

Road and Stream Network Connectivity and Potential: Northeastern Puerto Rico, an exploratory analysis.

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Abstract

Interactions between road and stream networks are complex and are influenced by a range of environmental and road design characteristics. These interactions are not clearly understood and are the subjects of current research. To increase understanding of these interactions we explore the concepts of Road and Stream Network Connectivity (R/S Connectivity) and Road and Stream Network Connectivity Potential (RSNCP). Lastly we provide a methodology for study and analysis of R/S connectivity.

This study focuses on road induced alterations to sediment and water flow processes, which are important road effects of R/S connectivity. For 25 river road crossings (RRC) in the Rio Mameyes and Rio Espiritu watersheds of Northeastern Puerto Rico, a multi-scale Geographic Information Systems (GIS) database measuring environmental and road characteristic variables was developed specifically to measure variables influencing sediment and water flow. Multivariate analysis methods were used to select the environmental and road characteristic variables which were used in multiple linear regression models for three biota variables (Decapod Richness, Adult Fish Richness, and Total Richness), and four stream habitat geomorphology variables (Median Channel Grain Size, Active Channel Maximum Depth, Pool Volume, and Active Channel Width). Explained variance (R^2) from modeling results ranged from 0.22 to 0.86, demonstrating that the GIS derived variables can successfully be used to model important stream biota and geomorphology response variables.

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