Geophysical Research Abstracts
Vol. 17, EGU2015-878, 2015
EGU General Assembly 2015

Plot and Catchment Scale Hydrological Impacts of Agricultural Field Boundary Features

Victoria Coates and Ian Pattison

School of Civil and Building Engineering, Loughborough University, Loughborough, United Kingdom
(v.l.coates@lboro.ac.uk)

Natural flood management aims to reduce downstream flow levels by delaying the movement of water through a catchment and increasing the amount of soil infiltration. Field boundary features such as hedgerows and dry stone walls are common features in the rural landscape. It is hypothesised that there presence could reduce runoff connectivity and change the soil moisture levels by altering the soil structure and porosity. The use of larger agricultural machinery has resulted in the removal of field boundaries and the subsequent increase in field sizes over the 20th Century. This change in the rural landscape is likely to have changed the partitioning of rainfall into runoff and the hydrological pathways throughout the catchment. However, the link between field boundaries and catchment scale flood risk has not yet been proven.

We aim to address this need for evidence to support natural flood management by focussing on these widespread features in the rural landscape. Firstly, we quantify the change in the density of field boundaries over the past 120 years for the Skell catchment, Northern England using historical OS maps. The analysis has shown that field size has approximately doubled in the Skell catchment since 1892, due to the removal of field boundaries. Secondly, we assess the effect of field boundaries on local soil characteristics and hydrological processes through plot scale continuous monitoring of the hydrological processes along a 20m transect through the linear boundary features. For the summer period results show that soil moisture levels are lower immediately next to the hedgerow compared to distances greater than 1m from the hedgerow. Finally, we use this data to parameterise and validate a catchment scale hydrological model. The model is then applied to test the impact of a network of field boundaries on river flow extremes at the catchment scale.