



## **The identification of sediment and connectivity patterns to map critical source areas across scales for effective mitigation of diffuse sediment pollution**

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Diffuse pollution from agriculture constitutes a key pressure on the water quality of freshwaters and is frequently the cause of ecological degradation. The problem of diffuse pollution can be conceptualised with a source – mobilisation - pathway (or delivery) - impact model, whereby the combination of high source risk and strong sediment connectivity and connected pathways leads to ‘critical source areas’ (CSAs). These areas are where most sediment diffuse pollution will originate, and hence are the optimal places to implement mitigation measures. However, identifying the locations of these areas is a key problem across different spatial scales within catchments. We evaluate the sediment sources, connectivity patterns and CSAs identified by and the benefits and disadvantages of traditional walkover surveys supported by a custom smartphone app; a desktop geographic information system (GIS) using the terrain analysis-based SCIMAP approach; and the use of a high spatial resolution drone dataset as an improved input data for SCIMAP mapping. Each of these methods predicts the locations of the CSAs, revealing similarities and differences in the prioritisation of CSA features. The differences in the CSA locations are due to the temporal and spatial resolution of the different methods such as the use of static land cover information, the ability to capture small scale features, such as gateways and the incomplete catchment coverage of the walkover survey. The relative costs and output resolutions of the different methods indicates that they are suitable for application at different catchment scales in conjunction with other methods. Based on the results in this work, it is recommended that a multi-evidence-based approach to diffuse pollution management is taken across different catchment spatial scales, incorporating local knowledge from the walkover with the different data resolutions of the SCIMAP approach.