WATER QUALITY AND AGRICULTURE

Payment for Ecosystems Services (PES) schemes to reduce the adverse water impacts of land management in England

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National water quality context and main challenges, including the costs of water pollution

England is a developed and mostly post-industrial society with associated water quality issues. Former problems of water pollution from point sources such as factories and other industrial activity have declined through both structural change in the economy and effective regulation. That said, legacy water quality problems from industrialisation include persistent pollution from old mine workings (now managed through public investment in the absence of historic polluters), and morphological alteration to waterbodies as a result of human activity (such as navigation, use of water for power, flood defence activity etc.).

The most significant modern water quality problem is "diffuse" pollution which is difficult to attribute to specific sources. This arises in both rural and urban areas. In the former, agriculture and rural land management collectively causes pollution to waterbodies from runoff of pesticides, nitrates, sediment, organic material etc. In urban areas, a range of substances from silt and sewage overflow to metals and chemicals typically pollute the urban water environment, which is also often characterised as heavily modified from nature in terms of morphology. This can make the water environment unattractive to those living in urban areas, with many waterbodies in towns and cities suffering from legacy modifications reflecting earlier economic uses and pollution.

Population and economic growth contribute to diffuse pollution. Growth in urban areas has increased pressure on sewerage systems which risk more frequent overflow. Vibrant urban development activity increases the likelihood of drainage systems being misconnected, with sewage ending up in places where it shouldn't. Similarly, historic policies such as agricultural subsidy frameworks and land use planning systems have contributed to water quality pressures.

Water quality is improving, however, through regulation and investment. Since 2010, water utilities have invested around £3.5bn in improving the water environment. Although 19% of surface waters currently meet "good" or better ecological status as defined in the EU Water Framework Directive, this status involves meeting all of a number of sub-elements such as fish, plant life and water chemistry. When considering those underlying elements individually, some 83% achieve good or better status.

The economic cost of water pollution in England is difficult to estimate, though a 2010 report by the National Audit Office put the cumulative cost of water pollution at between £700m and 1.3bn per annum (NAO 2010). More recent work to assess the costs and benefits of options to deliver the Water Framework Directive suggests that the benefit from preventing deterioration and improving the water environment where technically feasible amounts to around £23bn (Environment Agency 2015).

National policy responses to manage water quality

Point-source pollution has historically been tackled through a framework of regulation implemented by Her Majesty's Inspectorate of Pollution and now the Environment Agency, which is mature. Since 2000, England as part of the UK has adopted an approach set out in the EU Water Framework Directive (WFD) which involves plans to improve the water environment, and prevent deterioration, in each of ten River Basin Districts. Over the 2015-21 period, improvements worth £3.7bn are being implemented across a variety of sectors, with 14.5% of waterbodies expected to see some improvements in at least one quality element. The WFD brings together the management of water quality (including bathing and shellfish waters) with water abstraction and flood management. To be fully successful, this involves strong collaboration both across water management sectors and across stakeholders, and the rational geography for managing such complex interactions is the rural or urban catchment or watershed. English water management is, in principle, built on the internationally recognised practice of Integrated Water Resource Management.

In practice, developing a fully collaborative catchment-based approach to water management has taken time, and is ongoing, but in recent years the Department for Environment, Food and Rural Affairs (Defra) has sought to accelerate the development of a governance framework to deliver true collaborative catchment-based management. Alongside this, it has provided public funding for rural and urban water improvement measures, and worked with the economic regulator of the privatised water utility sector (the Water Services Regulatory Authority or Ofwat) to ensure the water services sector plays a full part in improving the water environment and preventing deterioration. Defra and the Environment Agency also regulate agriculture and provide support to help farmers meet their requirements and improve the water environment.

