainable decision making.

A new understanding of water, environment, and development challenges is needed to develop concrete solutions. It will take new, innovative, and culturally appropriate methods to create awareness, understanding, and knowledge before those changes can occur. If current approaches create barriers to a sustainable future, then simply asking people to change their behavior will not work unless their underlying beliefs support the changed dynamic. Holistic water and resource recovery perspectives will help to change those beliefs. For instance, the water industry must embody the change it wishes to see. The industry must start talking about water use and reuse holistically and it must change the way it describes water and wastewater treatment.

The vision of sustainable, vibrant, and viable global communities is unattainable by continued reductionist thinking in fragmented silos. That vision requires a different strategy – a system thinking approach – to create holistically integrated and interdisciplinary solutions.

Leading the charge

Some forward-thinking organizations are already leading the charge. Clean Water Services, a public utility in the US state of Oregon, is promoting phosphorous recovery and views wastewater as a recoverable, reuseable resource. For Clean Water Services, resource recovery is the key to long-term success, based upon the belief that "wastewater disposal" is not economically or environmentally sustainable. It has embraced innovation as a critical business strategy, which led to its implementation of the world's first and largest phosphorus recovery facilities. It has also created the not-for-profit Clean Water Institute to help to protect and restore watersheds and recover resources globally.

In Perth, Australia, Water Corporation has led efforts by local utilities to describe the water cycle more completely as a long-term cycle of

use and reuse. CEO Sue Murphy noted that along with the shift to climate-independent water resources came the need to re-educate the community and bring them along on the journey of change. Relying on research, Water Corporation understood the strong correlation between urban water cycle understanding and the acceptance of what had previously been understood as a non-traditional source of supply.

In Singapore, the successful NEWater program has been extolled for nearly a decade. Many are now recognizing that it is important to follow Singapore's lead in educating their community about water supply sources. Singapore was the first to create a new lexicon of water: language without the "yuck factor." NEWater is treated used water that has been purified by advanced membrane technologies to produce water that is cleaner than normal tap water. A comprehensive public education program ensures that NEWater technologies are understood to quicken the process of The Water Loop.

In Windhoek, Namibia, during the planning of the world's first direct potable reuse facility, Dr. Lucas van Vuuren said, "Water should be judged by its quality, not its history."

In conclusion, this remarkable molecule and reuseable resource should be celebrated – not stigmatized. The trend to direct drinking water must continue and accelerate in order to meet the increasing demands for water, energy, and nutrients, such as critically needed phosphorus for food production.

Author's Note

CH2M Hill's Reuse Principal Technologist Linda Macpherson delivered the keynote presentation, "From WASTEwater to Resource: New Language, New Thinking, New Possibilities," at the International Water Association's 2012 World Water Congress in Busan, South Korea, on September 19, 2012. This article is derived from the keynote presentation.

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