

Developing an integrated 'whole-catchment' approach to water management

Over the course of SWEEP's 5 year programme, the UoE SWEEP team have supported South West Water (SWW) to embed a Natural Capital and Whole Catchment Approaches to their business planning, monitoring and investments.

Phase 1 work (2017-2019) supported SWW and their Upstream Thinking (UST) Delivery Partners in planning for the PR19 business case submission, helping SWW achieve coveted Fast Track Status and £15m investment in catchment management approaches. The relationship between SWW and UoE was further strengthened with the establishment of the £31.5m Centre for Resilience in Environment, Water and Waste (CREWW), funded jointly by SWW and Research England.



swEEP Impact Summary

Phase 2 work (2019-2022) involved collaborative development, with SWW and Delivery Partners organisations, of the innovative UST Portal and Decision Support Tool, now being used to record, monitor and potentially evaluate SWW commitments on biodiversity and environmental enhancements to improve catchment water quality.

£15m investment in catchment management supported (2020-2025)



40 jobs (15 FTE) safeguarded across UST programme



Evidencing water quality and biodiversity interventions on **50,000** ha land (2020-25)



Ways of Working



Why it mattered?

Freshwater quantity and quality are key environmental concerns for the South West. Numerous economic activities rely on good water quality, either directly or indirectly, including the delivery of clean drinking water, fish and shellfish aquaculture, recreational fishing and the use of the region's fresh and coastal waters as recreation and tourism destinations.

In 2020, the Environment Agency reported that 0% of rivers, lakes and streams in England were in good overall health². Affected by pollution from agricultural and industrial activities, urban runoff and sewage, and surface water flooding.

The build-up of excessive nutrients like phosphorus and nitrogen from animal waste and sewage reduces oxygen in rivers which harms its biodiversity. Plastic and synthetic chemical pollution and climate change further weaken the resilience of freshwater ecosystems³.

Following the publication of Defra's 25 Year Environment Plan in 2018, water companies began considering

how they could better account for the environment in their 5-yearly cycle of business planning, both generally through catchment management and specifically via Natural Capital Accounting⁵.

In 2017, at the start of this SWEEP project, South West Water (SWW) had begun designing their five-year Asset Management Plan (AMP7) and were planning for the related Price Review process (PR19) which, subject to Ofwat approval, would direct the company's investments from 2020 to 2025.

SWW were keen to invest further in **catchment management solutions** within their business planning and to be delivered through their innovative **Upstream Thinking programme (UST)** but, at the time, lacked the key evidence needed to support the investment case.



Healthy rivers are vital for biodiversity and to human health and well-being. Rivers provide habitats for a range of wildlife, protect against flooding and provide beautiful places for recreation and reflection."

House of Commons Environmental Audit Committee¹



It is manifestly apparent that the preservation of natural capital stocks—such as the biodiversity in rivers—has not been valued highly enough in decisions by regulators, water companies and successive administrations over recent decades." House of Commons Environmental Audit Committee⁴

1 p7. House of Commons Environmental Audit Committee. (2022). Water quality in rivers. Fourth Report of Session 2021–22.

2 Environment Agency, 2020.

3 p193 CIWEM, 25 Year Environment Plan. Ambition to realisation.

4. House of Commons (2022)

5 p108 House of Commons (2022).

6 South west Water. Who we are.

7 South West Water. Green Recovery Initiative

Phase 1 (2017-2019) - What we did

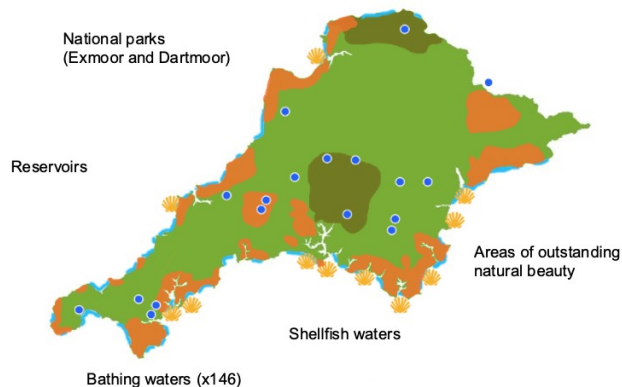
Between 2017-2019, the SWEEP team worked closely with South West Water and its catchment management delivery partners to develop an **integrated, spatially explicit understanding of catchment scale processes that impact water-based natural capital, economic development and health/wellbeing in the South West**. A key objective was to collate and translate existing research and evidence into a coherent argument to Ofwat for investment in catchment management under PR19.

