



Four Rivers for LIFE project

Four Rivers for LIFE is a large-scale river restoration project to improve the condition of four major rivers in south Wales: Teifi, Cleddau, Tywi and Usk. These four rivers are classed as [Special Areas of Conservation \(SAC\)](#) which means they are of international importance for their wildlife and plants such as Atlantic salmon, lamprey, shad, otter and water crow-foot. All four rivers are currently in an unfavourable condition as a result of multiple pressures such as climate change, habitat degradation, water quality, migration barriers and invasive non-native species. A total of 776km of river will be improved in mid and south Wales as the project aims to restore the rivers to a better condition.

Description

The rivers support several habitats and species from bogs and floodplains to fish, otter, freshwater pearl mussel and floating water plantain. These habitats and species are all threatened, and some are at risk of disappearing in Wales. The project will use long term nature-based solutions to improve the ecological quality of the four rivers such as, improving accessibility for migratory fish, improving habitat structure and function, and improving water quality.

Working with partner organisations, farmers, landowners, local communities and contractors the project aims to:

- Improve conditions for salmon, lamprey, shad, bullhead and other fish populations that have declined drastically in recent years.
- Remove constraints to fish migration – improve fish passage at 12 sites, addressing in-river barriers such as weirs and other structures.
- Re-naturalise rivers and restore natural processes – boulder, woody material and gravel re-introduction. Re-meandering, and floodplain reconnection along 5km of river and restoration of freshwater and wetland habitats on 136 hectares of floodplain. (*This aspect of the project is described in more detail in the below Case Study*).
- Planting 50,000 native trees (supplied by the Woodland Trust) along river banks to create habitat, increase shading and establish buffer strips with 100km of fencing, with associated water quality and bank stability benefits.
- Reduce the impact of invasive non-native species such as Himalayan balsam, American skunk cabbage, Japanese knotweed and giant hogweed. Trialling Rust Fungus on 8 sites to reduce Himalayan balsam, and working with contractors and volunteers to significantly reduce coverage in 15 sub-catchments.
- Improve land management practices – reducing nutrients and sediment inputs from

agricultural land by working with farmers and landowners to promote best practice farming techniques with the aim of engaging 350 farms.

- Habitat improvement over 15km for the critically endangered Freshwater Pearl Mussel.

The project will work closely with the River Restoration Centre (RRC – an Associated Beneficiary), and the European River Restoration Centre (ECRR) across Europe, in order to facilitate knowledge transfer and dissemination from the project.

The project is led by Natural Resources Wales in partnership with the [Brecon Beacons National Park Authority](#), [River Restoration Centre](#), [Agricultural Research Centre Coleg Sir Gâr](#) and [Woodland Trust](#). The project was established in 2021 and is planned for completion in December 2026. Funding totalling £9 million for the Four Rivers for LIFE Project has been given to Natural Resources Wales from an [EU LIFE programme grant](#), with support from Welsh Government and Dŵr Cymru/Welsh Water (LIFE20/NAT/UK/000100).

Case study: Re-establishing natural processes by introducing large wood into the Tarell River, part of the Usk River SAC

Tarell River (Usk River SAC)	High energy, gravel/cobble/boulder
Location	Libanus, Powys, Wales, UK
WFD mitigation measure	N/A
Waterbody ID	GB109056033070
Designation	SAC
Project specific monitoring	Morphology, substrate transport/characteristics, fish, macroinvertebrates.
Date of works	Autumn 2024
Length	600 metres
Cost	£18,000



The Tarell River is a high energy, predominantly gravel, cobble, boulder-bed stream, which runs for approximately 13km from its source in the Brecon Beacons to its confluence with the Usk River near Brecon. Much of the upper part of the Tarell River catchment is under National Trust ownership as the river flows through land owned by the orgnaistaion at Ty Mawr Farm.

Ty Mawr Farm, at the heart of the Bannau Brycheiniog National Park, is on a journey to re-naturalise the land from agricultural use to one connected to its natural environment and surroundings. The National Trust have expressed an ambition of using Ty Mawr Farm to demonstrate what can be achieved for nature whilst still farming productively. This approach ties in with their new 10 year strategy, [People and Nature Thriving](#), which sets out an increased focus on tackling the nature crisis, on its own land and through partnership working. After a previous farming tenancy expired in December 2023, the National Trust took back management of the site with the aim of reducing agricultural pressures and restoring conservation management to much of the valley.

Background

Intensive management of the thin margin of riparian woodland and flood maintenance activities have left the river depleted of dead wood and lacking habitat diversity. The lack of instream wood and associated dynamism meant much of the gravel substrate had become stable and consolidated, reducing suitability for fish spawning.

Gravel supply in this catchment is also limited by road infrastructure associated with A470. A dense single line of trees along both banks limited lateral mobility of the channel, which had become incised and disconnected from its floodplain. There were also artificial embankments present, which further reduced floodplain connectivity.

