
THE STORY OF SWEEP
Benefitting the environment, economy and society in the South West and beyond.
sweep
University of Exeter
UNIVERSITY OF PLYMOUTH
PML Plymouth Marine Laboratory
UKRI Natural Environment Research Council

HEADLINE IMPACTS

THE MISSION

The natural environment and the economy are two complex systems whose fate is bound together. Yet they have long been placed in opposition to each other. Now, there is a mounting sense of urgency for us to rethink the ways in which we value and interact with nature and the goods and services it provides us with.

The South West Partnership for Environmental and Economic Prosperity – SWEEP – was a response to this need for change. The SWEEP team used multi-disciplinary research, expertise and evidence to deliver economic and community benefits to South West England, and, at the same time, protect and enhance the region's natural environment.

This is the story of SWEEP and its impact – within and beyond the South West.

SWEEP impact was delivered through action in partnership with business, policymakers and society. SWEEP projects provided co-creative spaces for partners to think afresh and, for example, develop new legislation, environmental plans protected by law, strategies, schemes and their delivery mechanisms.

These are some of SWEEP's most effective cases of evidence-led policy change or implementation.

1 SWEEP outputs underpinned the world's first **Marine Natural Capital Plan** for the North Devon Biosphere Reserve, a UNESCO World Heritage Site. Pioneering methods to develop a marine asset and risk register were at the core of the plan. SWEEP methods have informed the delivery of the **UK Government's flagship 25 Year Environment Plan.** The evidence of risk to natural capital assets has been integrated into three Marine Protected Areas management plans and also incorporated into a successful application to designate the **UK's first World Surf Reserve** in North Devon.

2 Social science research by SWEEP contributed to a **landmark Government decision to allow England's first wild breeding population of beavers for 400 years** the permanent right to remain in, and spread naturally from, their East Devon river home, leading Devon Wildlife Trust to describe it as 'the most ground-breaking government decision for England's wildlife for a generation'.

3 SWEEP provided evidence for **new fisheries management plans** by Devon & Severn Inshore Fisheries and Conservation Authority (IFCA), which, for the first time, adopted a strong social and economic component informed by SWEEP. Sussex IFCA used the SWEEP methodology for an impact assessment that underpinned a **trawling byelaw to protect 304km² of coastal seabed** for the regeneration of underwater seaweed forests.

4 Using novel mapping tools, SWEEP helped Cornwall Council implement its **Environmental Growth Strategy to 2065** helping to inform the **location of billions of pounds of development decisions** under the Local Plan to 2030. Thirteen major regional policies and strategies were also informed including delivery of the **£30M Forest for Cornwall project** creating 8,000 hectares of canopy cover capturing 38,000 tonnes of carbon dioxide a year.

5 Harnessing the latest scientific evidence, SWEEP delivered **innovative resources** and approaches to a large network of cross-sectoral partnerships and influenced more robust and equitable investments in the environment for health outcomes. This has **strengthened regional and national policy and strategies,** including informing the Wildfowl & Wetlands Trust's contribution to Somerset's new 61.4km² **'super' National Nature Reserve.**

SWEEP IN NUMBERS

325 Government, business and civil society partners

159 Tools and services created

2,464 People trained in the use of SWEEP tools

304km² Seabed protected

3,626km² Natural space designed for health and wellbeing

84km² Wildflower and pollinator habitat created

£115M Partner investments influenced

£78M Funding leveraged

£25M Cost savings to business and public purse

£35M GVA from funding leveraged (to 2028)

327 FTE Jobs supported by funding leveraged (to 2028)

38 Policies, legislation and regulations informed or influenced

WHY SWEEP?

REVALUING NATURE

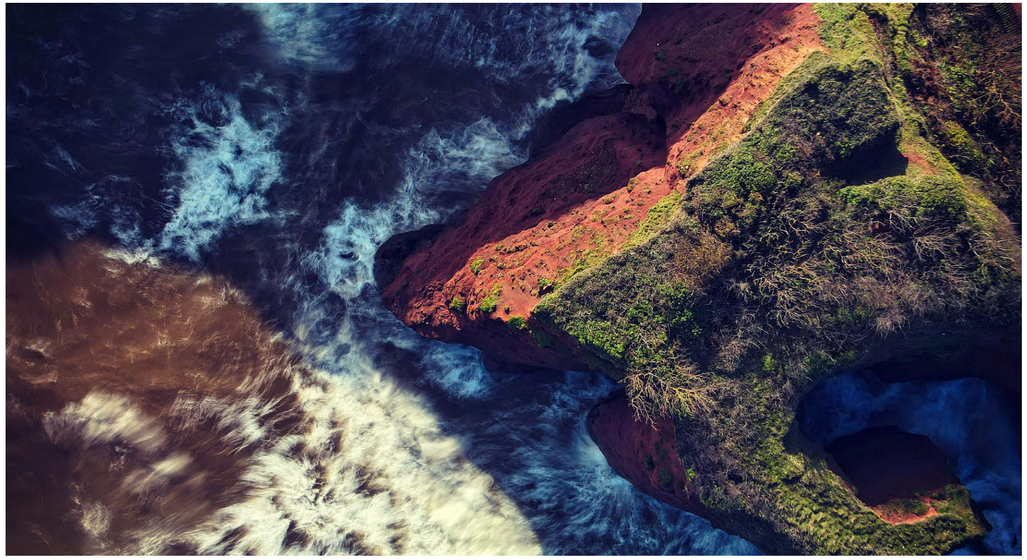
The economy is a subset of the natural world, wholly dependent upon its inputs and significantly affecting its quality and health. Recognising this interdependence is essential if we are to transition to a form of decision-making that is sustainable, efficient and equitable.

SWEEP set out to place the environment at the heart of business and policy-making in the South West. It sought to embed the Natural Capital Approach: a means to identify and take into account those parts of nature that underpin our wellbeing, our health and our economic prosperity.

