



Evaluating the potential of multi-purpose nature based solutions in peri-urban landscapes – a preliminary assessment

Josie Geris (1), Mark Wilkinson (2), Marc Stutter (2), Daniel Guenther (2), and Chris Soulsby (1)

(1) University of Aberdeen, Northern Rivers Institute, Geosciences, Aberdeen, United Kingdom (j.geris@abdn.ac.uk), (2) James Hutton Institute, Craigiebuckler, Aberdeen

Many communities across the world face the increasing challenge of balancing water quantity and quality protection and improvement with accommodating new growth and urban development. Urbanisation is typically associated with detrimental changes in water quality, sediment delivery, and effects on water storage and flow pathways (e.g. increases in flooding). Current mitigation solutions are typically based on isolated design strategies used at specific small scale sites and for storm water only. More holistic catchment scale approaches are urgently required to effectively manage the amount of water flows and protect the raw water quality in peri-urban landscapes.

This project aims to provide a better understanding of the connectivity between natural and managed flow pathways, storage, and biogeochemical processes in the peri-urban landscape to eventually aid a more integrated water quantity and quality control design. For an actively urbanising catchment in NE Scotland we seek to understand the spatio-temporal character of the natural flow pathways and associated water quality, and how these may be used to support the design of nature based solutions during urbanisation. We present preliminary findings from a dense and multiscale monitoring network that includes hydrometric, tracer (stable water isotopes) and water quality (turbidity (sediment), nitrate, phosphate) data during a range of contrasting hydroclimatological conditions and at different stages of the development of urban infrastructure. These demonstrate a highly variable nature, both temporally and spatially, with water quality dynamics out of sync with storm responses and depending on management practices. This highlights potential difficulties for managing water quantity and quality simultaneously at the catchment scale, and suggests that a treatment train approach may be required. Well-designed nature based solutions that tackle both water quantity and quality issues will require adaptability and a focus on the whole spectrum of the flow regime.