



Thresholds for runoff and sediment transport in Semi-arid areas; implications for connectivity

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The concept of connectivity is increasingly being applied within a range of disciplines in the Earth and Environmental sciences as researchers recognize the need to move beyond the traditional view that runoff is generated by either saturation overland flow or by the variable source area model. In studies which focus on connectivity two key assumptions tend to be made. Firstly, that local runoff thresholds, defined in terms of a simple bucket model or more dynamically through an infiltration equation, must be exceeded for runoff to be produced and secondly, that the factors that influence runoff thresholds are also important for hydrological connectivity. It follows that hillslope hydrological connection can be initiated by short duration, high intensity events, whereas catchment-scale hydrological connection and flooding, requires prolonged, lower intensity storms with a large total rainfall. Each catchment thus has a base spatial pattern of response units and connections between these, but connectivity and runoff production depends on the characteristics of runoff generating events, and the response curve as the catchments wets up. In this paper we explore how this base spatial pattern changes according to thresholds in the landscape for runoff generation and sediment transport. By examining a range of events at different spatial scales it is hoped that an understanding can be developed of whether key thresholds exists in semi-arid landscapes which will assist in understanding long term landscape development.