Using this approach to collaboratively develop bespoke guidance, modelling and mapping tools, the aim was to transform the decision-making culture and capabilities of organisations in South West England. This would, in turn, strengthen their policies and plans, and inspire and shape large-scale regional investments for the good of both the environment and the economy.

Natural Capital

Our environmental assets – the ocean, land and soil, freshwater, air, the species and habitats they contain – and the processes and functions that they generate which provide value for people.



Langstone Rock, Devon; *Credit: Red Zeppelin, Unsplash*

Leather Tor, Devon; *Credit: Dartmoor National Park Authority*

PLACE-BASED IMPACT

In targeting a single region, SWEEP intended to establish the South West as an exemplar, nationally and internationally, for Natural Capital-led economic growth, social gains and environmental improvements.

The distinctive characteristics of the South West made it ideally suited to the approach. With more than 1,000 kilometres of spectacular coastline and a quarter of its land area within National Parks or Areas of Outstanding Natural Beauty, the region has an especially abundant, rich natural environment. A number of economically important sectors, such as tourism, farming and fisheries, are reliant upon it.

But with a dependence on natural assets comes vulnerability. Declines in natural capital will have a severely detrimental impact on a region with one of the lowest rates of productivity and some of the poorest areas in the UK – and at a time when climate and environmental change is accelerating.

This regional focus allowed three connected research institutions – the University of Exeter, the University of Plymouth and Plymouth Marine Laboratory – to build durable partnerships with a broad group of highly engaged business, policy and third sector organisations. Together with local communities, they developed a shared vision for how to turn the South West's high economic dependence on its valuable natural capital into a key strength.

> “Our unsustainable engagement with Nature is endangering the prosperity of current and future generations … The solution starts with understanding and accepting a simple truth: our economies are embedded within Nature, not external to it.”
>
> **The Economics of Biodiversity: The Dasgupta Review (2021)**

HOW SWEEP IS UNIQUE

TOWARDS WHOLE-SYSTEMS THINKING

The idea at the heart of the SWEEP philosophy is to transform a culture of decision-making that has too often focused on improving one area of the economy or environment, only to result in unintended negative consequences for others.

Throughout the programme – 2017 to 2023 – SWEEP explored new ways and approaches that considered the whole environmental and economic system. SWEEP recognised the need to work at larger spatial scales, combining landscapes, river catchments, coastal zones and seascapes. It sought to overcome the challenge of separate responsibilities for different, but linked, parts of our land, freshwaters and seas.

These approaches helped the SWEEP team embed the Natural Capital Approach more widely, strengthened existing partnerships and developed new ones, and created momentum to move towards the positive tipping points needed to deliver real change.

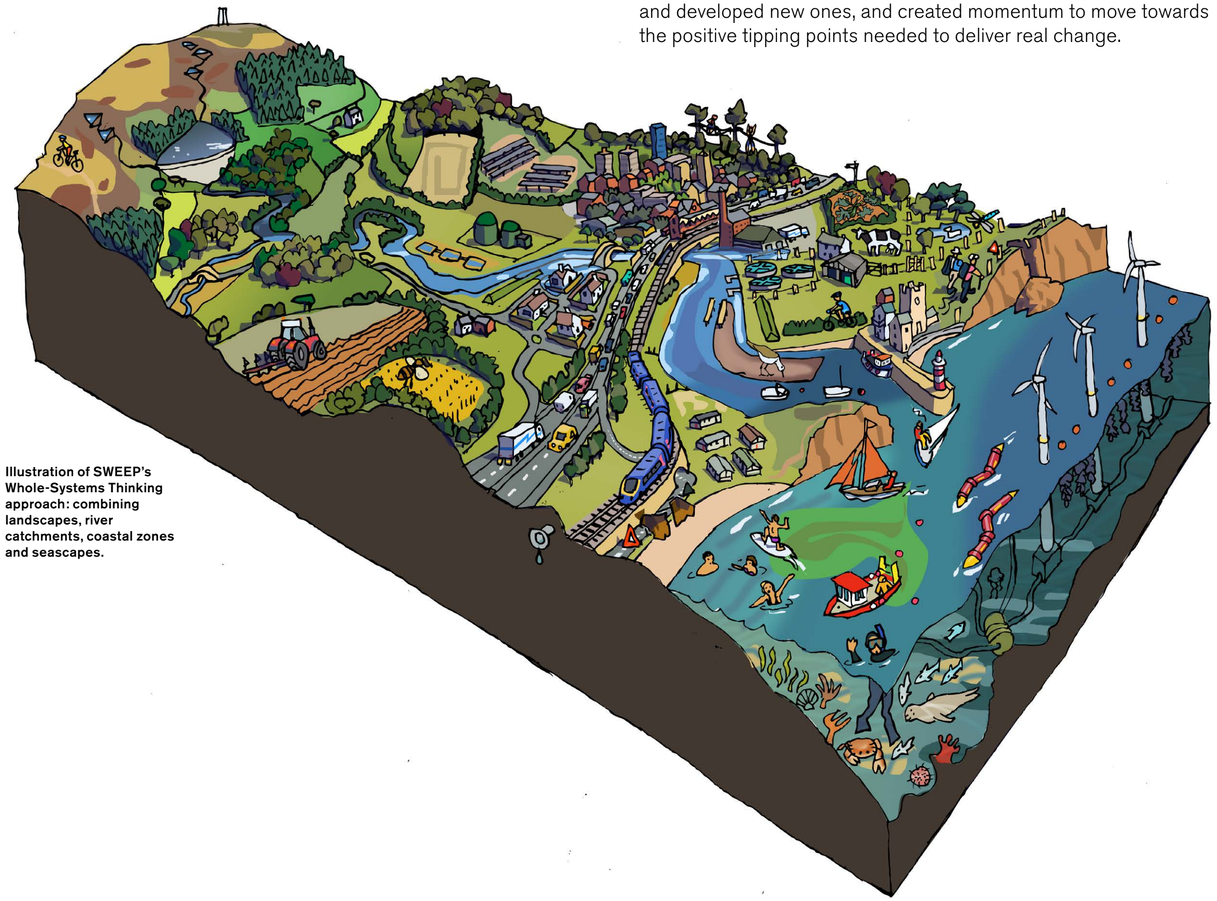


Illustration of SWEEP's Whole-Systems Thinking approach: combining landscapes, river catchments, coastal zones and seascapes.

