Introduction to rivers & catchment science

A bioregional and systems approach for river enthusiasts

Course overview:

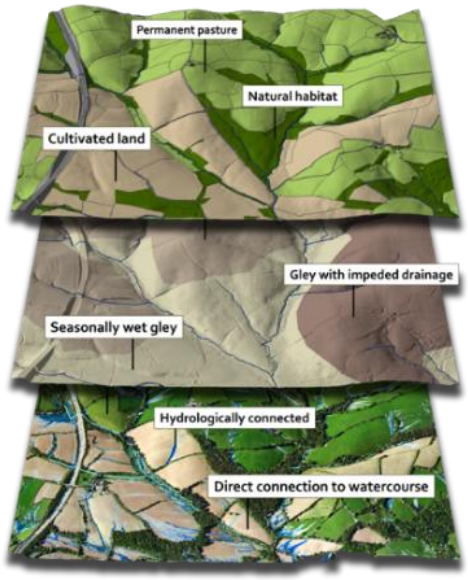
Rivers are not just channels of water – they are living systems shaped by geology, rainfall, soil, land use, infrastructure, culture and human management. They connect uplands to estuaries, farms to towns, and people to place.

This six-session online course offers a grounded introduction to river and catchment science, framed through systems thinking and a bioregional lens.

It is designed for river enthusiasts, citizen scientists, community groups and regenerative practitioners who see rivers as a powerful entry point into understanding how landscapes function and how they can be restored.

During the course, participants will explore:

- How natural and human water systems interact
- What determines the health (or dysfunction) of a river
- How to diagnose problems using 'source-pathway-receptor' thinking
- How monitoring and evidence can guide restoration action
- What river and water restoration, regeneration and stewardship look like in practice



Schedule: Spring 2026

Six 90-minute online sessions from 18:00-19:30 held fortnightly from Wednesday 11th March 2026.

-> Session 2 from 18:00-19:30 on 25th March 2026.

1-day fieldtrip in Devon in May/June (TBC)

The course combines scientific foundations (hydrology, ecology, hydrogeomorphology, water chemistry) with discussion, reflection and real-world case studies. Field visits at the end of the course will ground learning in real world situations and landscapes.

By the end, participants will not only understand rivers more deeply, but they will also be better equipped to participate meaningfully in their protection and regeneration.

Learning outcomes:

By the end of the course participants will:

1. Understand rivers as **integrated social–ecological systems** operating at catchment scale.
2. Recognise how land use, infrastructure, governance and climate interact to **shape river health**.
3. Be able to **assess river condition** using ecological, hydrological, geomorphological and chemical indicators.
4. Apply **source–pathway–receptor** thinking to diagnose water quality problems.
5. Understand the roles of **monitoring, modelling and data in targeting interventions**.
6. Identify **practical restoration**, nature-based and governance approaches that support resilient and regenerative river systems.
7. Develop a clearer sense of their own role as **river stewards** within a bioregion

The aim is for the course content to be tailored to the specific learning goals of the target audience. Field trips and practical activities will also be tailored to the local environments of the participants to ensure learning is context specific and relevant.

Online session will be interactive to encourage mutual learning and will include practical exercises, discussions or mini workshops to reinforce learning. Participants will be encouraged to share their own experiences and insights.

Course programme:

1: What is a river? Seeing the system

Framing the river as a social–ecological system

- What is a river? Channel, process, habitat, cultural entity?
- What is a catchment and why scale matters
- The natural water cycle
- The human water system (drinking water, wastewater, land drainage, abstraction)
- How natural and human systems interact
- Walking by the river in 1750, 1950 and today – what's changed?

Systems lens: Feedback loops, flows, interdependencies

Bioregional lens: Rivers as organising features of place-based systems

2: How rivers work – flow, form & life

Understanding the foundations of river health

- Hydrology: rainfall, runoff, groundwater and soil hydraulics
- Hydrogeomorphology: banks, beds and sediment processes
- Ecology and aquatic biodiversity
- Functions and ecosystem services
- Hydrological response in wet and dry conditions
- What makes a river resilient?

Regenerative lens: Working with natural processes rather than against them

3: Water quality & river health

Diagnosing the causes of dysfunction

- Source-Pathway-Receptor explained
- Types of pollution: point and diffuse
- Nutrients, sediments, pathogens and emerging pollutants
- River 'epidemiology' - symptoms vs causes
- WFD classification and its strengths/limitations
- Using monitoring intelligently (design, bias, error, uncertainty)

Systems lens: Upstream-downstream connections

Critical thinking lens: What data reveals and what it obscures

4: Human pressures & governance

Putting urban and rural impacts in context

- Agriculture, soil management and diffuse pollution
- Urban drainage, wastewater and infrastructure
- Abstraction, drought and flooding
- Climate change and shifting hydrological regimes
- Governance: who is responsible for what?
- From OECD water governance principles to local river charters

Bioregional lens: Accountability at catchment scale

5: Restoration, regeneration & NBS

Moving from risk mitigation to regeneration

- Removing anthropogenic pressures
- River restoration and re-naturalisation
- Nature-based solutions (NFM, wetlands, SUDS, WSUD, soil restoration)
- The role of soil as a key hydrological regulator
- Partnerships and collaborative catchment approaches
- Citizenship, stewardship and citizen science

Regenerative lens: What does a thriving co-evolving river system look like?

6: Future rivers – scenarios & horizons

Trajectories of change and storying the future

- Post-industrial recovery vs modern pressures
- Climate adaptation and resilience
- What does a 'regenerative river' look like in 2050?
- Alternative futures for rivers in a bioregion
- Where do enthusiasts and practitioners fit in?
- Forecasting the future for rivers at the science-policy-practice interface

Regenerative lens: Imaging a walk by the river in 2050 - what do we notice?

Field Trip: Optional

Learning to read a river

- Observe flow, form and habitat
- Identify pressures and pathways
- Practice rapid diagnostic thinking
- Examine restoration interventions *in situ*
- *Reflect on place, stewardship and identity*

Resources & further reading

Course participants will have access to a cohort-exclusive **online space** where they can meet and exchange information with their fellow trainees.

Via this collaborative space, they also be given access to a broad library of supporting resources that includes case studies, relevant literature, guidance and online resources that will help them to deepen their understanding.

Participants will also be signposted to opportunities for further learning or ongoing professional development. Additional more advanced or specific training sessions are also being developed, which will be offered to course participants as a priority.

Registration

If you would like to register for the course, you can do so by clicking this link.

https://www.zeffy.com/en-GB/ticketing/introduction-to-rivers-and-catchment-science

The cost of the full 6-session (90 minutes each) and optional attendance at 1-day field trip in South Devon is:

- **£60** – Volunteers and community group members
- **£120** – Professionals and practitioners

Places are limited to maintain an interactive learning environment.

Meet the trainer:

Nick Paling is a systems practitioner who uses rivers as an entry point into understanding whole landscapes. For over two decades he has worked on river restoration, water governance and catchment management across the UK, supporting collaboration between communities, land managers, regulators and utilities.

Originally trained as a scientist, Nick now focuses on helping people see patterns in how soil, water, infrastructure, land use and governance interact at catchment scale. As co-lead of the Bioregional Learning Centre in South Devon, he works to build local capacity for regenerative, place-based practice.

Nick believes rivers make systems visible. His teaching style is practical, participatory and grounded in real-world experience, helping others develop the confidence to steward the rivers of their own bioregions.

https://www.linkedin.com/in/nick-paling/