Exmoor Mires peatland restoration, UK

Year of issue

2025

Summary

The Exmoor Mires project is part of a wider Upstream Thinking programme initiated by the local water company South West Water (SWW) to use land management to tackle problems of water quality and quantity across South-west England. The benefit to SWW is in potentially reducing the costs of water treatment. Demonstration of success will allow SWW to approach the regulator (OFWAT) for permission to develop PES schemes to deliver these benefits in future. The Exmoor Mires project involves peatland restoration through blocking historic drainage ditches with a target of restoring 2000 ha by 2015. The primary benefits of the project have been to reduce runoff (32%) and increase water storage (additional 364 m3/ha). The success of the project has been aided by the land ownership and public engagement by the Exmoor National Park Authority and support from other public agencies and research from universities.

Photo Gallery



Location

51.129, -3.757

Project

NWRM

National ID

UK_04

Sector

Hydromorphology

Installation Date

2006-ongoing

Implementation status

Ongoing

Contact

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Overview

Location of the project

The Exmoor Mires project is located in Exmoor National Park, Somerset, mainly on upland blanket bogs near Simonsbath, Wheddon Cross, and Exe Head. Key restoration sites include Hoar Oak, Chains Barrow, Blackpitts, and Furzehill Common. Areas are near minor roads like B3223 and B3358 but are largely remote moorlands in river headwaters.

Country

United Kingdom

NUTS2 Code

Dorset and Somerset

Sponge measures implemented in the case study

Wetland restoration and management

Objectives

Restore 2,500 hectares of peatland by 2020.
Achieve a 30% reduction in peak flow rates in restored areas.
Increase water retention capacity by 20% in targeted sites.

Involved partners

Authority type	Authority name	Authority role	Comments	Authority responsibility

Regional / sub-national water authority	South West Water	Financing	SWW is a private sector water company covering the South West of England. Its role has been to finance the project.	Responsible
Nature park	Exmoor National Park Authority	Implementation	ENPA is a land owner within the National Park including project sites. ENPA is responsible for delivery of the project with funding from SWW	Responsible
National water authority	Natural England	Determination of design details of the measure	NE is the national agency responsible for agri-environment funding and advice. Their role in this project is to fund captial works through agri-environment scheme measures	—
Other	English Heritage	Determination of design details of the measure	EH will provide advice on matters relating to the historic environment and provide project steering	Supporting
National water authority	Environment Agency	Monitoring	The EA will provide hydrological data and analysis and has a role project steering	Supporting
Research institute / University	University of Exeter	Monitoring	UoE is providing research and monitoring of hydrological and GHG impacts together with UoB and EA	Supporting
Research institute / University	University of Bristol	Monitoring	UoB is providing research and monitoring of hydrological and GHG impacts together with UoE and EA	Supporting

Site Information

Climate Zone

Cool temperate moist

Precipitation

1581.00 mm

Temperature (°C)

8.00 °C

Runoff

1327.00 mm

Runoff coefficient

0.84

Elevation range

420 m

Vegetation class

The area is characterized by blanket bog vegetation, including species such as Sphagnum mosses and cotton grass, indicative of wetter conditions.

WFD Ecological status

Good

WFD Chemical status

Good

Water quality status

Prior to restoration, the peatlands were degraded due to historical drainage, leading to increased runoff and potential water quality issues.

Design and Implementation

Project scale

Meso

Project scale specifications

Work spans multiple Exmoor headwaters (e.g., Exe headwaters/The Chains), with ~3,000 ha restored by 2020 and ongoing regional programme (SWPP) across several moors

Project area

> 2,000

Basis of design

The restoration measures are designed to handle typical rainfall events in the region, aiming to restore natural hydrological regimes rather than targeting specific storm events.

Principles

The project is grounded in principles of ecosystem restoration, aiming to re-establish natural hydrological functions, enhance biodiversity, and contribute to climate change mitigation through carbon sequestration.

Constraints

Challenges include the site's steep slopes and thin peat layers, which require careful planning and adaptation of restoration techniques to ensure effectiveness and prevent further degradation.

Favourable preconditions

The project has involvement from a number of key stakeholder groups including South West Water (as part of its Upstream Thinking Programme), academic researchers, land owners (Exmoor National Park Authority). There has also been a history of re-wetting projects in the the surrounding area.

Financing

Total cost

12185302.50 €

Total cost information

2006–2010 (EMRP): precursor phase reviewed; Ofwat (PR09) allowed SWW to spend up to £3.8m on Dartmoor & Exmoor catchment management (not Exmoor-only).
2010–2015 (Mires on the Moors): SWW £2.2m committed.
2010–2020 (Exmoor Mires Partnership): ~£4.5m to restore ~3,000 ha; funders: SWW, Environment Agency, Natural England. Public sources do not break down shares beyond this.
2021–2025 (SW Peatland Partnership covering Exmoor, Dartmoor, Bodmin, West Penwith): £13m programme incl. £9m from Natural England’s Nature for Climate Peatland Grant Scheme plus match from SWW, Duchy of Cornwall, National Trust, Cornwall Council. (Regional, not Exmoor-only; no Exmoor split published.)

