Safe to the last drop

Associate Professor Arumugam Sathasivan, from the School of Computing, Engineering and Mathematics, is investigating an early warning system to detect deterioration of drinking water in Sydney. The project, which is supported by UWS and Sydney Water, aims to detect microbiological changes to water in time to respond in a safe and cost-effective way.

'Water utilities aim to maintain a disinfectant that stays in the system right to the last customer’s tap to protect public health,' says Associate Professor Sathasivan. 'Chloramine is often used because it remains active over long periods, especially in challenging conditions such as hotter climates or long distribution mains. However, under certain conditions it can decay rapidly and unexpectedly.'

Sydney Water provides safe drinking water for about 4.5 million customers, making it the largest supplier in the country. More than 80 per cent of the water it delivers is disinfected by chloramine. However, managing chloramine is challenged by nitrification, a microbial process. Traditionally, the existence of nitrification has been identified by isolating nitrifying microorganisms, especially ammonia oxidizing bacteria (AOB), but that does not identify the problem in its earliest stages. After the onset of nitrification it is difficult to reverse. Control of nitrification currently calls for labour-intensive and hence costly management approaches to maintain a disinfectant residual.

A new method has been developed to identify and quantify chloramine loss well before the detection of nitrification. It relies on the measurement (potentially online) of simple water quality parameters (chlorine, temperature and reservoir retention time) to predict the onset of nitrification and improve disinfection management. However, advances have mostly been confined to the laboratory.

The aims of Associate Professor Sathasivan’s research are to test the proposed approach in the field (two of Sydney Water’s reservoirs) and to identify any issues that need further examination. Specifically, he will test whether the new assessment approach can identify the cause of chloramine depletion and identify when and where to intervene. He will also establish the ideal concentration of chloramine concentration to prevent nitrification from occurring.

Sydney Water’s vast drinking water services have an area of operations covering about 13,000 square kilometres. Treated water can remain in the Sydney Water distribution system, largely in service reservoirs or tanks, for as long as 10 days. Effective and enduring disinfection is a crucial element for Sydney Water to maintain its focus on the provision of safe drinking water.

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