- The phase 1 SWEEP team was comprised of UoE Impact Fellows Dr Donna Carless, Dr Mandy Robinson, Dr Michela Faccioli and Gemma Delafield and Prof. Richard Brazier and Prof. Brett Day.
- Extensive stakeholder engagement was undertaken with UST delivery partners (Westcountry Rivers Trust, Devon Wildlife Trust and Cornwall Wildlife Trust) as well as Exmoor National Park Authority, the Water Research Centre, Environment Agency and Natural England.

Outputs include:

- 10 Catchment Summary reports, relating to new Drinking Water Catchment Schemes or Investigations, and 11 Business as Usual cases, supporting SWW's PR19 process.
- A suite of GIS maps and spatial analysis outputs, including: (1) maps of catchment locations, SWW assets, environmental designations such as priority habitats, and analysis of current UST coverage; and (2) mapping and analysis of pollution incidents and biodiversity enhancement opportunities.
- A Natural Capital Accounting Ecosystem Services Valuation Tool, with analysis of planned interventions and their impacts. The simplified natural capital accounting⁸ exercise included analysis of interventions such as woodland and grassland management, peatland restoration, other soil management practices and changes in agricultural practices.

Our natural capital environment



SWW provides water and wastewater services to a resident population of 1.7 million and over 2 million people in peak tourist months⁶. The majority of water supply (93%) comes from reservoirs and rivers and the area includes 34% of England's bathing waters, 25 designated shellfish waters and 2 National Parks⁷.

SWW's Upstream Thinking programme (UST)

The UST is an award-winning catchment management scheme launched in 2010 by South West Water and delivered in collaboration with regional environmental and conservation charities (Cornwall and Devon Wildlife Trusts, the Farming & Wildlife Advisory Group South West, Natural England and Westcountry Rivers Trust). Innovative in its conception, it recognises that, by changing land use and land management practices, pollution can be eliminated at source. By paying landowners to deliver these changes it can, in the long run, also generate wider environmental benefits beyond water quality improvements. It can also do this at far less cost compared to over engineered solutions which remove pollutants in water treatment works, and generally require multi-million pound investments. The programme supports farm advisers who work closely with landowners to advise on water friendly farming practices.

⁸ Natural capital accounting is the attempt to bring a systematic, standardised and repeatable framework to recording information on: (1) natural capital (i.e. stocks on natural assets) and the flow of ecosystem services and goods they supply; and (2) a measure of the benefits or costs to society linked to changes in these ecosystem services flows, whether or not they have a market value.



Good Farm, Bad Farm. Source: [West Country Rivers Trust](#)

Impacts & benefits delivered

SWEEP's phase 1 work delivered the following benefits:



Attitudinal/Capacity

Transformed SWW's understanding and knowledge base: SWEEP-produced information and the Natural Capital Accounting Ecosystem Service Valuation Tool transformed SWW's understanding of its natural capital assets, business challenges and the investment case for potential catchment solutions.

Strengthened SWW's reputation for catchment management and environmental protection:

SWW PR19 business plan was ranked 1st by Wildlife and Countryside Link⁹ in their *Blueprint for Water* (2019), in terms of how England's nine water and sewage companies matched the coalition's view of the environmental challenges and opportunities facing the water sector in England¹⁰. SWW also scored well in relation to commitments to protect and restore catchments from source to sea.



Organisational Function

Embedded the Natural Capital

Approach: Using the SWEEP Natural Capital Accounting Ecosystem Services Valuation Tool, SWW embedded environmental values directly within its PR19 catchment business planning, demonstrating that the expected return on primary investments would be fourfold.

Helped secure £15m investment in catchment management approach:

this new SWEEP-informed approach directly contributed to SWW being awarded £15M by Ofwat to deliver on their catchment management ambitions delivered through interventions aimed at tackling diffuse pollution.

