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Catchment scale multi-objective flood management

Steve Rose (1), Peter Worrall (2), Zdenka Rosolova (1), and Gene Hammond (2)

(1) Maslen Environmental (part of the JBA Group), Salts Mill, Victoria Road, Saltaire, West Yorkshire, BD18 3LF, UK (s.rose@maslen-environmental.com), (2) Penny Anderson Associates, Park Lea, 60 Park Road, Buxton, Derbyshire, SK17 6SN, UK

Rural land management is known to affect both the generation and propagation of flooding at the local scale, but there is still a general lack of good evidence that this impact is still significant at the larger catchment scale given the complexity of physical interactions and climatic variability taking place at this level.

The National Trust, in partnership with the Environment Agency, are managing an innovative project on the Holnicote Estate in south west England to demonstrate the benefits of using good rural land management practices to reduce flood risk at the both the catchment and sub-catchment scales.

The Holnicote Estate is owned by the National Trust and comprises about 5,000 hectares of land, from the uplands of Exmoor to the sea, incorporating most of the catchments of the river Horner and Aller Water. There are nearly 100 houses across three villages that are at risk from flooding which could potentially benefit from changes in land management practices in the surrounding catchment providing a more sustainable flood attenuation function. In addition to the contribution being made to flood risk management there are a range of other ecosystems services that will be enhanced through these targeted land management changes. Alterations in land management will create new opportunities for wildlife and habitats and help to improve the local surface water quality. Such improvements will not only create additional wildlife resources locally but also serve the landscape response to climate change effects by creating and enhancing wildlife networks within the region. Land management changes will also restore and sustain landscape heritage resources and provide opportunities for amenity, recreation and tourism.

The project delivery team is working with the National Trust from source to sea across the entire Holnicote Estate, to identify and subsequently implement suitable land management techniques to manage local flood risk within the catchments. These techniques will include: controlling headwater drainage, increasing evapotranspiration and interception by creating new woodlands in the upper catchment areas, enabling coarse woody debris dams to slow down water flows through steep valleys, improving soil water storage potential by appropriate soil and crop management, retaining water on lowland flood meadows and wet woodland creation within the floodplain.

The project, due to run from 2009 until 2013, incorporates hydrometric and water quality monitoring, together with hydrologic and hydraulic modelling in order to attempt to demonstrate the effect of land management changes on flood dynamics and flood risk management. To date, the project team have undertaken the fundamental catchment characterisation work to understand its physical setting and the interaction of the physical processes that influence the hydrological response of the catchment to incident precipitation. The results of this initial work has led to the identification of a suitably robust hydrometric monitoring network within the catchments to meet the needs of providing both quantitative evidence of the impacts of land management change on flood risk, together with generating good quality datasets for the validation and testing of the new hydrologic models.

As the project aims to demonstrate ‘best practice’ in all areas, the opportunity has been taken to install a network of automatic hydrometric monitoring equipment, together with an associated telemetry system, in order to maximise data coverage, accuracy and reliability. Good quality datasets are a critical requirement for reliable modelling. The modelling will also be expanded to incorporate climate change scenarios.

This paper will describe the catchment characterisation work undertaken to date, the proposed land management changes in relation to flood risk management, the initial catchment hydraulic modelling work and the implementation of the new hydrometric monitoring network within the study area.