

# Safeguarding and Improving Raw Water Quality by Increasing Catchment Resilience



The Scottish Government

Hydro Nation Scholars Programme



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## Background

Water resources and freshwater ecosystems are subject to multiple pressures. Many are at risk of being functionally compromised, leading to a loss of ecosystem services, including the supply of clean water.

An integrated catchment resilience approach emphasizes protecting and enhancing source areas, rather than treating the effects of pollution. This includes:

- ❖ Reinstating the functionality of ecosystems to improve their ability for water purification
- ❖ Restoring ecosystems to enhance their buffering role, especially during extreme events
- ❖ Identifying and disconnecting pollution sources
- ❖ Enhancing ecosystem capability to respond to change, particularly the effects of land use and climate change

So how can this approach efficiently contribute to ensuring long-term delivery of the multiple benefits from water?

## Examples of pressures on catchments and their effects on water quality



Arable agricultural ecosystems are associated with sediment and nutrient runoff, leading to nitrate, phosphate and pesticide pollution of water sources.

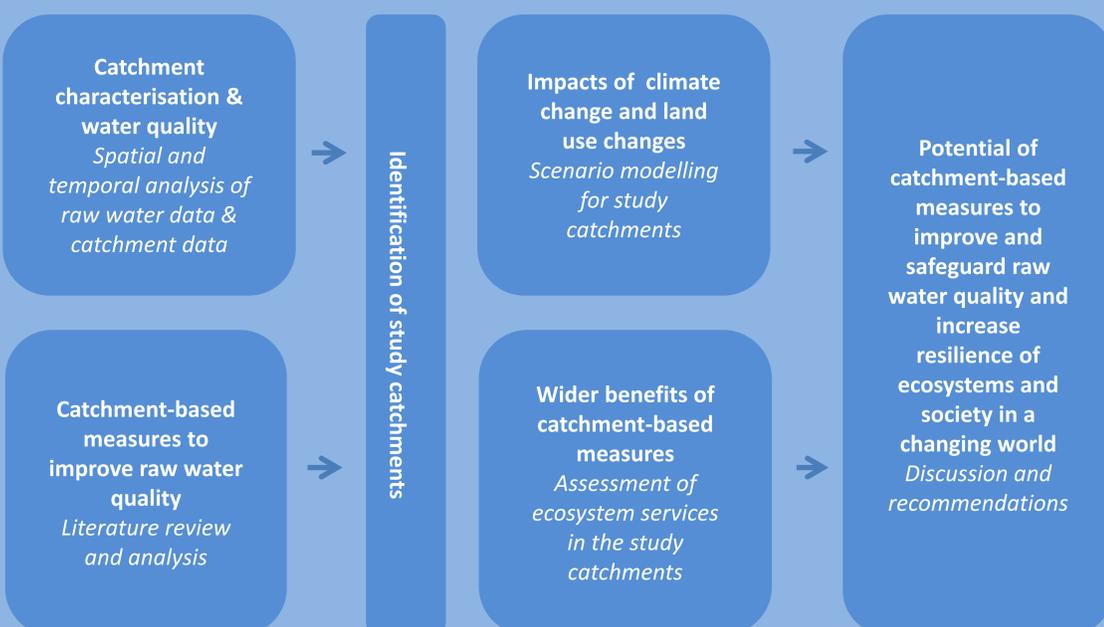


Pastoral agricultural ecosystems, especially where livestock has direct access to water courses, are often associated with faecal pollution of water, including pathogens such as *E. coli*.



Upland land management practices can impact on water quality; moorland vegetation burning may increase discolouration of surface water from dissolved organic carbon, also impacting on the smell and taste of water.

## Project outline



## Impact

- ❖ Stronger evidence and understanding for links between hydrological processes, ecosystem functions, landscape patterns and land use.
- ❖ Practical guidance to maximise the effect of catchment-based management measures on water quality and other ecosystem services.
- ❖ Estimation of the value catchment-based management measures can add now and in the future.
- ❖ Increased resilience to change by strategically protecting raw water quality at the source.

## Contribution to Hydro Nation

- Sustainable use of water resources: reducing water treatment costs while achieving multiple benefits
- Recognition as water leaders: exemplary for a catchment approach and upstream thinking
- Research with international impact through transferability and practical application

Supervisors: John Rowan (University of Dundee), Iain Brown (James Hutton Institute)  
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