Project Title: GIS Feature Extraction Tool Capabilities in Diverse Landscapes

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Project Goals:

In the analysis of watershed landscapes, important parameters describing the characteristics of the basin of interest can be derived using GIS tools to perform feature extraction on high-resolution imagery data. Three of these parameters are: (1) slope of the terrain, (2) curvature of the terrain, and (3) accumulation area, or the area from which water flows into a single depression. Furthermore, the graph of the accumulation area (A) versus slope (S) is used to estimate a fourth critical characteristic of the basin; the initiation area or channel head.

For this project, I will examine two basins in the U.S. with diverse physical characteristics: the Eel River Basin in northern California and the Le Sueur Basin in southern Minnesota. The Eel River Basin is characterized by high variations in elevation, from very steep to flat areas. It is also highly vegetative. In contrast, the Le Sueur Basin has little variation in elevation and features meandering river channels. From each basin, I will delineate a sub-basin of approximately 1 km^2 in size utilizing the Hydrology tools in ArcGIS. Once these sub-basins are identified, feature extraction tools will be used to obtain accumulation area, curvature, and slope data. Analysis of the curvature data will include the development of a quartile-quartile plot to identify channel and ridge features in the sub-basins. Graphs of the accumulation areas versus slopes for the sub-basins can be used to identify the initiation area/channel head which corresponds to the inflection point on the graph. A comparison of the results from these two sub-basins will illustrate GIS extraction tools’ capabilities and limitations in diverse landscapes.

Data Required:

LIDAR for Le Sueur Basin (acquired from Harish Sangireddy)

LIDAR for Eel River Basin (downloaded from OpenTopography)

I was going to use HUC 12 data to help delineate approximately 1 km^2 sub-basins, but the areas of the HUC basins are too large. Do you have suggestions for other data I could use for this task?