

# Understanding the Wye catchment: project update

August 2024

The Wye Catchment Partnership (WCP) is creating a new catchment management plan to restore the health of the River Wye. To support the creation of the plan the Environment Agency funded Mott MacDonald to coordinate a project with the WCP called "Understanding the Wye Catchment". The project published its [main report](#) in July 2024 and this note provides an overview of the method and findings. The project had two main parts of its systems approach. This is the first time this systems method has been used with a catchment partnership in England.

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## Bring people together to understand the catchment

Local experts came together to share understandings of the issues, opportunities and trade-offs in the catchment. The aim was to build consensus on how the catchment works as a whole system and to map connections, dependencies and trade-offs.

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## Identify potential interventions and assess their impact

The impact and scale of different potential catchment interventions were quantified using numerical modelling.

### System mapping

Participatory system mapping is a means of gathering and collating insights from a wide range of catchment experts. The maps hold pooled knowledge and can be used to provide insight to inform the new catchment plan.

### Numerical modelling

The project used a numerical model developed and set up for the Wye Catchment by Imperial College London. The Water System Integrated Model (WSIMOD) was used to understand the impact of potential interventions on the River Wye.



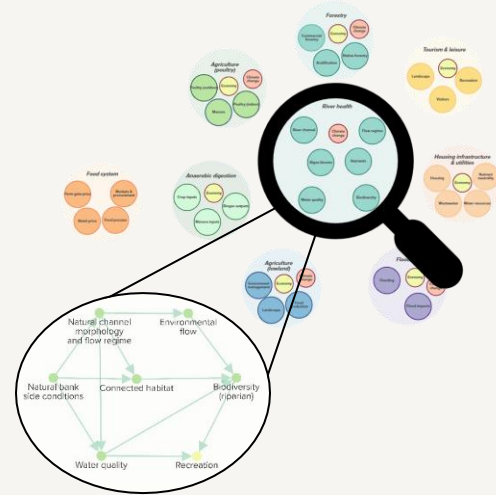
# Phase 1: Pooling insights with a system map

## Bringing people together Participatory system mapping

To create a shared understanding of the catchment we held 11 online focus groups and an in-person workshop to talk through different aspects of how the catchment works.

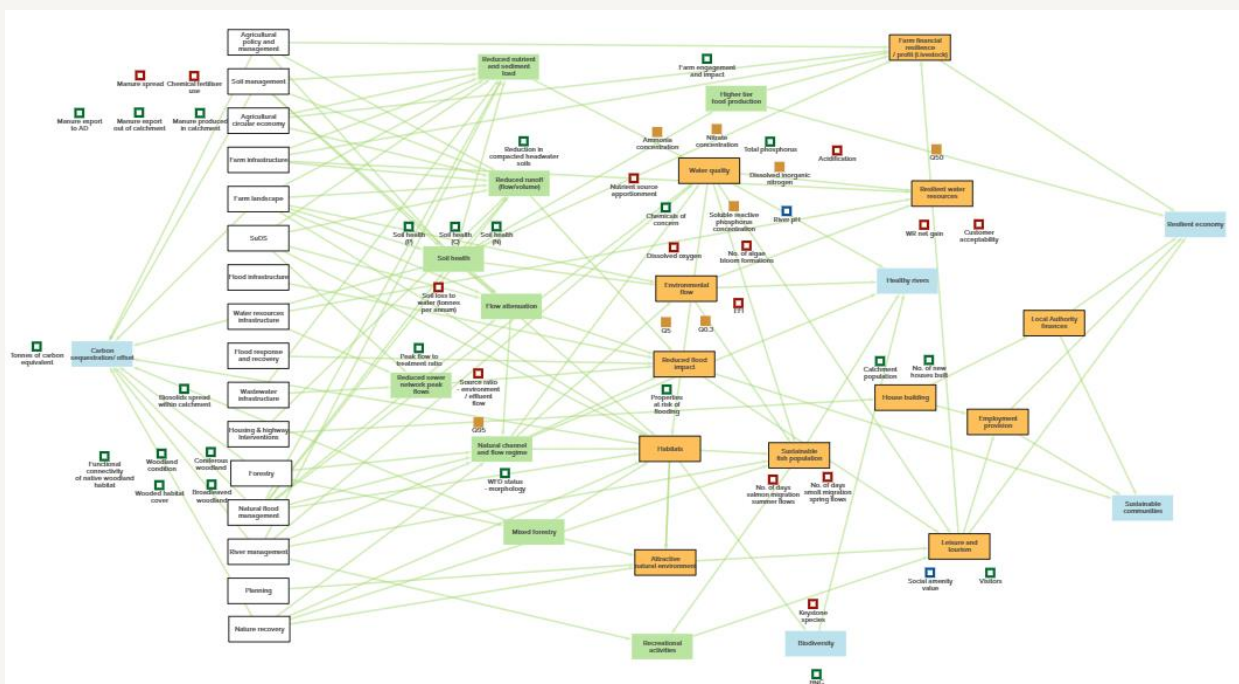
The catchment system map, co-created by a total of 45 local experts, showed how different activities such as agriculture, housing and tourism interacted with each other via their influence on the river.