Costs investment information

The land is under Higher Level Stewardship scheme and would be eligible for measures including "Maintenance of Moorland†Ÿ (HL9) or "Restoration of Moorland†Ÿ (HL10) at £40/ha (€47.2/ha at £1 = €1.18) plus a £10/ha (€11.8/ha) supplement for "Moorland re-wetting†Ÿ (HL13). This would either be paid under the HLS agreement or by the project (i.e. no cost to the land owner)

Costs land acquisition information

Land is owned by the Exmoor National Park and tenanted for farming

Financing authorities

Authority name	Type of funding	Comments
European Union	EU-funds: Rural development funds	The capital costs of the measures themselves are funded through agri-environment payments.
SWW	Private funds	—

Policy and Governance

Policy description

The Exmoor Mires Restoration Project addresses the degradation of peatlands due to historical drainage and land-use changes. This degradation leads to increased runoff, reduced water quality, and loss of biodiversity. Digging of drainage ditches over decades has resulted in drying out of blanket peat bog, re-wetting is being undertaken through blocking drains to increase retention of water and carbon.

Land ownership

Exmoor National Park Authority owns much of the restoration land; areas are tenanted for farming. Work also involves other local landowners/commoners.

Policy targets

Runoff control

Increase Water Storage

Pollutants Removal

Oher Societal Benefits

Target remarks

The project's design focuses on re-wetting drained peatlands to restore their natural hydrology, which helps in controlling runoff and peak flows. This restoration enhances water storage capacity and supports diverse habitats, contributing to biodiversity. Secondary benefits include improved groundwater recharge, reduction in pollutant loads, and erosion control. Additionally, the project offers societal benefits like carbon sequestration and recreational opportunities.

Policy pressure

Directive	Relevant pressure

WFD identified pressure	Good ecological and chemical status of water bodies.
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Pressure remarks

The project aligns with multiple EU directives, addressing pressures related to water quality, flood risk, and habitat conservation. Restoration efforts contribute to meeting the objectives set by these policies.

Policy impact

Directive	Relevant impact
WFD identified pressure	Improved water quality and ecological status of water bodies.
Floods Directive identified pressure	Enhanced flood risk management through natural retention.
Other EU	Habitats Directive : Restoration of priority habitats leading to increased biodiversity.

Part of a wider plan

Oui

Wider plan

Wider plan type	Wider plan focus	Name	Comments
Regional	Water	Upstream Thinking	Upstream Thinking is an initiative run by South West Water in South West England that aims to improve water quality and quanitity through improved land management in upper catchments. The benefit to SWW is in potentially reducing the costs of water treatment. Demonstration of success will allow SWW to approach the regulator (OFWAT) for permission to develop PES schemes to deliver these benefits in future.
Regional	Environment & Biodiversity	South West Peatland Partnership (SWPP)	A regional initiative coordinating peatland restoration efforts across South West England.
National	Environment & Biodiversity	National Peatland Strategy	Focuses on the protection and restoration of peatlands for climate regulation, water management, and biodiversity in the UK.

Wider plan type	Wider plan focus	Name	Comments
Local	—	Exmoor National Park Management Plan	Local plan emphasizing the conservation of natural resources, including peatlands, within the park.

Public consultation

Oui

Consultation activities

Activity stage	Activity type	Comments
Implementation phase	Project website	http://upstreamthinking.org/index.cfm?articleid=8699 (no longer available)
Implementation phase	Online, classroom and outdoor educational materials and activities	http://www.exmoormires.org.uk/index.cfm?articleid=9633 (no longer available)
Implementation phase	Outdoor events and activities	http://www.exmoormires.org.uk/index.cfm?articleid=11396 (no longer available)
Implementation phase	Volunteering opportunities	http://www.exmoormires.org.uk/index.cfm?articleid=10819 (no longer available)

Has contractual arrangements

Oui

Contractual arrangements

Arrangement type	Name
Contractual agreement	Memorandum of agreement concerning the Exmoor Mires Project

Impacts and Monitoring

Monitoring System

Monitoring parameters

Measurements of discharge, water table levels, dissolved organic carbon (DOC), water color, and pH.

Impact Assessment Methodology

Performance impact assessment method

Catchment outlet

Performance impact estimation information

Water quantity:
In-situ depth to water table measurements at > 200 locations across 8 "experimental pools" and within 3 headwater catchments.
Discharge quantified for 7 drainage features and at 3 catchment outlets.
Meteorological variables are recorded at each catchment.
Water quality:
Storm-flow sampling using ISCO pump sampler
DOC measurements (UV spectrophotometer)
Colour: UV - vis Spectrometer (Abs 400nm; Fulvic/Humic ratio (E4/E6))
pH

Biophysical impact assessment method

Assessed through hydrological monitoring (e.g., water table measurements, discharge) and water quality analyses (e.g., DOC, pH).