Value of being awarded Fast Track

Status: SWW's PR19 submission was awarded Fast Track Status by Ofwat for innovation, around its adoption of the Natural Capital Approach. This delivered a £200m cost saving due to SWW being able to make early planning decisions and gaining access to preferential borrowing rates.

Water treatment cost savings: It is anticipated that SWW and customers will benefit from reduced water treatment costs in the long-run under UST3.



The SWEEP team helped us look at our data in a new, and really valuable, way. We benefited from their academic perspective and best-available mapping, data analysis and processing skills... and became much better-informed about the natural environment in the South West river catchments."

David Smith, UST Programme Manager, SWW



Our PR19 Business Plan, for the first time, adopted a natural capital approach and we couldn't have done that without SWEEP."

"The SWEEP natural capital valuation tools helped us show that the expected return on our primary investment in the catchments was fourfold, where the return on investments included the value of water quality improvements, as well as the value of a range of other possible natural capital outcomes."

David Smith, UST Programme Manager, SWW



SWEEP work helped secure over £15m of new funding from Ofwat for the 2020-2025 period... It was vital in demonstrating quantitatively the benefits of catchment management to our customers and the environment. This also helped us achieve an 'exceed expectations' from Ofwat on our Water Resources Management Plan."

Simon Bird, Former Managing Director, SWW



Adopting a Natural Capital Approach to our Business Planning aligned with Ofwat's priorities around customer value and innovation. It made it easier for us to explain the case for investing in catchment management to Ofwat which was reflected in our achieving Fast Track Status for our overall PR19 Business Plan."

David Smith, UST Programme Manager, SWW



The SWEEP work on catchment management impacts is helping us reduce operation costs and improve reliability. At Wendron water treatment works we have seen shut downs reduce from 19 to zero over a two month period... On this site alone, this is a saving in two months in the order of £50k in lost productivity."

Simon Bird, Former Managing Director, SWW

⁹ Wildlife and Countryside Link is the largest environment and wildlife coalition in England, bringing together 67 organisations to use their strong joint voice for the protection of nature.

¹⁰ *Blueprint for Water* (2019) *Blueprint for PR19: Our Environmental Scorecard*. Wildlife and Countryside Link.

Strengthened relationship between

UoE and SWW: contributing to £21m investment from Research England and £10m from SWW for the new Centre for Resilience in Environment, Water and Waste (CREWW).

Deepened long-term collaborations with UST Delivery Partners: during the PR19 process and going forwards.



Economic

Jobs safeguarded: approximately 15 FTE jobs in the UST programme were safeguarded during 2020-2025 through the PR19 investment in catchment management.



Natural Capital

Biodiversity and water quality

improvements: SWEEP information enabled SWW to make the business case for delivering environmental improvements, even beyond its regulatory requirements, and then set ambitious targets for area of land 'actively engaged' for water quality or biodiversity enhancement.



Argal Reservoir. Source: Emilie Grand-Clement, UoE



Upstream thinking: Natural Capital investment: Moors



The process of engaging with SWEEP strengthened our relationship with the University of Exeter. It helped shape our thinking around data handling, laboratory capacity and analysis, which ultimately led to our investment in, and the development of, the Centre for Resilience in Environment, Water and Waste (CREWW)."

David Smith, UST Programme Manager, SWW



Working with SWEEP gave me a really clear insight into the water companies business planning process. As a result, it feels like we're now in a good place to begin negotiations on PR24, which sounds bizarre because it's 2019, but this is when the conversations need to happen."

Nick Paling, West Country Rivers Trust



The UST programme and Farming Advisory Service is delivered by around 40 people in different organisations... The SWEEP work helped us deliver more environmental improvements through natural solutions, supporting jobs within the environmental sector and water industry."

David Smith, UST Programme Manager, SWW



The SWEEP process enabled us to commit to a biodiversity Outcome Delivery Incentive (performance commitment) of 50,000 ha of catchment environmental improvements over 2020-2025. And to continue this ambition at the same scale over the next 25 years."

David Smith, UST Programme Manager, SWW



Source: David Smith, SWW

Phase 2 (2019-2022)

What we did

During the PR19 planning process, the need for a new method for recording UST activity was identified, to provide evidence of achievements and ensure consistency in reporting.