Case study of innovative water quality policy instrument

Project/Policy Overview

This case study concerns the actions the English water utility industry has taken to work with rural land managers to improve water outcomes. Work in this area has mostly developed since the early 2000s. As already suggested, the rural land management industry (including agriculture) can have a large impact on the water environment, through its practices in terms of pesticide and fertiliser use, control of sediments, drainage arrangements, choice of planting etc. For water utilities, land management practice can lead directly to different requirements to treat water for drinking or return to the environment. The primary pollutants which water utilities have to deal with are nitrates, phosphates and sediments. It is estimated that since the 1989 privatisation of the water sector up to 2015, the industry has invested around £1.7bn in traditional treatment approaches to reduce the levels of pesticides and nitrates in water (Ofwat 2011). The scale of these costs has been a key driver for the industry to pursue new ways of working with land managers to reduce pollution, at the catchment scale.

Although there have been more than 100 individual catchment-based projects, this case study focuses on two of the largest schemes: the Sustainable Catchment Management Programme or "ScAMP" run by United Utilities in the North West of England; and the "Upstream Thinking" project run by South West Water. Both of these projects have involved the companies making alternative investments in land management to improve water outcomes – mostly for water quality but also for water resources, flood risk and wider biodiversity benefits.

Reasoning for reform and the introduction of the instrument

A key driver for reform has been a recognition that, in a wider social sense, it is not efficient to pollute at source through sub-optimal land management practice and then have to consume resources "downstream" to remove pollution. Rather, it would be more efficient to tackle pollution issues at source, and this could lead to cost savings for water utilities and customers (and possibly also land managers too if it is possible to adjust management practice for low cost without impacting revenues). In economic terms, externalities are part of the reason why the efficient solution does not occur– land managers do not face the costs of water treatment and there has not been a mechanism to recognise those costs through transactions. In addition, there may be an information failure in that land managers may not be aware of downstream problems and/or may not be able to identify alternative management approaches even if they impose little cost on themselves.

Water companies began to explore the scope to work with land managers in the early 2000s. The ScAMP project, for example, was started by United Utilities in 2005. To the extent that water companies were considering diverting investment from traditional water treatment into land management, this required the agreement of the regulators of the sector, Ofwat (economic regulator), the Environment Agency (pollution regulator), and the Drinking Water Inspectorate. A key concern of the regulators, especially OfWAT, was that land management approaches were felt to be less certain in their outcomes than traditional treatment approaches. A "worst case" scenario was felt to arise where water companies spent significant sums altering land management, through investments with farmers and others, but the outcomes were not sufficient to deliver any detectable saving in downstream water treatment costs.

Nevertheless, at the 2009 Price Review, Ofwat supported companies' proposals to spend £60m on more than 100 catchment management schemes and investigations. Ofwat later said that "at the time, our support for this approach represented something of a departure for us. This is because of the significant uncertainties that surround its use". (Ofwat 2011).

South West Water – Upstream Thinking (www.upstreamthinking.org)

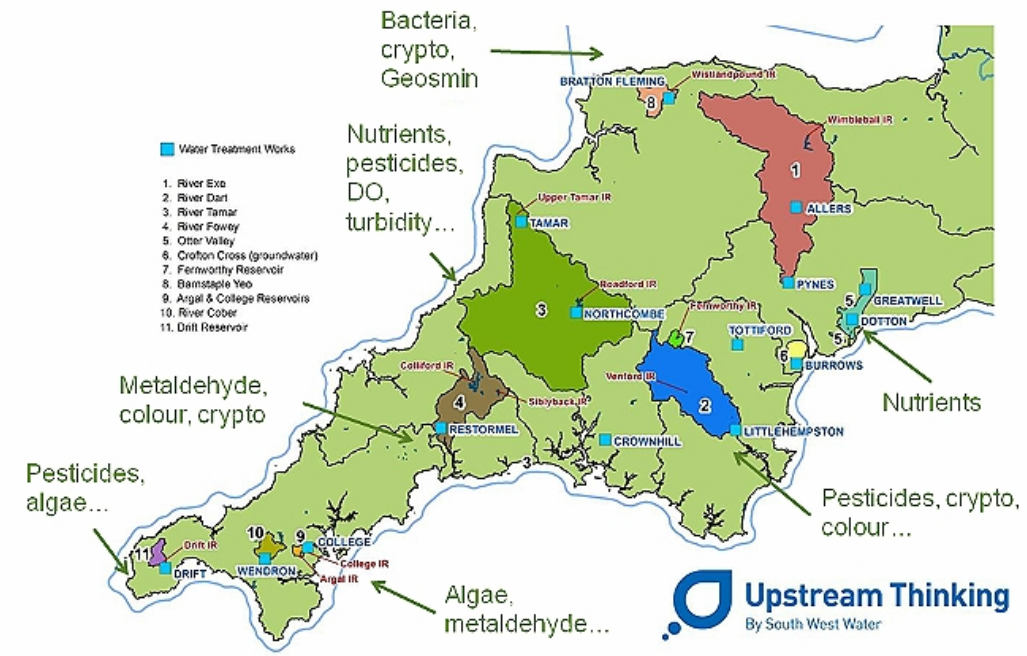
Upstream Thinking is South West Water's catchment management scheme which has been applying natural landscape-scale solutions to water quality issues since 2008. The current programme is being delivered through a partnership of South West Water, the Devon Wildlife Trust, the Cornwall Wildlife Trust, the Westcountry Rivers Trust and the Exmoor National Park Authority. Upstream Thinking is a sustainable approach, working with the expertise of partners, the knowledge of farmers and nature itself to improve raw water quality at source. This keeps down costs for water company customers and reduces the impact of water treatment on the environment. The target for the programme is 750 farms and 1,300ha of moorland and other semi-natural land under revised management. The main delivery partner organisations also work closely with a wide range of stakeholders including the Environment Agency, Natural England, the Farming and Wildlife Advisory Group (FWAG), the National Farmers Union and the local Catchment Partnerships. Over the 2015-20 period, the latest £11.8m programme is focussing on 11 catchments across Devon and Cornwall.

