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NOTTINGHAM TRENT UNIVERSITY 

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the professions and society”*

**Nottingham Trent University, School of
Science & Technology, and the
Environment Agency
PhD Studentship –
2017/18 Entry**

Ecological responses to natural intermittence, abstraction pressures and flow restoration in chalk streams

Temporary rivers experience natural transitions between lotic, lentic, and terrestrial instream conditions. This dynamism makes effective assessment and enhancement of ecological quality a unique and pressing challenge in temporary river ecosystem management. This project represents an exciting opportunity to collaborate with leading researchers from academia and industry to address this challenge and to contribute to the rapidly expanding discipline of temporary river ecology. The PhD research will contribute to EU-wide and global initiatives seeking to improve characterization of temporary rivers and the biodiverse biota they support, and will inform the design and implementation of future ecosystem enhancement initiatives.

In the UK, temporary rivers include the iconic chalk streams of southern England. The high biodiversity of chalk stream invertebrate communities results in part from biotic shifts that occur in response to alternating wet and dry instream conditions. Aquatic taxa dominate during wet phases, and a terrestrial fauna colonizes during dry phases. In addition, a little-known 'seedbank' of freshwater invertebrates persists in damp sediments during dry phases, supporting aquatic community recovery after flow returns.

The natural environmental variability and consequent high biodiversity of temporary rivers is threatened by anthropogenic pressures: water abstraction, physical habitat modification, climate change, and land use change. In particular, over-abstraction affects UK chalk rivers, with habitat modification exacerbating the ecological impacts of flow reductions. The effects of these interacting pressures on chalk river communities are poorly understood, but there is evidence that the persistence of aquatic fauna including seedbank assemblages is threatened, reducing community resilience to flow variability.

To address these threats, restoration schemes combining abstraction reductions and habitat enhancements have been implemented in chalk rivers. Biomonitoring data collected during an extensive Environment Agency sampling campaign provides the opportunity to evaluate restoration projects and to identify effective practice. However, such biomonitoring remains restricted to wet phases, limiting the robust assessment of variation in ecological quality as temporary rivers transition between wet and dry states. Development of dry phase biomonitors is a research priority, with the potential of the aquatic seedbank and terrestrial invertebrates warranting detailed evaluation.

The PhD research will evaluate the effectiveness of flow and physical habitat restoration as a means of improving the ecological health of temporary rivers. This evaluation will be achieved by interrogating a 20-year Environment Agency data set comprising aquatic invertebrate community data, hydrological measurements and physical channel characteristics collected across six UK chalk rivers. The PhD project will also involve field experiments to relate terrestrial invertebrate and seedbank communities to instream and riparian environmental conditions. By characterizing the ability of these groups to distinguish between impacted and unimpacted conditions, this research will establish their potential to act as biomonitors of dry-phase ecological quality in temporary rivers.

Funding: The studentship will pay UK/EU fees and provide a maintenance stipend linked to the RCUK rate for up to three years.

Specific qualifications/subject areas required of the applicants for this project: Applicants are expected to be highly motivated individuals with strong academic research profiles, and in receipt of a UK first-class or 2:1 BSc Hons (or NARIC

equivalent) in ecology, environmental biology, physical geography, or a related discipline, plus research experience and/or a UK MSc or MRes with a minimum of a merit/commendation (or NARIC equivalent) in a relevant subject.

For informal discussion regarding the project, please contact:

rachel.stubbington@ntu.ac.uk