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Using 2D Sediment Modelling to Simulate Geomorphic Change for River Restoration Initiatives

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River restoration projects have long relied on the use of modelling in both 1D and 2D to simulate the changes to flow hydraulics and flood extent that alterations to a river and floodplain will have caused. These methods have grown more accurate with increasing computing power and more complex software. However, despite the developments in modelling, a significant gap remains in the usage and accuracy of sediment modelling to identify arguably one of the most important metrics of river restoration: Geomorphic Change. Therefore, this paper attempts to address this by investigating the accuracy of high-resolution sediment modelling to identify geomorphic change on Blaze Beck in Cumbria, a high energy wandering river system that has recently been restored. Comparisons have been made between the impacts of a simulated flood event created using HEC-RAS 6.1 modelling software and a real-life flood event on October the 27th 2021, to compare changes to geomorphology and identify the degree of accuracy of the 2D change modelling compared to change measured using drone-based photogrammetry. The results appear generally accurate, predicting locations of head cutting and more general low-level erosion and deposition. Bar formation, splay deposition and general bed raising are all predicted. The model is, however, very sensitive to the gradation of sediment it has been trained with and this can skew the ratio and pattern of deposition and erosion depending on the sample data used to simulate real life conditions. The model, once refined and iterated to best simulate potential change, is functional even in a high energy hydraulically diverse environment like Blaze Beck, and will have significant value in predicting the degree to which geomorphic change will occur because of restorative or other changes to a river reach.