NEW WAYS OF WORKING

SWEEP's success was very much about how partnerships worked across conventional boundaries, disciplines and sectors, and the interplay between four key components of the SWEEP team.

1 EXTERNAL PARTNERS

Projects were co-designed with highly engaged, forward-thinking regional businesses, policymakers, civil society organisations and community partners.

2 IMPACT FELLOWS

Hybrid roles were created, translating applied science into environmental, economic and social benefits. Impact fellows worked alongside non-academic partners to embed new capabilities in their decision-making and delivery.

3 IMPACT FACILITATION TEAM

SWEEP impact specialists were embedded in project teams. This helped to optimise impact planning, project management, strategic impact delivery, relationship building, knowledge exchange and transfer, impactful communications and evaluation.

4 ACADEMIC EXPERTS

With diverse and interdisciplinary backgrounds, academic experts integrated the natural and physical sciences, economics and social sciences. They provided academic leadership and embedded research excellence throughout SWEEP's activities.

> It's widened our horizons. It's a game changer for us. The tools, and the experience of co-creating them with SWEEP, has made us think more ambitiously and innovatively about what we can do rather than continuing with how we've always done things."
>
> **Ally Kohler BEM, Director of Conservation and Communities, Dartmoor National Park Authority.**

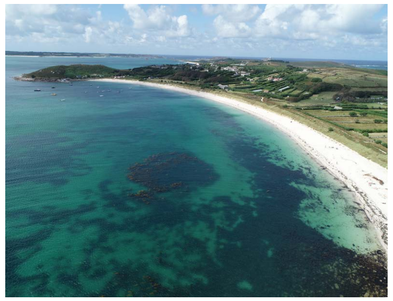
IMPACT IN ACTION: MARINE

VALUING THE MARINE ENVIRONMENT

The marine environment in the South West supports 19,000 jobs and contributes £1.1BN to the UK economy. However, the region's diverse marine habitats are threatened by human activities, population growth and climate change. SWEEP has pioneered Natural Capital Approaches and the co-creation of innovative tools and methods that are changing the way the marine environment is considered, valued and managed. Researchers helped introduced a view that takes into account all of the environmental, economic and societal assets and services the marine environment provides. This strengthened 17 governance policies and programmes and resulted in £50M in new funds to improve management and restoration of the marine environment.

CASE STUDY

WORLD-FIRST MARINE NATURAL CAPITAL PLAN



Sea Grass, Isles of Scilly, Cornwall

The challenge:
Needing to trial Natural Capital approaches for the delivery of the Government's 25 Year Environment Plan, Defra set up two Marine Pioneer projects – one in North Devon – and required support to test new tools and methods for better management of the marine environment.

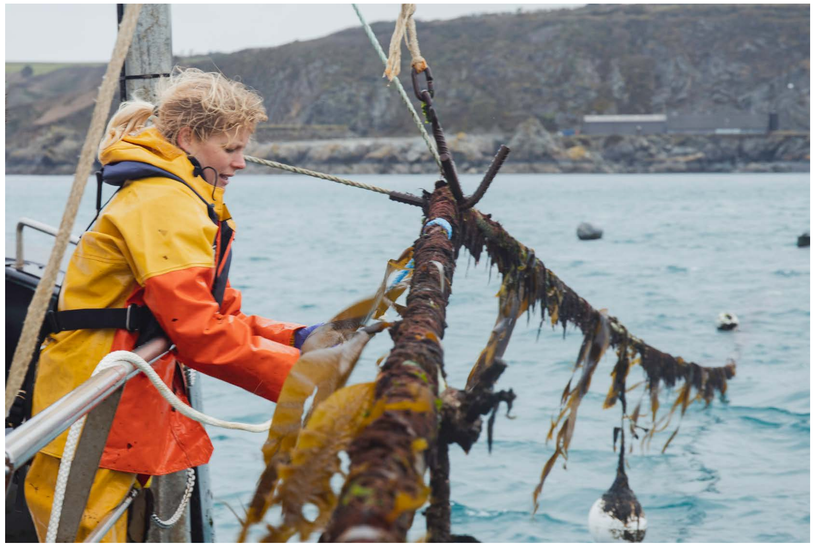
SWEEP solution:
Working within the North Devon Biosphere Reserve, SWEEP researchers produced the first-of-its-kind Natural Capital Asset and Risk Register of marine habitats and a novel framework for integrating Natural Capital values into sustainability appraisals.

Key impacts:
- Project outputs provided a basis for the world's first Marine Natural Capital Plan, in North Devon.
- The Plan brings partners together to invest in the region's marine habitats and improve how they are managed, from developing sustainable tourism to increasing resilience to climate change.

> "Without going on that journey with SWEEP and the decision-makers, I don't think we would have reached the point of thinking about having a Marine Natural Capital Plan."
>
> **Aisling Lannin, Head of Evidence and Marine Pioneer Lead, Marine Management Organisation.**

CASE STUDY

SUPPORTING SHELLFISH AND SEAWEED SECTORS



Seaweed farming, Porthallow Bay, Cornwall

The challenge:
Shellfish mariculture production in the South West is estimated at 7,300 tonnes per year. Seaweed mariculture is in its early stages, with production levels limited to <100 tonnes per year. Both have significant sustainable growth potential, but their development is constrained by poor water quality.

SWEEP solution:
A SWEEP team developed a first-of-its-kind, source-to-sea modelling application of a whole-systems approach in the Exe estuary catchment that examined the effects of future land use changes on water quality and associated impacts on farmed shellfish.

