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Modelling the natural flood management in medium scale lowland catchments in Thames Basin (UK)

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Natural flood management (NFM) is widely promoted and adopted as an effective way of managing flood risks. However, there remain many unknowns especially on its effectiveness at medium and large scales. This study has first analysed the consistency of a modelling framework that integrates the Soil and Water Assessment Tool (SWAT) model for simulating the land based NFM in two medium scale lowland catchments within the Thames River basin (UK). Afterwards, it has assessed the effectiveness of NFM in these catchments using broadscale hypothetical scenarios. The results show that it is possible to model land-based NFM in medium scale catchments but this is highly dependent on the one hand on catchment landscape characteristics and on the other hand on the availability and quality of necessary input datasets, model choice, configuration, parametrisation and calibration and uncertainty analysis techniques. Furthermore, the NFM effects vary across the catchments and landscapes characteristics. Afforestation seems to provide less effect on large flood events in terms of reducing the peak flows compared to small events. The implementation of crop rotation scenarios, depending on the crop choice and tillage practice may lead to the increase of the peak flows. Overall, this study showed that NFM modelling in medium catchments is not straightforward and prior to any task, an extensive analysis needs to be carried out to understand the datasets, the model, and processes configuration as well as different calibration and uncertainties analysis techniques. Moreover, the choice of woodland planting only as NFM measure will require an extensive work within the catchment to produce an effect which suggests that to better minimise the flood risk, the combination with other measures that can reduce the amount of flow reaching the river channel or delay the timing of the peak flow (eg. leaky barriers) would be necessary.