



Effect of scale on runoff and sediment transfers in small catchments

C. Deasy (1), R.E. Brazier (2) and A.L. Heathwaite (1)

(1) Lancaster Environment Centre, Lancaster University, UK (2) Department of Geography, University of Exeter, UK (c.deasy@lancaster.ac.uk)

The limitations of current monitoring techniques mean that it is necessary for scientists to select particular spatial scales at which to measure and study processes. We argue in this paper that this has critical implications for environmental science, as certain processes can only be measured, or only operate at particular scales, and the scale which we choose to observe influences the data we collect and hence our resultant process understanding. This study uses event-based runoff and suspended sediment data collected at four spatial scales (c.0.01 ha, 1.9 ha, 2.5 ha and 3.7 ha) integrated within a small (30 ha) agricultural catchment to illustrate how the scale studied can influence our understanding of hydrological and sediment transfer processes. The paper makes three main points. First, not all events occur at all scales, therefore is not possible to capture all catchment event dynamics, or the dynamics of a particular scale, by monitoring just one scale or an inappropriate scale. Second, the timing and magnitude of event responses differs between events and between scales, therefore it is impossible to understand event responses at other scales by monitoring just one scale or an inappropriate scale. Third, event characteristics are different at different scales, hence it is inappropriate to apply data and findings taken from one observation scale to another scale, without understanding just how and why the data vary. The results highlight the importance of scale-appropriate monitoring, and the need for more consideration of the appropriateness of the monitoring scale when undertaking field monitoring or using field data in modelling and management applications.