The SWEEP catchment management project was completely aligned with the work we were trying to do with SWW. The first phase put in place the building blocks. The second phase, developing the UST Portal, will completely change the way we report and monitor UST! Developing a single, integrated data capture solution that everybody can use... is critical and will utterly transform the UST monitoring and evaluation process."

Nick Paling, West Country Rivers Trust

Phase 2 of the SWEEP project 'whole catchment approach to water management' was delivered by UoE SWEEP Impact Fellows Dr Donna Carless, Dr Mandy Robinson, Dr Ben Jackson and Jess Kitch, and Prof Richard Brazier, working in collaboration with South West Water and UST Delivery Partners: Cornwall Wildlife Trust, Devon Wildlife Trust, Farming and Wildlife Advisory Group South West, Catchment Sensitive Farming (Natural England) and Westcountry Rivers Trust.

In 2021, reporting capabilities for the South West Lakes Trust and South West Peatland Partnership were developed within the Portal.

In the same year, reporting capabilities were also developed for the post-Covid Green Recovery Initiative. Relating to catchment management, the aimed to deliver 10,000 hectares of additional activity, including restoration of some of Dartmoor's most damaged degraded peatland and work to improve biodiversity and enhance natural habitats.

Outputs include:

- **Upstream Thinking Portal** – designed to allow Delivery Partners to consistently record interventions and activities delivered as part of the UST programme. The portal uses the ArcGIS Online platform and is only accessible to SWW and the UST Delivery Partners. Details of the Portal and its Instruction Manual are located at: <https://sweep.ac.uk/tools/ust/>
- **UST Decision Support Tool (DST)** - developed for use alongside the UST Portal, the DST is a series of Contextual and Evaluation Data Layers. It was designed to help Delivery Partners and SWW improve UST management within catchments, by enabling them to be better informed about the landscape and natural processes and to help evaluate the impact of interventions on water quality and biodiversity. This tool is also only accessible to SWW and the UST Delivery Partners via ArcGIS Pro. A report detailing the DST is located at: <https://sweep.ac.uk/tools/ust/>

South West Water

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It can also do this at far less cost compared to over engineered solutions which remove pollutants in water treatment works, and generally require multi-million pound investments. The programme supports farm advisers who work closely with landowners to advise on water friendly farming practices.



Farm land along the River Exe, Devon

Impacts & benefits delivered

SWEEP's phase 2 work delivered the following benefits:



Attitudinal/Capacity

Improved collaboration and understanding: Development of the UST Portal led to improved collaboration, co-operation, understandings and knowledge sharing between SWW and the Delivery Partners.



Organisational Function

Enhanced data and capabilities: The SWEEP UST Portal provides SWW with a new, more powerful mechanism to record UST3 engagement activities and interventions, both through time and spatially in greater depth of detail than previously possible.

Trusted evidence: In 2021 it demonstrated the potential for an “auditable and transparent delivery data trail” essential for auditors to sign off on number of hectares of land actively engaged for water quality and biodiversity enhancement ODI targets. In 2022 it was the sole reporting mechanism for this audit process.

Supporting future business planning:

With business planning for PR24 ongoing, the UST Portal is expected to generate data for SWW's PR24 Business Plan, influencing OFWAT's decision making and SWW's future investments post-2025. Data is to be used to help understand and model outcomes of Nature Based Solutions, leading to investment, cost savings or potential new income sources from Biodiversity net gain or carbon credits.

Delivering outperformance awards and cost savings:

In 2020-21 the UST Portal helped SWW claim the maximum possible annual outperformance rewards for ODI targets, which are capped at £4.02M. In the following year (2021-2022), the UST Portal became SWW's primary tool for quantifying UST performance enabling SWW to again claim the maximum annual outperformance reward of £4.02M. Internal cost savings were also expected to accrue to SWW during 2021-2022.

Capacity building and upskilling: 8 UST Delivery Partners and 3 SWW staff were trained in the use of new UST Portal.

Anticipated benefits to UST Portal users:

UST Portal users anticipate that the newly created DST will be used to support planning for PR24 and UST4, could identify new areas of opportunity and improve cross-team relations and understandings. It is also hoped that work on the UST Portal can continue to boost its function for Delivery Partners.