Key impacts:
- Modelling demonstrated that modest long-term changes in catchment land use (e.g. strategic tree planting) can improve water quality and shellfish production in the Exe Estuary. It showed that reductions in sewage overflows close to estuarine and coastal shellfish beds would likely have even greater benefits.
- Related SWEEP work enabled the identification of a 25km^2 aquaculture investment zone that could support seaweed, scallop and mussel farming, generating a potential £280M each year in the South West and creating 4,025 new jobs for the harvesting of 280,000 wet tonnes of seaweed.

CASE STUDY

NEW LAWS FOR MORE RESILIENT FISHERIES

The challenge:
Inshore Fisheries and Conservation Authorities (IFCAs) around the UK are exploring the introduction of more robust, evidence-based measures to strengthen fisheries management and protect stocks of commercially significant species.

SWEEP solution:
SWEEP worked with Devon & Severn IFCA to develop the tools to collect and analyse social data from the fishing industry, informing the development of five Fisheries Research and Management Plans (FRMPs). They partnered with the Isles of Scilly IFCA to develop an asset and risk register of its fisheries resources, and with Sussex IFCA to apply the SWEEP methodology to an impact assessment on trawling.

Key impacts:
- FRMPs are now a recognised tool included in the Fisheries Act.
- A new trawling byelaw in West Sussex was approved to protect 304km^2 of coastal seabed and rejuvenate kelp forests that provide habitats for fish, while reducing carbon and improving water quality.
- Inspired by SWEEP work and the Sussex byelaw, Adur District & Worthing Borough Councils secured funding to restore almost 200km^2 of kelp forest lost to trawling.
- The Isles of Scilly Asset and Risk Register is being used to consider a revision of fisheries management to further protect Natural Capital assets.

IMPACT IN ACTION: THE COAST

MANAGING COASTAL CHANGE

The South West has 1,014km of beautiful, environmentally diverse coastline. Yet, it is increasingly vulnerable to flooding, erosion and human activity. In some places the coastline retreats by a metre every decade, while the detrimental impacts of flooding are being exacerbated by climate change and rising sea levels. Improving both coastal defences and hazard forecasting can deliver wide-ranging economic and societal benefits on land and at sea. SWEEP's Operational Wave and Water Level (OWWL) model, for example, exemplifies the Whole Systems approach; by producing more accurate, site-specific coastal hazard forecasts, the team has helped to protect the environment and properties, save lives and achieve cost savings for marine businesses.

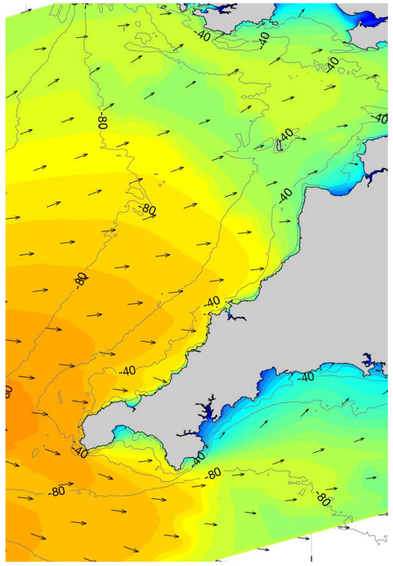
CASE STUDY

MAKING WAVES IN THE ENERGY SECTOR

The challenge:
Wave Energy Converters (WEC) are expected to play a key role in meeting global electricity demand. However, progress is slow, partly due to poor survivability of wave technologies. Bombora Wave Power is constructing the world's first full-scale, membrane-style WEC in Pembrokeshire. With four enormous membranes worth £200K each, Bombora's WEC is vulnerable to costly damage in high waves.

SWEEP solution:
Bombora approached SWEEP to develop a bespoke version of their OWWL model to generate more localised forecast data at higher spatial resolutions. A SWEEP team delivered five-day forecasts with details on wave height and wave power thresholds.

Key impacts:
- The new forecasts allow Bombora to plan experiments on the WEC demonstrator in advance and react more quickly when it needs to shut down the machine in adverse conditions.
- Material and repair cost savings will be realised, and greater profits will be delivered through avoiding unnecessary interruptions to energy production. This will contribute to increased investor confidence in wave energy technology.



OWWL forecast

CASE STUDY

SAVING LIVES AT SEA

The challenge:
Crantock is a popular beach in north Cornwall that has several significant bathing hazards: rip currents, estuarine currents and powerful breaking waves. The RNLI has seen a steep rise in safety incidents since 2014, including two fatalities when lifeguards were not present. The lifeguard service is under increasing pressure and in need of innovations that deliver and communicate improved hazard data.

SWEEP solution:
Working with the RNLI and community groups, SWEEP delivered bespoke daily hydrodynamic forecasts for Crantock, providing up to 5-days pre-warning of peak bathing hazards. These informed the development of innovative public-facing digital signage for beach hazard warnings, which is now installed in the beach car park.

Key impacts:
- A world first, community-led, science-based smart beach technology; enhancing beach safety.
- Contributed to 31 'out of hours' rescues and assists, and 91 advisories, at Crantock.
- Accelerated the delivery, and potential wider roll-out, of innovative RNLI water safety measures.


Crantock Beach, Cornwall

CASE STUDY

STRENGTHENING COASTAL PLANNING POLICY

The challenge:
Local authorities (LAs) are required under the National Planning Policy Framework to identify where shorelines are likely to change significantly over the next 100 years. These designated Coastal Change Management Areas (CCMAs) can then be used to inform planning decisions. LAs have often lacked the confidence, in-house expertise or consistent methodology to establish these designations. As such, very few CCMAs exist, and coastal development continues in active coastal zones with little regard for future shoreline shifts.

SWEEP solution:
The SWEEP team and partners developed a new, accessible, scientifically robust method for demarcating CCMAs for use by any LA. It takes into account the latest climate change projections and higher spatial resolution mapping to predict future shoreline positions and sea level rises.

