



Overland flow in plot- to hillslope-scale hydrology: what are the major knowledge gaps?

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Though overland flow has been studied systematically for more than 70 years, knowledge has been built in a piecemeal fashion, through studies exploring only particular aspects of overland flow. Holistic investigations have been notably lacking. An overview of the literature suggests that the occurrence of overland flow on hillslopes is frequently characterised by very large spatio-temporal variability, reflecting the many factors that influence overland flow behaviour. These include rainfall intensity, duration, event profile, and other properties; antecedent soil moisture and soil hydraulic properties; the influence of vegetation canopies, ground litter, and associated throughfall, stemflow, and percolates; microtopography and soil surface roughness; soil erodibility; runoff and interactive infiltration; raindrop impact; and surface detention and afterflow. Overland flow may be patchy and discontinuous over the ground surface. The integration all of these influences, with support from suitable distributed data collected during rainfall, remains an unrealised need. Progress has been slowed by a lack of suitable field data collection apparatus, especially for the recording of flow depths and speeds in overland flows that are commonly < 1-3 mm deep. There is also a need to develop a view of overland flow that accords with existing field observations showing that in many cases overland flow does not result from soil infiltrability being exceeded. In this context, a new descriptive term for transitory forms of overland flow arising from other mechanisms is suggested – facilitated overland flow.