



## **The role of multifunctional Nature Based Solution zones in intensively managed agricultural systems: re-evaluating edge of field measures**

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Intensive agriculture has the potential to increase local runoff rates resulting in various environmental issues including unfavourable impacts on water quality, soil loss and flooding. Amongst catchment measures, Nature Based Solutions (NBS) appeal since they have the potential to enhance multiple ecosystem services if designed and positioned correctly. Whilst certain types of NBS measures have been implemented through EU rural development funding and catchment initiatives, progress remains slow in reducing catchment-wide agricultural diffuse pollution and storm runoff rates. There is a need to incorporate a greater range of technical advancements into our options for measures, develop evidence of effectiveness of individual and collective functioning at headwater scales, to demonstrate measures and generate guidance, placement and other decision support tools. This is necessary to achieve a role of NBS as part of multifunctional environmental zones that enhance the protection of watercourses through interruption of surface and subsurface runoff pathways, improve soil and watercourse ecological condition. Riparian and field margin buffers represent a space already taken commonly from fields and development areas. Within these existing areas, multifunctional NBS placement may substantially enhance the limited benefits of existing basic designs for water quality and ecology, to include wider climate change resilience and flood management benefits.

This presentation uses an overview of different integrated approaches to manage riparian and field margins (and where appropriate, artificial ditches and small channels) to demonstrate NBS concepts for delivering multifunctional benefits whilst still allowing landowners to farm the upslope landscape. We present the concept of 3-dimensional structural attributes of buffers that actively enhance natural processes of water and pollutant attenuation from rooting depths to the canopy. Through a review process and expert workshop, it was highlighted that woodland and soft engineered riparian zones can deliver the greatest number of enhanced multiple benefits compared to the passive traditional grassed buffer. To further highlight this, we present empirical evidence from two UK case study examples. Whilst these multifunctional soft engineered zones may have greater and enhanced multiple benefits, the acceptability and management by landowners remains a challenge that needs to be addressed. To help address this, we propose the use of novel GIS frameworks that can be used in an engagement process with landowners to suggest measure locations and footprints.