Key impacts:
- New method applied to 115km of Devon coastline.
- Natural England created one new post with a coastal and CCMA remit.
- Strengthened 'material considerations' for coastal planning decisions in light of 28% of English and Welsh coastline experiencing erosion rates >10cm/year.

"SWEEP's work galvanised us into action, really helping Natural England to up its game and be a better advisor. It provided us with the confidence to have more informed CCMA conversations with our stakeholders across the South West, as well as on a wider, national platform – conversations that would not be possible right now without SWEEP."

Corine Dyke, Lead Advisor, Natural England.

IMPACT IN ACTION: RIVER CATCHMENTS

‘WHOLE CATCHMENT’ WATER QUALITY

Freshwater quantity and quality are leading environmental concerns for the South West. Numerous economic activities rely on good water quality, including the supply of clean drinking water, fish and shellfish aquaculture, and recreation and tourism. However, according to the Environment Agency, not a single river in England has a clean bill of health for chemical contamination. The SWEEP team worked with the water industry, the agricultural sector, landowners, government agencies and nature-focused NGOs to develop an integrated understanding of catchment-scale processes that not only impact on natural capital, but also on economic development and health and wellbeing.

CASE STUDY

REDUCING POLLUTION AT SOURCE

The challenge:
In 2017, South West Water (SWW) had begun designing their five-year Asset Management Plan and were planning for the related Price Review process 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 to be delivered through their innovative Upstream Thinking programme (UST) but, at the time, lacked the key evidence needed to support the investment case.

SWEEP solution:
Working with SWW and organisations like Westcountry Rivers Trust, SWEEP analysed and mapped pollution incidents and biodiversity enhancement opportunities. Crucially, this included the development of a Natural Capital accounting tool to value ecosystems services. This evaluated the economic and environmental impact of a range of catchment-wide interventions, including woodland management, peatland restoration and changes in agricultural practices.

Key impacts:
- Directly contributed to SWW being awarded £15m by Ofwat to deliver catchment-wide interventions aimed at tackling diffuse pollution; this helped safeguard 40 jobs.
- Evidenced water quality and biodiversity interventions on 50,000 hectares of land.

> “The SWEEP team helped us to look at our data in a new, and really valuable, way. We benefitted 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, Upstream Thinking Programme Manager, South West Water.**

CASE STUDY

RESPONDING TO FLOOD RISK

Whitford, Devon

The challenge:
Sudden flash flooding can be devastating, risking lives, homes and vital infrastructure. Damages in the UK are between £250M and £500M annually. The environment suffers through uncontrolled sewer discharges into rivers, lakes and bathing waters. Public health and tourism can also be affected. South West England has been particularly badly hit by surface water flooding, with major flash flood events at Boscastle, Coverack and Clovelly in recent years.

SWEEP solution:
SWEEP’s Strategic Screening Tool for Sustainable Drainage Systems (SuDS) was used by organisations in the South West in a range of drainage projects to deliver business efficiencies. Training in its use and other flood risk tools boosted capacity and commercial strategic advantage. A new Opportunity Mapping Tool further identifies where SuDS measures can be applied at scale, across Devon.

Key impacts:
- The SuDS Strategic Screening Tool supported projects valued at £355K and a further £370K in funding bids.
- Six staff trained in the use of SWEEP SuDS and flood risk tools.

> “The SWEEP SuDS project provided a huge opportunity for us… We are now able to offer a broader, integrated package of natural flood management and SuDS services to our clients which has definitely boosted our reputation and opened doors for us… A real game-changer for WRT!”
>
> **Nick Paling, Head of Evidence & Engagement, Westcountry Rivers Trust**

CASE STUDY

PAYMENTS TO PROTECT NATURE

The challenge:
Payments for Ecosystem Services (PES) schemes are designed to incentivise the conservation of natural resources. Payments can be made to farmers or landowners who agree to take actions to manage their land or watersheds in ways which sequester carbon or improve biodiversity or water quality.

SWEEP solution:
PES schemes can take many forms, from flat-rate payments to sophisticated market-based mechanisms. SWEEP research explored a range of design issues relating to market-based PES schemes. In collaboration with a range of public and private sector partners, and Exeter University’s Mechanism Design Team, these research findings informed changes to a range of active PES markets and trials.

Key impacts:
- Instrumental in improving the efficiency of Poole Harbour’s nitrate offsetting project and the Forestry Commission’s £50M carbon-reduction tree planting scheme, delivering net cost savings of £11.5M to business and £12.4M to the public purse.
- Ground-breaking trials of world-first catchment markets developed in collaboration with Wessex Water. This includes the Bristol Avon Catchment Market, designed with the Avon and Wiltshire Wildlife Trusts to secure fair prices for project suppliers and businesses buying environmental credits.

IMPACT IN ACTION: THE LAND

RESTORING TERRESTRIAL ECOSYSTEMS

Our landscapes and their habitats are coming under growing stress. Agricultural intensification has had a significant impact on soil, water and ecosystems. Over the past century, 97% of Britain's wildflower meadows have been lost, and with them many pollinating insects. As the UK's population increases, more homes are needed; the Government aims to deliver 300,000 new homes a year, half of which will be built on 'greenfield' sites, leading to biodiversity loss. SWEEP has developed new tools and approaches to address this decline in natural capital at a landscape, woodland and farm scale.

CASE STUDY

LET THE WILDFLOWERS BLOOM

The challenge:
Pollinator decline is of particular concern in the South West, which is home to rare bee species and contains almost a fifth of England's total farmed area. Despite initiatives to manage grassland less intensively, most of the region's grassland remains heavily mown, grazed and fertilised.

Wildflower Meadow; *Credit: Preston Browning, Unsplash*

SWEEP solution:
Working with partners across Cornwall, the SWEEP team developed a new version of Bee-Steward, a decision support tool that helps farmers and land managers understand how their practices affect bee survival and pollination. They carried out pollinator audits, produced pollinator management reports for landowners and businesses, and helped create a series of 3km-wide insect pathways by connecting wildflower-rich habitats.

