



Is there a Link between Land Use Management and Flooding?

P E O'Connell, John Ewen and Greg O'Donnell

P.E.O'Connell@ncl.ac.uk

When Jim McCulloch was appointed Head of the Hydrological Research Unit in 1964, the leading research question of the day was 'Do trees use more water than grass?' In tackling this question, the Severn (forest) and Wye (grass) headwater catchments Plylimon were instrumented, and process experimentation was used to identify the role of interception loss as a controlling factor in the catchment water balance. Underlying this key question was an important land use policy issue: the consequences of large scale afforestation of the uplands for the water yields of the catchments affected.

Over the ensuing years, the Hydrological Research Unit grew into the Institute of Hydrology to tackle a range of challenging issues, ranging from fundamental questions about process understanding to more applied hydrological prediction problems, and was widely recognised for the notable contributions made to resolving many of these issues. However, the question posed by this paper shows that there is still one leading question in this field which has escaped resolution, and it is now of major concern to the UK agencies concerned with flood risk management. Tackling it presents formidable problems for catchment research, and for modelling and prediction. Across the UK, there is substantial evidence that land use management practices can lead to changes in local-scale runoff generation, resulting in local-scale flooding. However, major flooding occurs in valley floors at larger catchment scales, and so there is a key question as to how spatially heterogeneous changes in runoff generation might affect flooding at larger scales. The issue of how runoff is generated across a heterogeneous landscape, and aggregated/routed through the channel network to larger catchment scales, is the scaling issue being addressed by the CHASM network of multiscale catchment experiments recently established in the UK. The problems of designing and running such experiments will be discussed, together with the difficulties of detecting any impacts land use management practices might have on larger-scale catchment re-

sponse. Jim McCulloch's quest to unravel the complex interactions between land use and catchment hydrology is still being pursued today!