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of Glasgow

# Statistical Patterns in River Water Chemistry to Inform Environment Agency Monitoring Review

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## The Opportunity

Environment agencies invest a wealth of resource in monitoring river chemistry and biology in order to protect water quality and for compliance reporting for the Water Framework Directive. At the time of the project, the EA were undertaking a strategic review of its water quality monitoring sites.

## What was done to address the challenge?

As a proof of concept of the use of statistical approaches to re-designing the EA monitoring network, a large catchment in England, the River Trent, was selected as an exemplar. The statistical approaches proposed are scalable.

## What was the outcome?

EPSRC Impact Acceleration Account funding has been utilised to design and create 3 online web applications at UofG using advanced statistical approaches. Specifically, the online applications can be used by the EA to:

- identify detailed features of the data across the River Trent catchment, including sites where nutrient levels (for phosphorus and nitrogen) fall below the limit of detection and are missing at particular points in time;
- investigate patterns over time and across the river network for nutrients;
- identify monitoring sites on the river network where nutrient patterns are similar over time;
- identify monitoring sites which show the highest level of variation in nutrient patterns over time; and
- assess the impact on water quality predictions of reducing the number of monitoring locations.

The partnership has developed through funding from the EA, and collaborative work has been used to inform the design of a new spatially representative monitoring network, within practical and budgetary constraints. The work of the collaborative partnership formed the basis for a successful REF impact case study in REF 2021.

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