Key impacts:
- Fast-tracked the UK's first county-wide approach to pollinator habitat management.
- 8,000ha of pollinator-friendly habitats created, safeguarded or enhanced.
- Innovative business solutions (e.g. wildflower planting at visitor attraction The Lost Gardens of Heligan) generating £400K in savings.

> "We now have over 40 hectares of new species-rich wildflower meadow restoration in progress on Duchy of Cornwall land. This is a significant area, and, along with our Plantlife partners, SWEEP was instrumental in making this happen."
>
> **Jeremy Clitherow, Natural Capital Advisor, Duchy of Cornwall.**

CASE STUDY

MAPPING HABITAT CHANGE

Kennick Reservoir, Devon; *Credit: Red Zeppelin, Unsplash*

The challenge:
We are in an age of open access geospatial data. This has the potential to revolutionise the way we understand and monitor landscape change, including loss of woodland, moorland and key habitats. However, highly complex remote sensing workflows are required to translate these data into user-friendly mapping tools that non-specialists can use to guide decision-making.

SWEEP solution:
SWEEP worked with the Dartmoor National Park Authority, the North Devon Biosphere Reserve and the Forestry Commission to create bespoke habitat mapping tools. They included methods to classify habitat types across the entire National Park area and detect changes in these habitats over time, and tools to map changes in woodland and hedgerow stock using satellite radar data.

Key impacts:
- Estimated partner costs savings of at least £750K over five years.
- Tools expected to play a key role in enabling North Devon to realise c.£40M in natural capital benefits and safeguard or create c.700 jobs by 2030.

> "This work has put us two or three years ahead of the game in terms of natural resource mapping data at landscape scale... It simply wouldn't have happened without SWEEP in this timeframe, and quite possibly would not have happened at all."
>
> **Richard Knott, Ecologist, Dartmoor National Park Authority.**

CASE STUDY

SMART TOOLS FOR SMARTER LAND MANAGEMENT

The challenge:
With land available for nature under increasing pressure from population growth and climate change, those responsible for terrestrial spatial planning need access to intuitive decision-support tools, to make informed decisions on land management and investments.

SWEEP solution:
The SWEEP team worked with Cornwall Council and The Cornwall Area of Outstanding Natural Beauty to develop a new environmental intelligence platform 'Lagas', a Cornish word meaning 'eye'. The platform adopted many of SWEEP's natural capital maps to guide decision making.

SWEEP's NEVO tool (Natural Environment Valuation Online), originally developed with Defra, was made more accessible for a wider range of users investigating the effects of potential land-use change.

Key impacts:
- More than 100 Cornwall Council and AONB staff were trained in the use of Lagas.
- NEVO's new functionality, developed under SWEEP, includes coverage of beaches and coastal areas. Users can also now upload their own shapefiles to create bespoke 'My regional' analyses.

IMPACT IN ACTION: PEOPLE

CONNECTING PEOPLE WITH NATURE

There is increasing evidence that spending time in nature leads to longer term improvements in our physical and mental health, and wellbeing. A study by University of Exeter and Public Health England estimated that exercising in natural environments – or 'green exercise' – delivers £2.2BN a year in health benefits in England alone. Yet much of the population is more disconnected from nature than ever before. Partnering with local authority and third sector partners in the South West, SWEEP researchers helped to inform interventions designed to bring people closer to the natural environment.

CASE STUDY

INVESTING IN NATURE FOR HEALTH AND WELLBEING

The challenge:
The UK Government's 25 Year Plan outlined a need for strengthening our understanding of health outcomes through investments in natural capital. However, limited cross-sectoral partnership working and a lack of evidence demonstrating exactly how health benefits can be realised have stalled progress.

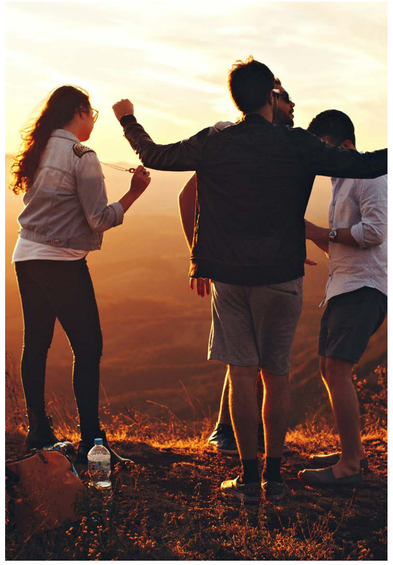
SWEEP solution:
SWEEP collaborated with key partners – Dorset Local Nature Partnership, Public Health Dorset, Cornwall Council, Wildfowl & Wetlands Trust, Dartmoor National Park Authority, Plymouth City Council – and established an online hub for sharing regional best practice for making more robust and equitable investments in the environment for health outcomes. The SWEEP team provided evidence to successfully support partners' business cases for their strategic investments.

Key impacts:
- A network of 118 stakeholders, and 12 evidence-based resources, strengthening cross-sectoral nature-based outcomes.
- Influenced seven business cases, secured five jobs and leveraged £2.43M in funding.
- Strengthened strategic thinking and evaluation for projects like Health and Nature Dorset and Plymouth's Green Minds Derriford Community Park.

> SWEEP resources are prompting discussions, informing conversations and sowing the seeds for a different way of thinking at WWT. This has significant potential to influence how we assess and value the health benefits of our work and ultimately manage new sites and advise policy development."
>
> **Jonathan Reeves, Principal Research Officer, Wildfowl & Wetlands Trust.**

CASE STUDY

BALANCING RECREATION WITH CONSERVATION



The challenge:
Dartmoor National Park Authority (DNPA) must weigh conserving and enhancing its unique landscape against the needs of residents, businesses and visitors. The local population is expected to increase by 13% by 2039 when day visits by residents are projected to rise 10% to 8M. Amid this uncertainty and change, DNPA was keen to explore new ways to manage and monitor its park.

