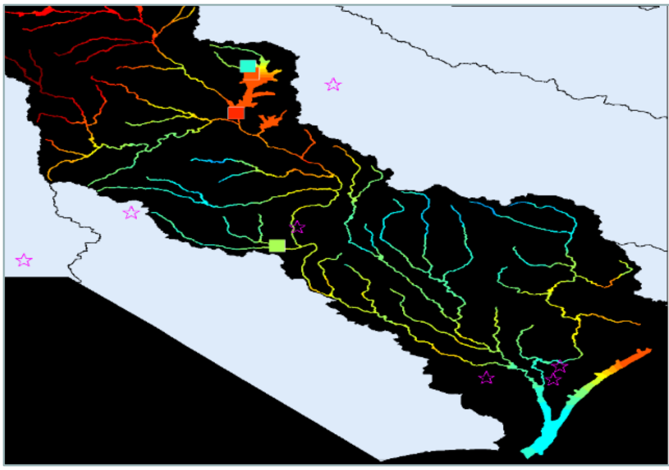

# Geostatistical Estimation of Surface Water Contaminants: Should We Use Distances across Land, or along Rivers

**Prahlad Jat**

PhD Candidate, ESE

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**0001 Michael Hooker Research Center**

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**Abstract:** The Clean Water Act provides primary authority to States to set their own surface water quality standards with approval from the U.S. Environmental Protection Agency and requires that state agencies assess all river miles for potential impairments. However, due to the large number of river miles to be assessed as well as budget and resource limitations, many states cannot feasibly meet this requirement. Therefore, there is a need for a framework that can accurately assess water quality at un-monitored locations, using limited data resources. The Bayesian Maximum Entropy (BME) method of modern spatiotemporal geostatistics provides an ideal framework to estimate environmental contaminant levels at unmonitored locations. However, the classical framework uses a Euclidean metric, which calculates distance across land. In this presentation, the Euclidean metric is contrasted with a river metric, which better captures the hydrogeometry of river networks. After introducing the BME-kriging estimation framework, a description of how this framework can be implemented using either a Euclidean or river metric is given. A simulation case study is conducted which demonstrates that using a river metric leads to an estimation that is significantly more accurate and physically more meaningful than that obtained using the Euclidean metric. The river metric is then applied to estimate aqueous lead concentrations along the Cape Fear river basin, which had not been performed before. Finally, a novel framework is under development that aims to extend the river metric framework to account for flow. Using simulated data, this seminar concludes by showing that this novel framework is leading to some promising results that could further improve estimation of water quality along rivers.