Optical water quality assessment

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This is groundwater flowing into the upper watershed of the McKenzie River in Oregon. Credit: Tamara Kraus

Scientists at the U.S. Geological Survey (USGS) have proven that measuring fluorescence could improve source water monitoring during a study of the McKenzie River in Oregon. The study was designed to assess the amount, type and source of dissolved organic carbon that exists in all sources of drinking water.

Dissolved organic carbon can react with chlorine during water treatment and form halogenated compounds, commonly referred to as disinfection byproducts. Some of these byproducts are regulated by the U.S. Environmental Protection Agency, but a lack of strict controls and guidelines underscores the need for better understanding of sources for dissolved organic carbon. Measuring optical properties allows for

researches to account for concentration, composition, and source of dissolved organic carbon, as well as its propensity to form disinfection byproducts.

In 2007 and 2008, water samples from the McKenzie River mainstream, tributaries and reservoir outflow were analyzed by scientists from the USGS in collaboration with the Eugene Water and Electric Board. Optical measurements assessed the full spectrum of fluorescence and absorption to provide an understanding of dissolved organic carbon properties and patterns, and to ascertain the benefits of using such measurements.

Results indicated sources of dissolved organic carbon and disinfection byproducts precursors originated upstream. They are most likely the consequence of human activity and are strongly linked to changes in the flow path of the waterway. Downstream tributaries did contain higher dissolved organic carbon concentrations; however they comprise less than 5% of the mainstream flow and therefore do not have a significant impact on drinking water.

Although there was interference while measuring the absorbance spectra, the study presented conclusive evidence illustrating the value of measuring optical properties.

"Optical measurements have the potential to be less expensive, faster, and more sensitive than laboratory chemical-based analyses," says Tamara Kraus, one of the authors of the study.

According to Kraus, instruments that measure optical properties have recently been developed and have the potential to help water utilities to understand the trends in water quality. She suggests that it would be more feasible and cost effective to lower the amount of disinfection byproducts precursors than establishing additional water treatment

technologies.

More information: The full study is available in the November-December 2010 issue of the *Journal of Environmental Quality*. www.agronomy.org/publications/ … /abstracts/39/6/2100

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