



Natural
Environment
Research Council

Welcome



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Department
for Environment
Food & Rural Affairs

Understanding changes in quality of UK freshwaters

Tuesday 7th February 2023

Programme Background

Indication of a gap in knowledge and understanding reinforcing the need for further investment:

- Every English river failed to reach 'good ecological status' and the general ecological status of many lakes, streams and other freshwater systems across England, Wales and Northern Ireland are continuing to decline
- Historical knowledge and methods used to estimate surface run off, sub-surface flows, and the mobilisation of sediments and pollutants through the air and off the land into the water system are no longer as reliable due to changes in climate and other catchment changes.
- In the context of changing hydroclimatological and hydroecological processes, less research has been conducted on water quality, freshwater ecosystems, and river and groundwater temperature than on rainfall and river flow.

Programme Overview

- Investigate how chemical (and biological) contaminants enter, transform, and interact within freshwaters, and the ecosystems that they support.
- Investigate how the infiltration and movement of chemical substances (pollutants) will be amplified or mitigated by a changing hydrological cycle induced by climate change and other catchment changes, including interfaces between air and land with water.
- Support the improvement and development of tools to monitor and measure contamination
- Collaborate and engage with key stakeholders to develop management and mitigation strategies for improving or sustaining freshwater quality in the UK.



Programme Themes

The overarching programme will enable transformative research in three thematic areas:

1. Better understanding of the sources and processes by which pollutants are entering, mixing, being transported through and leaving freshwater systems
2. Investigating the impact of mixtures of chemical (and biological) contaminants and their exposure regimes on the quality, ecology and biodiversity of UK freshwater ecosystems
3. Enabling and informing the development of better plans for adaptation, mitigation and detection of risks for key stakeholders, now and in the future

Programme Aims

- The programme will address multiple and interacting stressors as well as consider catchment-wide flows and dynamics
- This interdisciplinary programme will bring together relevant experts from environmental science and other relevant disciplines and sectors in the UK
- Collaborations will include steer from UK Government, devolved administrations, policy, regulators, and industry to ensure that they enable sustained change and long-term benefits. Projects have work closely with relevant stakeholders during the design phase and will continue throughout the lifespan of the project.



Delivery and coordination

- The total Budget for this programme was £8.4m (including funding from our project partner, Defra) with 5 projects being awarded.
- Proposals will run for up to 48 months having started on the 01 November 2022.
- Programme Champions have been appointed to provide a coordination function to bring together researchers, practitioners and policymakers and to ensure effective delivery of the programme.
- NERC has appointed a Programme Advisory Group (PAG) who will advise the programme champions and grant holders.
- The PAG includes representatives from: Defra, DAERA, Environment Agency, JNCC, Natural England, NFU, NRW, National Trust, UKWIR, Cardiff University, Lancaster University, University of Edinburgh, University of Reading

NERC investments

India-UK Water Quality

Budget: £3.6m from Natural Environment Research Council (NERC) and Engineering and Physical Sciences Research Council (EPSRC) through the Newton Fund with equivalent funding from India's Department of Science and Technology

Duration: 2018 – 2022

Partners: NERC, EPSRC, India's Department of Science and Technology (DST)

This India-UK collaboration supported research focused on improving water quality by providing a better understanding of the sources and fate of different pollutants and by supporting the development of management strategies and technologies to reduce pollution levels.

The programme aimed to provide policymakers, regulators, business and local communities, with information and solutions to tackle water quality issues and secure the provision of clean water, rejuvenate rivers, and restore ecosystems

Scope:

- Improving our ability to determine the presence of pollutants in water courses.
- Understanding of the transport, transformation, interactions and fate of pollutants, including both established and emerging contaminants.
- Developing novel approaches to reduce or prevent pollution at source



NERC investments

Emerging Risks of Chemicals in the Environment (ERCITE)

Budget: £6m

Duration: 2018 – 2023

Partners: Natural Environment Research Council (NERC)

ERCITE aims to conduct research to predict how the environment and its functioning will respond to chemical exposure that regulators or industry are currently facing or might face in the future in the UK and concerning chemicals whose environmental impacts have yet to be explored. The anticipated high level outcome is a transformation in the way chemical risk assessment is considered; to move towards an ecosystems approach with greater ecological relevance.