Farm advisers visit farms and carry out an assessment resulting in a whole-farm plan. This includes a water management plan and includes future capital investment proposals targeted at water quality improvements, which will be up to 50% funded by Upstream Thinking. These can include improvements to slurry storage, fencing to keep livestock out of rivers, providing alternative water sources for livestock, and better pesticide management including investment in new equipment such as weed wipers which deliver targeted doses of herbicide. A map of some of the key catchments for action and the issues being addressed is provided in **Figure 1**.

The programme is also concerned to improve the quantity of water held on Exmoor as a sensitive upstream area, to improve peatland, reduce sediment loads in watercourses and reduce flood risk downstream. This has been achieved by blocking up drainage ditches (see **Figure 2**), with a target of restoring 500 hectares of peatland over the 2015-20 period. Delivered by the Exmoor Mires Partnership, this part of the Upstream Thinking programme successfully investigated and restored over 2,000 hectares of land on Exmoor in 2010-15.

The overall programme is fully endorsed by the Environment Agency, Natural England and the Drinking Water Inspectorate. The work is targeted to benefit 15 water treatment works supplying 72% of the total daily water to customers.

Figure 1 Upstream thinking – catchments and issues



Courtesy South West Water / upstreamthinking.org

Figure 2 Ditch blocking to enhance water retention on Exmoor

Courtesy upstreamthinking.org / Exmoor Mires Project
United Utilities – Sustainable Catchment Management Programme (ScAMP)
(http://corporate.unitedutilities.com/cr-scamp.aspx)

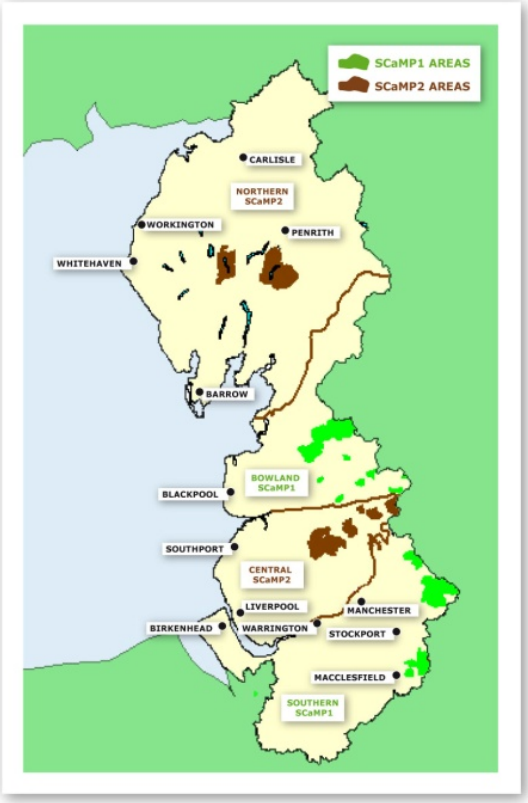
A key feature of ScAMP is that United Utilities own some 56,000 hectares of rural land in the North West, which is held to protect the quality of water entering its reservoirs. Much of this land is home to nationally significant habitats for animals and plants, with around 30% designated as a Site of Special Scientific Interest (SSSI).