SWEEP solution:
The SWEEP team applied a Natural Capital approach to identify mitigation measures and areas of potential conflict. Key wildlife hotspots were mapped and researchers predicted how local population growth would affect visitor numbers and footfall rates, and how this would impact on footpath erosion and wildlife.

Key impacts:
- Research revealed that each year Dartmoor provides an estimated £25.6M of welfare benefits to local residents, and this was expected to increase by £2.5M by 2039.
- Findings formed part of the evidence base for two key management plans for Dartmoor.

> We know that there are significant health and wellbeing benefits when people spend recreation time on Dartmoor but continuing to provide a growing population with easy access to the National Park can be a challenge."
>
> **Ally Kohler BEM, Director of Conservation and Communities, Dartmoor National Park Authority.**

CASE STUDY

ONE COAST FOR ALL

The challenge:
The One Coast project has a shared vision for a continuous, accessible nature-rich corridor around the South West coast for the benefit of nature and people. SWEEP responded to the need to articulate the economic context and how this ambitious scheme might be delivered in practice.

SWEEP solution:
This SWEEP project developed rich environmental and economic datasets, GIS maps of ecosystem services and a review of financing options, to support the National Trust and other partners, in identifying delivery mechanisms and priority investments.

Key impacts:
- Outputs from the project were used by the National Trust to produce an Advocacy Document which was shared with NT staff and the Cornwall and Isles of Scilly Local Nature Partnership Board.
- Supported business cases for £7.8M of National Trust funding bids submitted to the local nature partnership.

THE SWEEP JOURNEY

Much of SWEEP's immediate impact has been attitudinal or on organisational practice; laying the foundations to deliver truly transformational change. Longer term benefits are expected to accumulate over the next decade through improvements to natural capital, the economy and health and wellbeing – and from wider application of SWEEP approaches nationally and internationally.

INPUTS

£5M
Funding from UKRI and NERC

£7.3M
Match funding from 31 core partners

>£10M
Underpinning NERC-funded research

30
Impact Fellows

7
PhD studentships

13
Research leaders (PIs)

6
Impact & professional service experts

ACTIVITIES

57
Impact projects

473
Workshops & outreach events

SWEEP
Newsletters & comms channels


Collaboration & Co-creation


Capacity building


Innovative Knowledge Provision


Tailored Decision Support


Natural Capital Valuation

OUTPUTS

35
Impact summaries

325
Partners in SWEEP network

159
Products (e.g. new tools, models)

187
Reports, papers & policy notes

32 SWEEP
Films

SWEEP
Legacy website

SWEEP
Impact store

Cohort
Of academic & impact specialists

OUTCOMES

178
Business cases, strategies & investments influenced/informed

£115M
Partner investments influenced/informed

£78M
Funding leveraged

2,464
People trained to use SWEEP tools

2,800+
People using SWEEP tools

Effective
Durable partnerships

IMPACT

ATTITUDINAL

Natural Capital Approach
Embedded in South West decision-making & improved understanding

ORGANISATIONAL FUNCTION

Capacity
Improved to implement Natural Capital Approaches

ORGANISATIONAL FUNCTION

Profit & cost savings
£25M direct cost savings to business and public purse

£200M costs avoided by SW business, influenced

£8M profit & profit bonus to SW business, supported

HUMAN CAPITAL

New impact approaches
Training, tools & resources adopted beyond SWEEP

NATURAL CAPITAL

Nature enhanced, protected, safeguarded, more resilient, including
304km² seabed protected

84km² pollinator habitat created or enhanced
Coastline, water quality, biodiversity

HEALTH & WELLBEING

Health & wellbeing
3,626km² space designed for health and wellbeing in nature

31 beach rescues or help given, catalyst for

POLICY AND LEGISLATION

38 policies, legislation, regulation & implementation
Influenced / informed

ECONOMIC

£35M GVA
327 FTE jobs
Supported by funding leveraged (to 2028)
£12M GVA from cost savings to business

LONGER TERM, CUMULATIVE IMPACT

2017 2022 +10 YEARS

THE SWEEP LEGACY

A LIBRARY FOR LASTING IMPACT

A key SWEEP objective was to sustain the legacy of its work programme beyond the life of the original grant and extend the impact outside of the South West. To facilitate this, the team has published an online library of open-access tools. Applicable to other geographies, the Natural Capital principles underpinning these tools can be used to inform the practice of anyone delivering environmental improvements, anywhere.

Access our freely available SWEEP library of tools and resources;
sweep.ac.uk/resources/tools

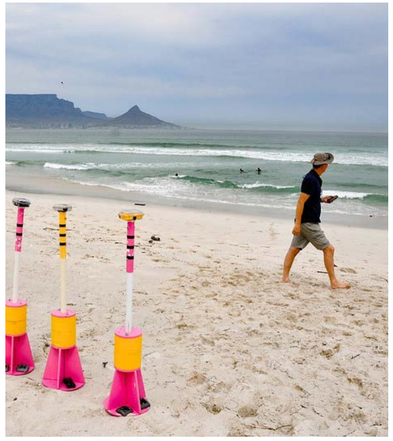
IMPACT BEYOND THE SOUTH WEST

SWEEP tools and methodologies are delivering benefits nationally and internationally.

1 SWEEP's OWWL wave forecast model has provided the University of New South Wales with best practice insight. Their researchers are working with the Australian Bureau of Meteorology to develop a novel coastal erosion Early Warning System for the entire coastline of Australia.

2 Working with the South African Weather Service, SWEEP created a version of OWWL for the Cape Town coastline to better predict hazardous storm events. The SWEEP team also delivered a pilot rip current forecast system, which will be used to generate public-facing warnings to increase beach safety.

3 Sustainable Drainage Systems (SuDS) tools were used in flood risk assessments and landscape management analyses in Yorkshire, the USA and Australia. In Melbourne, SWEEP's SuDS screening tool identified decentralised rainwater capture as the best strategy for limiting the impact of extreme intensity rainfall events.



