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Developing a Framework to Link Catchment Modelling tools to Decision Support Systems for Catchment Management and Planning

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Over the past few years a series of catchment monitoring studies in the UK have developed a wide range of tools to enable managers and planners to make informed decisions to target several key outcomes. These outcomes include the mitigation of diffuse pollution and the reduction of flood risk. Good progress has been but additional steps are still required to link together more detailed models that represent catchment processes with the decision support systems (often termed matrices; i.e. DSMs) which form the basis of these planning and management tools. Examples include: (i) the FARM tools developed by the PROACTIVE team at Newcastle University to assess different catchment management options for mitigating against flooding events, (ii) TOPMANAGE, a suite of algorithms that link with high resolution DEMs to enable surface flow pathways, having the potential to be mitigated by Natural Flood Management (NFM) features (in order to target diffuse pollution due to nutrients and sediments) to be identified.
To date, these DSMs have not been underpinned by models that can be run in real-time to quantify the benefits in terms of measurable reductions in flood or nutrient pollution risks. Their use has therefore been mostly as qualitative assessment tools.
This study aims to adapt an existing spreadsheet-based model, the CRAFT, in order for it to become fully coupled to a DSM approach. Previous catchment scale applications of the CRAFT have focussed on meso-scale studies where any management interventions at a local scale are unlikely to be detectable at the monitoring point (the catchment outlet). The model has however been reasonably successful in identifying potential flow and transport pathways that link the headwater subcatchments to the outlet. Furthermore, recent enhancements to the model enable features such as sedimentation ponds and lagoons that can trap and remove nutrients and sediments to be added, once data become available from different types of NFM features to parameterise these. The model can be used to investigate runoff attenuation (in this case primarily through a lagged routing term applied to surface runoff) as a result of implementing mitigation measures.
However to be fully integrated within a DSM framework requires the CRAFT to be linked to a user-friendly interface that will allow the user to modify key parameters, preferably using a web-based expert system, which will be explored further.