We used the insights from system mapping to identify what interventions could be made and how the results would combine to create overall improvements across the catchment as shown in the planning diagram below.



## The catchment system map and planning diagram

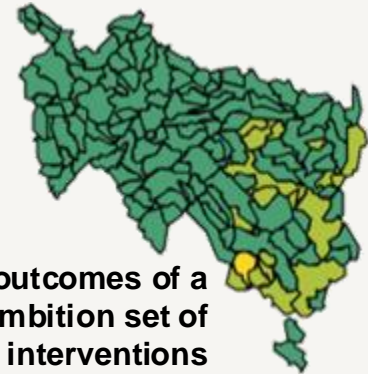
The catchment system map above and the planning diagram below can be found on the Wye catchment partnership website and are discussed in the project report.



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# Phase 2: Modelling the options

The WSIMOD model assesses water quality and river flows at the water body scale. It provides a wide-angle lens on how the catchment responds to changes. During the modelling we included for a future scenario of population growth and climate change, and then potential interventions also applied. The outcomes on the right require a high level of ambition across a range of interventions.



**Modelling outcomes of a high ambition set of catchment interventions**

We investigated five different types of intervention in the catchment:

1. Increase in tree cover in the catchment.
2. Decrease in manure and fertiliser application rates in the catchment.
3. Wastewater Treatment Works (WwTW) upgrades.
4. Improvements to soil permeability in the catchment.
5. Decrease in soil permeability (as a risk rather than an opportunity).

These 5 changes were also run in combination with each other under lower magnitude (lower ambition) and higher magnitude (higher ambition) combinations. Results from the modelling can be grouped into impacts on water quality and river flow, a summary is given below and more details including quantification of results are in the final project report.

## **Water Quality**

### **Modelling results**

**Reducing manure and fertiliser application** across the catchment results in the most significant water quality improvements.

**Improving soil health** at large-scale with a focus on increasing infiltration has a large impact on improving water quality.

**Increasing tree cover** will improve water quality with increased cover leading to increased water quality improvements.

**Upgrading WwTWs** will improve water quality, particularly in the lower Wye.

## **River Flow**

### **Modelling results**

**Improving soil health** by increasing infiltration rates, particularly in the upper catchment, has a positive impact on both high and low flows.

**Reducing soil infiltration** rates (e.g., through increased soil compaction) has a significant adverse impact on river flows, with worsened low flow events.

**Tree cover** had a smaller impact on flows within the modelling results than expected and this requires further investigation.

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# Outcome and next steps

## Outcome

This project brought together experts with diverse views on the Wye Catchment and created a good shared understanding of the challenges and opportunities in the catchment. The combination of working together on the shared conceptual understanding backed up with numerical assessment creates a good basis for collaborative planning. The current environmental condition of the river demands an ambitious response to restore the river to good health.

## Taking it forward

The tools developed in this project have ongoing use.

- The system maps and metrics can be used to keep track of what the catchment plan will measure and why.
- The system maps can be used to show who is involved and who has responsibility in different parts of the catchment plan, and how other plans are related.
- The numerical model can be used to quantify more impacts and combinations of interventions.
- As more data is collected, the numerical model can be revised and refined.

## For more information and the project report see:

<https://wyecatchmentpartnership.org/>

