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**SPATIAL VARIATIONS IN THE RELATIONSHIPS BETWEEN LAND USE AND WATER QUALITY ACROSS
AN URBANIZATION GRADIENT IN THE WATERSHEDS OF NORTHERN GEORGIA, USA**

Jun Tu*

ABSTRACT: A spatial statistical technique, Geographically Weighted Regression (GWR) is applied to study the spatial variations in the relationships between four land use indicators, including percentages of urban land, forest, agricultural land, and wetland, and eight water quality indicators including specific conductance (SC), dissolved oxygen, dissolved nutrients, and dissolved organic carbon, in the watersheds of northern Georgia, USA. The results show that GWR has better model performance than ordinary least squares regression (OLS) to analyze the relationships between land use and water quality. There are great spatial variations in the relationships affected by the urbanization level of watersheds. The relationships between urban land and SC are stronger in less-urbanized watersheds, while those between urban land and dissolved nutrients are stronger in highly-urbanized watersheds. Percentage of forest is an indicator of good water quality. Agricultural land is usually associated with good water quality in highly-urbanized watersheds, but might be related to water pollution in less-urbanized watersheds. This study suggests that GWR technique is a very useful tool in water environmental research and also has the potential to be applied to other fields of environmental studies and management in other regions.

* Assistant Professor, Kennesaw State University, 1000 Chastain Rd. MD2203, Kennesaw, GA 30101 USA, Phone: 678-797-2392, Email: jtu1@kennesaw.edu