Application of Geospatial Methods to support Water Quality Assessment in Guyana

*Annthea Percival¹, Dina Khadija Benn², Denise A. Simmons¹

¹Department of Environmental Studies. Faculty of Earth and Environmental Sciences. University of Guyana – Turkeyen Campus. Greater Georgetown, Guyana. *annthea.perci@gmail.com.

²Department of Geography. Faculty of Earth and Environmental Sciences. University of Guyana – Turkeyen Campus. Greater Georgetown, Guyana.

DOI: 10.52377/DGPK5456

Water quality degradation from anthropogenic activities is a critical issue requiring close monitoring and management. The Cuyuni and Mazaruni Rivers; major tributaries of the Essequibo River system in Guyana, feature gold and diamond mining that contribute to elevated levels of sediment loading. These excess sediments could endanger riverine ecosystems and indigenous communities. Water quality monitoring at these sites typically involves purposive *in situ* sampling and lab analyses, but this procedure can limit more comprehensive analysis. This research examined the usefulness of spatial interpolation for modelling distributions of surface water quality parameters. Twenty-nine river samples were retrieved through stratified sampling along twenty-two (22) kilometres of connected riverine area. Regularly-spaced transects were positioned at four locations: the lower Cuyuni River, the lower Mazaruni River, the Cuyuni-Mazaruni confluence, and the discharge point into the Essequibo River. Samples were tested for turbidity and total suspended sediments using the turbidity meter and filter paper method, respectively. Two spatial interpolation techniques (Inverse Distance Weighted and Ordinary Kriging) were selected to spatially model the samples, and Ordinary Kriging was found to be more accurate for modelling spatial distribution of the surface water quality parameters. Mapping the distribution of turbidity and total suspended sediments using an appropriate sampling procedure helped to identify problematic sediment accumulation zones and link them to nearby unregulated dredging activities. The study demonstrated that incorporating geospatial modelling techniques into water quality monitoring procedures can enable an improved response to unmitigated mining and water quality degradation issues, which can help safeguard communities and riverine ecosystem health.

Keywords: Surface water quality; geospatial methods; spatial interpolation