Socio-economic Impacts

Direct benefits information

South West Water report that reduced silt level in water could reduce treatment costs for drinking water by 20%. Research is ongoing with respect to agricultural impacts. These include sward quality for grazing (potential for higher and more uniform water table to improve dry matter and digestability, metabolisable energy and crude protein levels) and levels of parasites (reduction in tick numbers at one restored site; reduced habitat suitability for the snail host of liver fluke). Impacts of re-wetting on cattle movements are to be studied

Biophysical impacts: Hydrology

Hydrological effects

The project has restored the natural hydrology of degraded blanket bogs by blocking drainage ditches, leading to increased water retention and a rise in water table levels. This has resulted in enhanced water storage and a more stable hydrological regime.

Information on retained water

By blocking over 100 km of ditches with more than 10,000 dams, the project has re-saturated the bogs, allowing them to hold more water and release it more slowly. This has improved the bogs' capacity to retain water, acting as natural reservoirs.

Increased water storage

364.00

Increased water storage unit

m3/ha

Information on increased water storage

Based on 260,000 cubic meters of additional water storage in peat over the first restored area of 714 ha.

Peak flow reduction

32.00

Peak flow reduction unit

% Percent

Information on peak flow reduction

Storm flow production is reduced to approximately 32% of its pre-restoration level, following catchment restoration

Reduced depth to groundwater

0.02 m

Information on reduced depth to groundwater

Average decrease in depth to groundwater (during non rainfall-runoff event periods) with a range of 0.0103 to 0.0265 m

Reducing flood risks quantity

The re-wetted peatlands act as natural sponges, absorbing excess rainfall and reducing the risk of downstream flooding.

Biophysical impacts: Biodiversity

Improved biodiversity

Oui

Information on improved biodiversity

The project has improved habitats for various species, including sphagnum mosses, which are crucial for peat formation. The wetter conditions have also benefited wetland flora and fauna, enhancing overall biodiversity in the area.

Biophysical impacts: Water & Soil Quality

Information on water quality overall

Carbon/DOC: total carbon yield reductions up to ~50% reported; DOC/colour issues targeted as a utility driver.

Soil quality overall improvements

N/A info

Ecosystem erosion control

Non

Biophysical impacts: Others

Ecosystem impact climate regulation

Impact on GHGs (net emissions and storage) including soil carbon

Information on ecosystem impact GHG soil carbon

Restored peatlands sequester carbon, reducing net greenhouse gas emissions. The project helps in maintaining and enhancing soil carbon stocks.

Lessons Learned

Key lessons

This is an ongoing project of moorland rewetting involving blocking of existing drainage ditches, as such monitoring of impacts on water quality, water flow, habitats and greenhouse gases has not been completed. However, preliminary results for water quality and quantity are encouraging with storm water run-off reduced by 32% and the average depth to the water table level reduced. The project is a continuation of an exiting partnership between the regional water company (South West Water), the Exmoor National Park Authority (also the landowner) and national agencies (Natural England, Environment Agency, English Heritage). There is also academic input (Universities of Exeter and Bristol) into monitoring of inputs.

Barriers

Barrier type	Barrier role	Comments
Legal obligations / restrictions	Main barrier	SWW is subject to regulatory constraint (OFWAT) regarding investments such as NWRM. The benefits need to be demonstrated to secure regulatory authorisation to continue restoration work and develop PES schemes

Drivers

Driver type	Driver role	Comments
Organisation committed to it	Main driver	National and regional commitments to climate change mitigation and habitat restoration. The degraded peatlands contributing to carbon emissions and biodiversity loss.

Success factors

Success factor type	Success factor role	Comments
Successful coordination between authorities	Main factor	The Exmoor Mires project follows on from previous rewetting of 313ha of moorland on Exmoor by a partnership of the same stakeholders between 2006 and 2010 - 'Exmoor Mire Restoration Project'

Transferability

The project's methodologies are transferable to other degraded peatlands, provided there's stakeholder buy-in and appropriate funding. Key considerations include understanding local hydrology, land-use history, and socio-economic contexts. Flexibility in approach and continuous monitoring are essential for success elsewhere.

Basin characteristics influence

The site's steep slopes and thin peat layers necessitated tailored restoration techniques, such as using locally sourced materials for dam construction.

Sources

Sources

Upstream Thinking - Exmoor Mires Project

Initial changes in hydrology and water quality following restoration of a shallow degraded peatland in the South west

National River Flow Archive

UK Soil Observatory

Peat bog restoration work holds back water, scientists say

Assessing the impact of mire restoration on agricultural productivity: An interim progress report

Memorandum of agreement concerning the Exmoor Mires Project

Review of the Exmoor Mires Restoration ProjectFinal Report

Acres of Exmoor 're-wetted' and restored to peat bog

Exmoor Mires project - Historic environment overview and strategy

South West Peatland Partnership

Exmoor: Mires Partnership

Mires-on-the-Moors - Hydrological monitoring summary

Mires Monitoring Results - March 2016

Review of the Exmoor Mire Restoration Project

Exmoor: a case study, peatland restoration and the historic environment

Case study:Exmoor Mires Partnership