This research programme will deliver fundamental process understanding underpinning chemical behaviour and impact in the environment and a predictive capability to support chemicals management, in three interlinked research questions:

- What are the impacts of chemicals on populations, ecosystems and ecosystem services?
- What are the risks from chemical mixtures?
- How important are chemical stressors in relation to other stressors?

NERC investments

Ecotoxicological Risk Assessment Towards Sustainable Chemical Use (ECORISC) NERC CDT

Budget: up to £2.2m

Duration: 2021 - 2027

Partners: Natural Environment Research Council (NERC)

The centre combines mechanistic understanding, theoretical advances and modelling approaches to contribute to the development of predictive risk assessment frameworks that will allow society to benefit from chemical use while ensuring protection of the natural environment, now and in the future.

The CDT includes training in the following areas:

- detection, fate, transport and uptake of chemicals in the natural environment
- development of mechanistic understanding of the integrative effects of chemicals on individuals
- extrapolation of effects measured on individuals to impacts on populations and communities, and the ecosystem services they provide
- effects of chemical mixtures, including in combination with other environmental stressors
- landscape-scale risk assessment across different spatial and temporal scales
- translation of environmental risk science into practice.



NERC investments

Hydro-JULES

Budget: £6 million (NERC-funded National Capability research activity; not open call)

Duration: 2017 to 2022

Partners: Led by UK Centre for Ecology and Hydrology (UKCEH) in partnership with the British Geological Survey (BGS) and National Centre for Atmospheric Science (NCAS)



This project aims to build a 3-D community model of the terrestrial water cycle to underpin hydrological research in the UK, and support and enable collaborative work across the research and academic community.

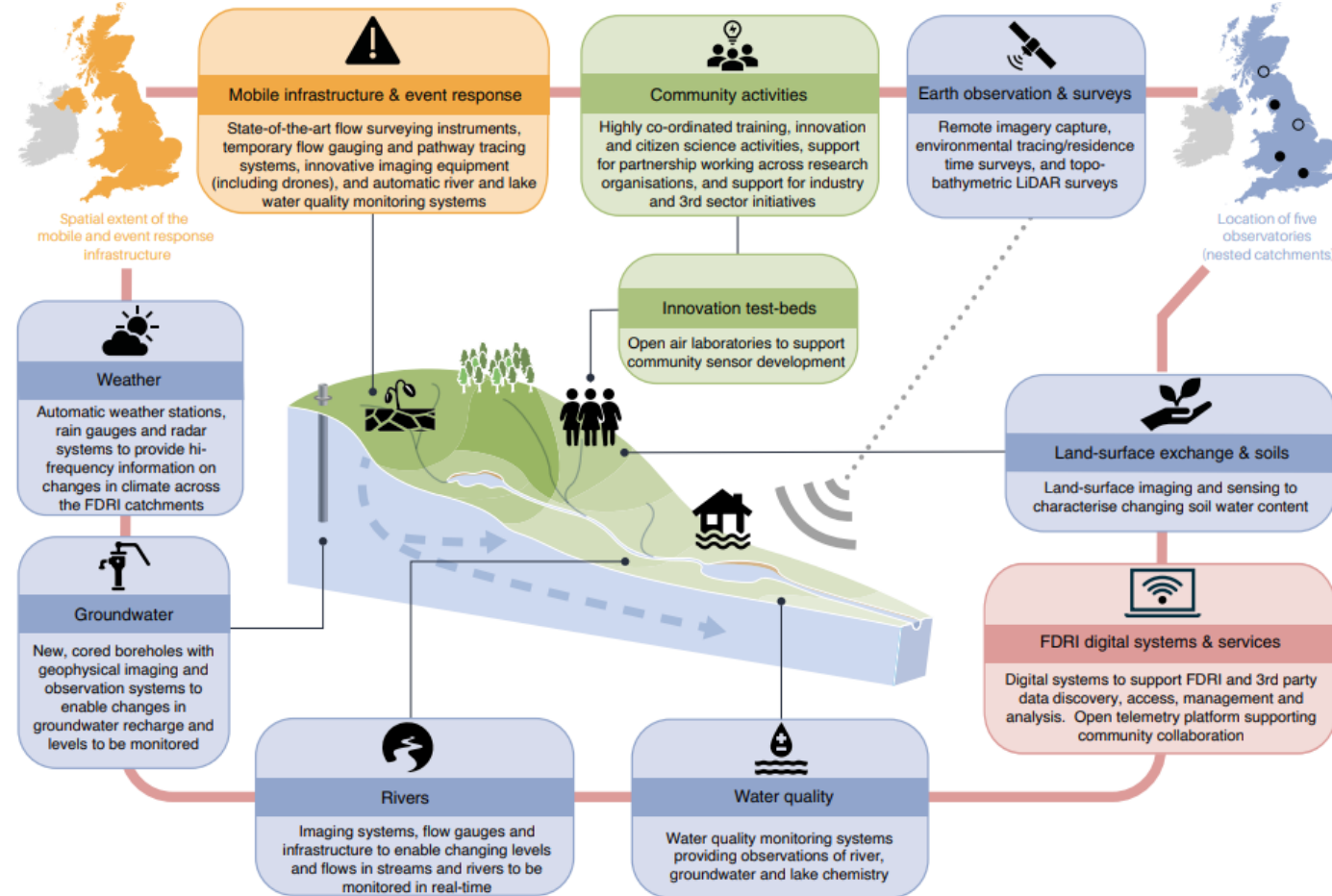
It will:

- address important science questions in the fields of hydrology, land-atmosphere feedbacks, carbon and nutrient cycles, data science and integration with novel instrumentation and Earth observation technologies;
- quantify the risks of hydro-climatic extremes (e.g., floods and drought) in a changing environment to support long-range planning and policy decisions;
- improve hydrological forecasting using new sensors and modelling technology.

NERC investments

Floods and Droughts Research Infrastructure (FDRI)

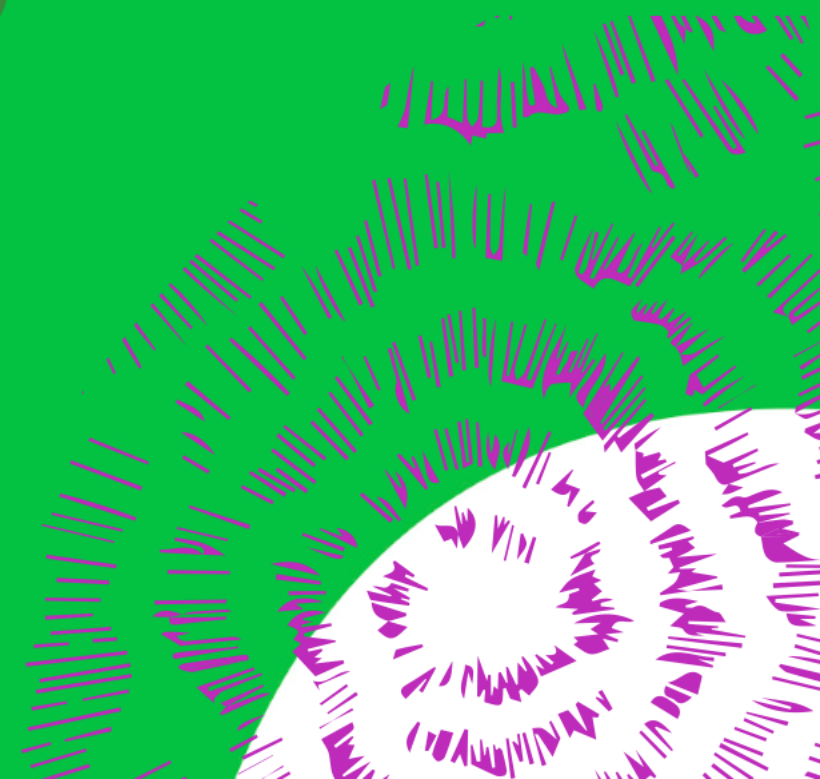
- £38m has been pledged by the UKRI Infrastructure Fund for this scoped investment (business case pending)
- FDRI will facilitate the hydrological science and innovation needed to make the UK more adaptable and resilient to floods and droughts. It will include urgently needed UK-wide deployments of instruments for observing our water environment, novel digital solutions to support data use, and testbeds for technological innovations. FDRI will ensure that the UK continues to provide global leadership for hydrological research and innovation, driving solutions worldwide.





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Questions?





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Thank you



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