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Hydrology and Earth System Sciences Discussions

Interactive comment on "Road and stream network connectivity and potential: northeastern Puerto Rico, an exploratory analysis" *by* K. R. Sherrill et al.

Anonymous Referee #2

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This paper presents an analysis of the effects of roads on streams using GIS and stream ecologic and geomorphic data in a multivariate analysis, for a study site in the Caribbean Forest of Puerto Rico. The analysis involved using GIS to count numbers of road crossings and lengths of roads within buffers of various dimensions around mapped stream channels, and relate these variables to measured stream ecologic and geomorphologic properties. Some variables (e.g., species richness), are negatively related to GIS-based measures of road-stream connectivity (e.g., road length within a prescribed distance of the stream). However, many of these relationships may be spurious correlations, resulting from geographic patterns, such as expected increases

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in both road density and species richness with increasing drainage area. Also, many of the hypothesized effects of roads on stream geomorphic and ecological variables might push a property in two different directions (e.g., road drainage producing both fining and coarsening of the bed, or both decreases and increases in pool depth), making simple correlations unlikely.

The paper is a good effort to try to separate these complex interactions in a rigorous statistical analysis. Criticisms of the paper include: (1) excessive reliance on mapped vs. field-checked features – how accurate were the road and stream layers? (2) the definitions of road-stream connectivity and the potential for connectivity were a little hard to follow, esp. Figure 1 – what are the mechanisms that could make a road that is more distant from a stream have more of an effect than one close to the stream? (3) descriptions of particular road configurations and the stream data from these locations would have helped make the manuscript more understandable; (4) hypotheses could have been presented more clearly in the introduction, rather than mentioned only in the results; (5) tables of statistical results are difficult to interpret, in part because variable names are abbreviated and because the criteria for significance of particular variables is not clear; (6) it’s not clear what was learned from models fitted both with and without X, Y coordinates; (7) it would have been helpful to more clearly tie the findings back to long-term work on stream ecology from Puerto Rico to assess whether roads appear, or don’t appear, to be affecting stream variables.

Overall, the work has good potential but seems somewhat incomplete. The authors should be commended for this effort and encouraged to try to push the results of this analysis to identify and articulate more general findings. Studies of this type from other locations would be helpful in increasing our understanding of the complex effects of roads on streams.

Interactive comment on Hydrol. Earth Syst. Sci. Discuss., 5, 1731, 2008.