



## **River ecosystem engineering by the aquatic macrophyte *Sparganium erectum*: the influence of biomechanical traits on sediment retention and fluvial landform development.**

Tom Liffen (1), Angela Gurnell (1), Matthew O'Hare (2), Judith O'Hare (1), Natasha Pollen-Bankhead (3), and Andrew Simon (3)

(1) Queen Mary, University of London, Department of Geography, London E1 4NS, UK (t.liffen@qmul.ac.uk), (2) Centre for Ecology & Hydrology, Bush Estate, Penicuik, Midlothian, EH26 0QB, UK (moha@ceh.ac.uk), (3) United States Department of Agriculture, National Sedimentation Laboratory, PO Box 1157, Oxford, MS 38655, USA (natasha.bankhead@ars.usda.gov)

This paper reports our research on physical engineering of river systems by *Sparganium erectum*, the most common emergent macrophyte in the UK, which has the potential to influence sediment retention, sediment stability and channel morphological change. After proposing a conceptual model of the ways in which this species may engineer river systems, preliminary observations of the model components are presented based on local to national scale investigations. These include the plants' hydraulic impact, resistance to uprooting and the protection it gives to the generally soft, silty sediments that it commonly retains.

Particular focus is given to the plants' biomechanical growth traits, which are thought to be significant in its ability to affect the aforementioned sedimentary processes. Amongst other results, seasonal changes in the depth and biomass of underground portions of the plant are presented, providing an indication of the extent and seasonality of its reinforcement of sediments.

Whilst the research is concerned with one particular species, the concepts are transferable to other macrophyte species and to their potential roles in modifying river channel form, particularly in low-energy river systems.