Geophysical Research Abstracts, Vol. 7, 00419, 2005
SRef-ID: 1607-7962/gra/EGU05-A-00419

An investigation of the hydraulic impact of floodplain woodland

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This paper examines the potential role of floodplain woodland in flood alleviation. In theory, the presence of trees, undergrowth and woody debris on the floodplain increases the hydraulic roughness thus slowing down the passage of flood flows. Trees and woody debris also direct and concentrate flows, forming complex networks of channels and backwater pools, which can enhance flood storage. One-dimensional (HEC-RAS) and two-dimensional (River2D) hydraulic models were applied to a 2.2km reach of river in SW England to assess the first of these processes. The hydraulic impact was represented using appropriate published roughness parameters for floodplain woodland. Three land use scenarios were considered; a complete grass cover, a complete woodland cover, and a grassed floodplain with a central 50 ha block of woodland extending across the full width of the floodplain.

Both 1D and 2D models predicted a reduction in water velocity within the woodland, resulting in water level increasing by up to a 120 mm and a backwater effect extending for as much as 300 m upstream. Flood storage was enhanced by up to 14%, while the flood peak travel time was reduced by 30 min and 90 min for the central block and complete woodland scenarios, respectively.

The results suggest that there is considerable scope for using strategically placed floodplain woodland to alleviate downstream flooding. In particular, it offers a means of tackling the increased flood risk associated with climate change. Further work is underway to check the roughness of UK floodplain woodland and to investigate how this could be enhanced by woodland design and management. Field experiments are

planned to measure the effects of floodplain woodland on flood flows in order to develop and validate the hydraulic models.