Cape Town, South Africa

Coastal erosion, Australia

4 NEVO is being used by 1,460 people from a wide range of UK organisations; including local councils, national parks and commercial consultancies to investigate the effect of potential land-use change on carbon sequestration, water quality and biodiversity.

5 SWEEP researchers contributed to a Natural Capital Assessment for the Ascension Islands, which informed the designation of a new Marine Protected Area. They also embedded SWEEP methods in a process to raise awareness among coastal communities in Indonesia, Vietnam, Malaysia and the Philippines of the value of their natural capital. Within the UK, SWEEP informed the understanding of marine Natural Capital in Sussex, Tyneside and Yorkshire.

OPEN-ACCESS TOOLS

GeoNode
A platform for the management and publication of geospatial data. It brings together open-source software within an easy-to-use interface that allows non-specialist users to share data and create interactive maps of natural assets.

HCaCD
The Habitat Classification and Change Detection toolbox, first applied to Dartmoor National Park, enables consistent, repeatable mapping of habitats. It identifies and maps pixels where change has occurred over time.

THaW
Using satellite-borne radar data, Tree, Hedgerow and Woodland high-resolution mapping tools detect changes to habitats in near real time, visualising the loss or gain of canopy cover, woodland and hedgerow.

SuDS
The Sustainable Drainage Resource Hub offers screening and mapping tools to speed up use of 'green' drainage systems, which adopt natural approaches (green roofs, ditches, ponds) to counter flash flood risks.

NEVO
The Natural Environment Valuation Tool quantifies and values the effects of land use change through ecological and economic systems. Under SWEEP, NEVO's functionality and accessibility were significantly enhanced.

UST
The Upstream Thinking Portal was developed to capture and visualise interventions undertaken by South West Water to apply natural landscape-scale solutions for the improvement of water quality and supply.

LAGAS
An environmental intelligence platform for Cornwall that has made available, for the first time, mapping tools and geospatial information on the relative value of natural assets and services across the county.

OWWL
The Operational Wave and Water Level model delivers site-specific coastal hazard forecasts to protect the environment, save lives and guide marine business decisions. A bespoke version is being developed for South Wales.

RDRes
SWEEP's Regional Development Resources are for local authorities, who can use them to evidence the benefits of the Natural Capital Approach for business cases, development of Local Plans and new policy initiatives.

The team has created the SWEEP Manual to provide a set of practical 'how to' guidelines for those undertaking environmental and natural capital projects, based on SWEEP approaches that were tested and adopted. It is online at
sweep.ac.uk/resources/sweep-manual

TOWARDS A GREENER FUTURE

SEVEN SWEEP LESSONS

1 SWEEP's Natural Capital-driven approach has provided evidence that a three-way balance between environmental improvements, economic gains and social benefits can be achieved.

2 SWEEP outcomes have shown how we might collectively think differently about economic success and how we measure it, and hence act differently to protect and enhance both our prosperity and the natural world.

3 Environment-focused research, innovation and impact programmes are ideally suited to addressing key policy priorities. SWEEP has helped to 'level up' one of the UK's poorest regions and contributed to the Net Zero, Green & Clean Growth and Biodiversity Net Gain agendas.

4 An emphasis on building durable partnerships with hundreds of business, government and third sector organisations, and using interdisciplinary research to underpin collaborative working practices, can enable better decision-making.

5 SWEEP's emphasis on place-based impact has created a model and set of principles that can be replicated in, or adapted for, other geographic regions, especially other coastal communities.

6 Unique approaches pioneered by partnerships like SWEEP can build valuable human capital: 15 SWEEP Impact Fellows and other staff and students have secured further employment and/or been promoted, both in academia and industry; nine new PhD studentships were unlocked; funding was leveraged for a Centre for Doctoral Training in Sustainable Management of UK Marine Resources.

7 A dedicated, well-resourced and experienced impact support and communications team is essential if the funding of these types of impact-driven research programmes is to maximise real-world benefits.

Dawlish Warren, Devon; *Credit: Nick Russell, Unsplash*

"The climate and biodiversity crises, combined with the need to address social inequality, mean we have to grasp and embrace new, integrated ways of working that enable a more resilient and enhanced natural environment, producing gains for business, government and society.

SWEEP has delivered a proven approach showing how strategic funding of such integrated actions can unlock the value of research to society, at scale.

Ian Bateman, Professor of Environmental Economics at the University of Exeter and Director of SWEEP.

ENGAGE WITH US

Access SWEEP's tools, resources, best-practice manuals and case studies via the SWEEP legacy website **sweep.ac.uk**

To speak to our SWEEP team, please contact **sweep@exeter.ac.uk**

Dig deeper into the University of Exeter's interdisciplinary research on better understanding and tackling environmental and climate change at our **Green Futures website**

And join our **Green Futures Network** to contribute to collective approaches to the climate and ecological emergencies and to access events, resources and communities of practice.

Find out how Plymouth Marine Laboratory is working towards a sustainable ocean future through the delivery of impactful, cutting-edge environmental and social science at **pml.ac.uk**

Explore how the University of Plymouth, with one of the largest marine and maritime portfolios in Europe, is advancing the sustainable use of the marine environment through a systems-thinking approach to research, education and innovation. **plymouth.ac.uk/research/institutes/marine-institute**

"Our economies, livelihoods and well-being all depend on our most precious asset: Nature."

The Economics of Biodiversity: The Dasgupta Review (2021)

Image credit: Illustrative Science 2022

SWEEP was funded between 2017 and 2023 by UK Research and Innovation (£5m), as part of Natural Environment Research Council's Regional Impact from Science of the Environment (RISE) Programme. This programme is aimed at "bringing research organisations together with businesses, policy bodies and other actors contributing to economic development specific to their location, to deliver significant regional impact from NERC environmental science." SWEEP also benefited from £7.3m in partner match funding.

Editorial: Researchful
Design: Boyle&Perks