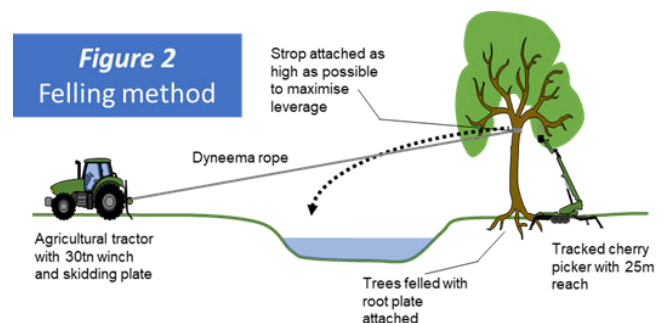
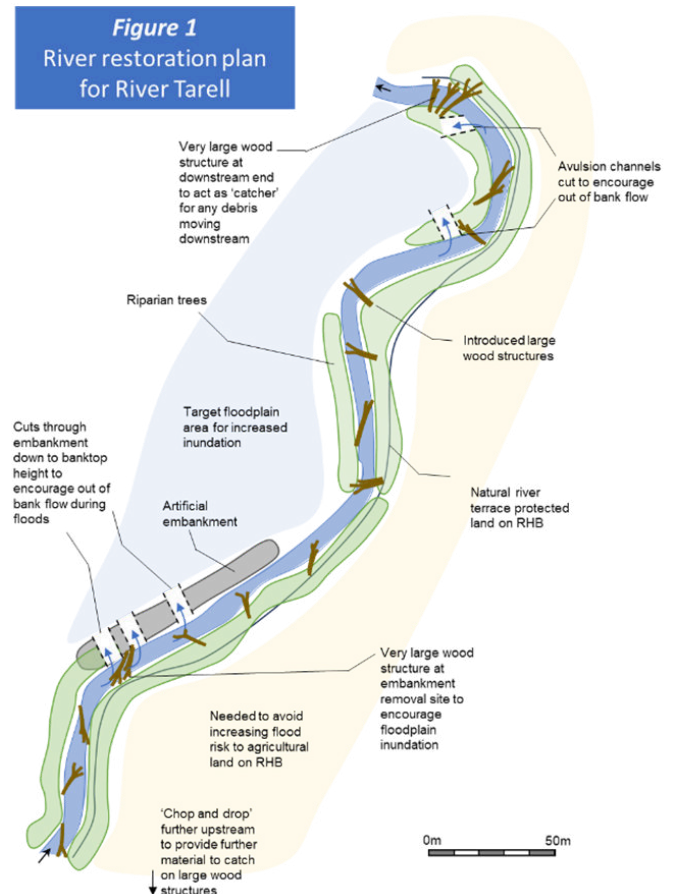
In collaboration with the River Restoration Centre, Natural Resources Wales's Four Rivers for LIFE project produced a river restoration plan. The aims of this plan was to improve river habitat by substantially increasing the amount of in-channel large wood to reestablish natural processes, raise bed levels and improve lateral connectivity. Embankment removal was also recommended aimed to increase floodplain inundation rates with floodplain habitat and flood benefits.

Design

The works targeted a stretch of the Tarell where there was a relatively low area of floodplain on the left hand bank (LHB) and agricultural land on the right hand bank (RHB) was protected by a natural river terrace (Figure 1). Fourteen large wood structures were placed every 30–50 metres (approx. 5–7 river widths) at locations where they would have the greatest habitat benefits and maximised chances of out of bank flow on LHB.

Due to potential flood risk downstream, the large wood structures were designed to be immobile. Riparian trees at least two times river width in length were selected. Trees were winched over with root plates attached (Figure 2) and were keyed into other live bankside trees to minimise

the chances of them being mobilised during large floods. No tethers, anchors or other artificial methods of fixing trees were used. 'Chop and drop' was undertaken further upstream to provide further structure as the finer material catches on the larger less mobile structures.



In addition to the large wood structures, several cuts were made in the artificial embankment to encourage floodplain inundation during high flows. Two avulsion channels were also created towards the downstream end of the floodplain to encourage the formation of secondary flow channels.



FIGURE 3 *Example of newly created large wood structure. © NRW*



FIGURE 4 *Embankment removal and large wood structure behind. © NRW*

Lessons learnt

- Check valley cross sectional profile first – only suitable if flood risk to property is low.
- Utilise on-site trees wherever possible.
- Go big – need large trees in high energy environments.
- Winching over is safer than pushing with excavator.
- Don't worry too much about exact placement – wood structures will settle into place.
- Get as much structure of the trees in contact with bed as possible.
- Avoid fixing (wire, anchors etc.) if possible.
- Ensure you have competent and experienced contractors.

After **only three months** the benefits of the restoration scheme was evident. Localised areas of erosion and deposition are starting to appear around the large wood structures. Newly worked areas of gravel have appeared, directly associated with the introduction of the wood. Several high flow events have happened since

the works in Autumn 2024 and large areas of the floodplain have been inundated with water where they would not have been pre-works. There is also evidence of some secondary channels starting to form at the avulsion channels.

Despite some fairly extreme wet weather events (Storm Bert and Storm Darragh), no flooding has been caused to agricultural land on RHB and none of the large wood structures have moved significantly.



FIGURE 5 *New mid-channel gravel bar created downstream of a large wood structure. © NRW*

Monitoring & Future work

Monitoring the pre-works and post-works condition of the stretch has been captured using RHS and Morph surveys, electrofishing surveys, macroinvertebrate sampling and REDOX testing to assess interstitial flow through gravels. The large wood structures have been fitted with PIT tags and movements will be monitored. Drone footage and trail cams are also being used to monitor changes.

Future work:

- Phase 2 is planned for late summer 2025.
- Monitoring of the site will continue until the end of the Four Rivers for LIFE project in December 2026.



FIGURE 6 Post-works floodplain inundation during high flows. © NRW

For more information: [Natural Resources Wales / Four Rivers for LIFE](https://naturalresourceswales.gov.uk/four-rivers-for-life), or to contact a member of the team 4RiversforLIFE@naturalresourceswales.gov.uk.

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