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Title: Spatial Analysis of Drinking Water Stability Changes in Risk Management Procedure for Water Supply System Operation

Abstract.

This research aims to develop a spatially informed system that integrates operational risk management with drinking water stability within water supply systems. Current risk management practices often lack the integration of real-time water quality data and spatial context, leading to challenges like secondary contamination and the formation of Disinfection Byproducts (DBPs). The study is driven by a commitment to apply spatial tools (GIS) and water modeling software (such as EPANET, WaterCAD, or WaterGEMS) to significantly enhance risk detection and management. It focuses on assessing the physicochemical properties of drinking water using GIS and modeling tools by testing parameters like pH, alkalinity, color, Total Dissolved Solids (TDS), and residual chlorine; evaluating the chemical and microbiological stability of drinking water through indicators such as algae, protozoa, and biofilms that compromise safety; and integrating the water stability data into a comprehensive, spatially informed operational risk model. The methodology involves collecting water samples, conducting physicochemical and microbiological tests, and integrating the resulting data through GIS with EPANET, WaterCAD, or WaterGEMS to develop the final operational risk model. Ultimately, this approach is designed to support evidence-based policy and provide tangible real-world impact for communities currently facing serious water quality challenges.

Key words: Disinfection Byproducts (DBPs), Drinking water stability, EPANET, GIS, Microbiological stability, Operational risk management, physicochemical properties, spatial analysis, WaterCAD, WaterGEMS, Water quality.