



The Catena Concept Revisited: Spatial Optimization of Ecohydrologic Form and Function

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Over the past two decades, empirical evidence and theory have been developed that suggest that the distribution of ecosystem properties such as canopy density and root patterns, evolve towards a state that maximizes resource use and net primary productivity. Repeated patterns of community composition and canopy density are taken to reflect available energy, and the cycling and storage of water and nutrients along hydrologic flowpaths. We use a combination of field measurement, signal processing and distributed simulation to identify emergent ecohydrologic patterns at mixed scales in a set of Long Term Ecological Research sites, and use this information to develop indices characterizing the type and strength of interactions between catchment geomorphic, soil, climate and ecosystem processes. These indices can be used in a catchment ecohydrologic classification to infer dominant processes from directly observable catena patterns.