



FLOWING WITH SUSTAINABILITY IN MIND

When we turn on the tap, we expect it to be there – a cool, fresh and constant supply of clean drinking water. But do we really give any thought as to how it gets there?

For Rehan Sadiq, Associate Professor of Civil Engineering at UBC's Okanagan campus, it's all he thinks about.

"Maintaining our water distribution systems – the way we get water from its source to our taps – is fundamental to community sustainability, yet it's not something most people think about," says Sadiq.

Most Canadians have ready access to seemingly unlimited amounts of freshwater and consume more water per capita than any other country, other than the United States. As the economy continues to grow, the result is that municipal water use strains the capacity of water supplies. In drought-prone areas such as the Okanagan, there is little margin for handling water shortages.

"A sustainable water system includes three components: the quality of the water, the quantity or amount of water we get when we turn on the tap and its continuity. When one of these is compromised, the system is no longer sustainable," says Sadiq. "Given the challenges we face with increasing drought conditions, we need to create better tools to help decide what part of the system needs replacing or repairing and when."

Unlike a pothole in the road, the challenge is that water systems can't be seen. For example, 20 to 50 percent of treated, drinkable water can be lost due to leaky pipes and erosion of pipes from surrounding soil. The water distribution infrastructure – all the underground water mains and water lines that bring water from the source to our homes – is the most expensive and challenging part of the system to maintain, yet it is critical to ensuring that constant supply of water.

Behind the scenes, local governments and water suppliers struggle to balance budgets and make decisions about multi-

"Maintaining our water distribution systems is fundamental to community sustainability. When you consider that 20 to 50 percent of our drinking water can be lost due to leaky pipes or erosion, it's critical to make informed decisions about when and where to invest in replacing or upgrading water lines."

million dollar investments in repairing or replacing water lines. In many communities, like London (UK) and Montreal, this infrastructure can be 150 to 200 years old.

"While the age of the water pipes often determines when it needs to be replaced, a far better strategy is to determine how that infrastructure is functioning and whether it needs replacing," says Sadiq. "It's like assessing the health of an individual. We can be old but in good health, or young and in need of care. We need a better strategy to assess when to invest in costly replacement or repairs. We need to know the overall health of the system."

Working with the Water Research Foundation, UK Water Industry Research, Infrastructure Canada and the National Research Council of Canada, Sadiq and his graduate students are developing tools that local governments or water suppliers can use to make better decisions around infrastructure replacements. He has developed a risk-based approach to decision making for the replacement or rehabilitation of water pipes. This includes programs to assess the viability of the water distribution system and make predictions that can help local governments set priorities.

"It's about maintaining a healthy water distribution system that will serve current and future generations. Without a sustainable water distribution system, the environmental, economic, social and health impacts are too great."

Going forward, Sadiq, with another colleague Dr. Solomon Tesfamariam, is working with local consulting firms to help them develop basic tools that municipalities can use to make capital investment decisions around the infrastructure that supports their communities, as well as working directly with municipalities. ●