The collaborative process of developing the UST Portal has given us a better understanding of the reporting requirements of the Delivery Partners and the challenges faced by them in terms of their resources and capacity to record interventions and complete their monitoring and evaluation of activities. This has improved the levels of engagement, collaboration and transparency of all involved.”

David Smith, UST Programme Manager, SWW (2021)



For the first time we know exactly where we've been in terms of spatial mapping and what we've done on every farm that we've engaged. The process of inputting data using the UST Portal is now more streamlined, easy, time-efficient, consistent and ultimately more effective, as more detailed data can be recorded.”

David Smith, UST Programme Manager, SWW (2021)



The SWEEP UST portal has great potential to be a useful tool helping us to monitor our catchment work and report on it accurately. We would value it being developed further to iron out a few teething issues, for example, adjusting it so we can monitor the intensity of UST catchment interventions per hectare, which have a cumulative impact on water quality and biodiversity. We anticipate that the DST will aid us in our planning for PR24 and UST4... and will help us identify additional new areas we can work in.”

Gwen Maggs & Vicky Brewis, Cornwall Wildlife Trust



“(The) external auditors, carrying out the 2020-21 audit of performance for SWW's annual business reporting to OFWAT and shareholders, were impressed with the development and demo of the (SWEEP-designed) UST Portal and the new levels of visibility and accuracy that it brings to SWW's reporting of UST performance in relation to our Biodiversity enhancement ODI (outcome delivery incentive) targets set by OFWAT.”

David Smith, UST Programme Manager, SWW (2021)

Looking to the future

UoE work continues to support and maintain the UST Portal and DST under the new CREWW centre.

For more information contact sweep@exeter.ac.uk

UST Reporting Tool

Land Unit Engagement | **Interventions** | Field Activation | Catchment Scale Engagements | Engagement Maps | Reporting Dashboard | Reporting Download | Download Layers

Interventions Editing App

Find address or place

40km

Full screen view of UST Portal interventions tab, showing the embedded Interventions Editing App

The role of this tab is to allow users to view or input information about interventions undertaken as part of UST3.

There are five types of intervention feature that you can interact with using this app:

1. Point Interventions
2. Line Interventions
3. Polygon Interventions
4. Land Unit (LU) Points
5. Field Parcel Interventions

From this app you can:

- a) Digitise intervention features
- b) Input information about features
- c) View, edit or add to entered information.

For more detailed information/instructions, click on the information button to the far left.

Organisations we've worked with



Underpinning NERC Science

Phase 1:

- NE/TS/KTP8009/1 - Understanding the impact of moorland restoration on water quality
- NE/D003199/1 - Understanding the environmental behaviour and biological impacts of manufactured nanoparticles in natural aquatic systems
- NE/L007371/1 - Metal/metal oxide nanoparticles and Oxidative Stress – Are there harmful health effects in fish for environmental exposures?
- NE/M019687/1 - Chicken or the Egg: Is AMR in the Environment Driven by Dissemination of Antibiotics or Antibiotic Resistance Genes?
- NE/M019792/1 - Does the potential for AMR selection differ between common UK cattle grazing systems?
- NE/M01133X/1 - Using next generation sequencing to reveal human impact on aquatic reservoirs of antibiotic resistant bacteria at the catchment scale
- NERC/ESRC/EPSC/BBSRC/AHRC funded Drought Risk and You (DRY) project
- NE/M010252/1 Climate, Harmful Algal Blooms and Human Health
- NE/M019713/1 Addressing valuation of energy and nature together

Phase 2:

- NERC CASE Multi-scale predictions of soil erosion and water quality from intensively managed grasslands
- NE/H01814X/1 - Impacts of farm-scale ecosystem management on water quality in intensively managed grasslands.
- NERC/TSB KTP - Understanding the impact of moorland restoration on water quality
- NE/TS/K00266X/1 - Developing a New Integrated Aerial Vehicle Platform 'Quest Earthwater' for assessing hidden blue water supplies

About SWEEP

The South West Partnership for Environmental & Economical Prosperity (SWEEP) is a partnership between the University of Exeter, the University of Plymouth, and Plymouth Marine Laboratory. Funded by the Natural Environment Research Council and stakeholders together to solve key challenges faced by those working with our natural resources. www.sweep.ac.uk



Natural Environment Research Council