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An Environmental Virtual Observatory pilot (EVOp) for integrated catchment science – A framework for demonstrating national scale modelling of hydrology and biogeochemistry

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There are many challenges in developing effective and integrated catchment management solutions for hydrology and water quality issues. Such solutions should ideally build on current scientific evidence to inform policy makers and regulators and additionally allow stakeholders to take ownership of local and/or national issues, in effect bringing together 'communities of practice'. A strategy being piloted in the UK as the Environmental Virtual Observatory pilot (EVOp), funded by NERC, is to demonstrate the use of cyber-infrastructure and cloud computing resources to investigate better methods of linking data and models and to demonstrate scenario analysis for research, policy and operational needs. The research will provide new ways the scientific and stakeholder communities come together to exploit current environmental information, knowledge and experience in an open framework.

This paper presents the project scope and methodologies for the EVOp work dealing with national modelling of hydrology and macro-nutrient biogeochemistry. We evaluate the strategies needed to robustly benchmark our current predictive capability of these resources through ensemble modelling. We explore the use of catchment similarity concepts to understand if national monitoring programs can inform us about the behaviour of catchments. We discuss the challenges to applying these strategies in an open access and integrated framework and finally we consider the future for such virtual observatory platforms for improving the way we iteratively improve our understanding of catchment science.