SCaMP began in 2005 with the aim of benefitting both water and wildlife through improved catchment management. SCaMP 1 (2005 to 2010) included projects across 27,000 hectares of water catchment areas in the Peak District and the Forest of Bowland. Working with farm tenants and in conjunction with partners, such as the Royal Society for the Protection of Birds, Natural England and the Forestry Commission, the programme invested £10.6 million in moorland restoration, woodland management, farm infrastructure improvements and watercourse protection. Like South West Water's Upsteam Thinking project, rehabilitation of moorlands to protect sensitive habitats, improve water retention and thereby reduce erosion and sediment losses was a key aspect.

Following on from the success of SCaMP 1, water industry regulators Ofwat, DWI, Environment Agency and Natural England supported further investment for catchment management between 2010 and 2015. During this time United Utilities invested a further £11.6 million in SCaMP 2 across 30,000 hectares in Cumbria and South Lancashire which included 53 separate farms, agricultural land and common land. **Figure 3** shows ScAMP areas under the programmes running up to 2015.

To allow land to start to recover and to establish woodlands, significant changes were required to agricultural practices and often a reduction in livestock numbers. SCaMP improvements were designed in conjunction with other agri-environment schemes which also allowed Natural England and the Forestry Commission to provide grants totalling £2.7 million towards the cost of the work.

Figure 3 SCAMP 1 and 2 areas



Courtesy United Utilities.

Following SCaMP 2, the initiative has broadened out to work not only on United Utilities' own land, but also with other catchment initiatives. In particular, United Utilities has contributed funding to the 16 North West Catchment Partnerships set up by the Department for Environment Food and Rural Affairs (see the separate case study on the **Catchment Based Approach in England**), and has set up a "Catchment Wise Intervention Fund" to contribute to 15 projects. There is also a SCaMP 3 programme which is focussing on 29 drinking water safeguard zones in surface and groundwaters. These zones are drinking water catchments where water quality in rivers, reservoirs or groundwater is deteriorating and is becoming harder to treat, due to human activities on the land. Safeguard Zones can be used to target measures, advice and incentive schemes for landowners and managers to help improve water quality. The approach will combine both investment on United Utilities' land with investment in partnerships on non-owned catchments to address deteriorating raw water quality. For this broadened approach, the SCaMP methods for moorland restoration, woodland planting, agricultural advice and diffuse pollution source-pathway investigations will be applied.

Project/Policy Outcomes

Upstream thinking

Monitoring of the programme is showing increases in plant and animal life like dragonfly and mayfly which are indicators of good water quality. Research carried out on the moors by the University of Exeter has shown that restored bogs release a third less water during storms and 30% less dissolved organic carbon from the peat. Research by the Environment Agency also indicates improvements in summer baseflows in local rivers.

ScAMP

After eight years of hydrological and water quality monitoring, the effects of SCaMP land management and interventions have had significant effects on water quality in key locations and, overall, the effects have been beneficial. As each year passes and the SCaMP monitoring dataset expands it is easier to see trends in the data and to compare SCaMP data to other moorland management data sets from across the UK.

Challenges with implementation and requisites to make the instrument work

Although physical evidence is emerging on the water quality benefits of working with land managers in catchments, through water companies making investments to pay for ecosystems services, the economic evidence on the costs and benefits of the approach has been slower to emerge. In its 2011 report, *From Catchment to Customer,* Ofwat acknowledged a lack of hard economic evidence on the net benefits of land management Payment for Ecosystem Services (PES) approaches. It also highlighted the role for polluter-pays mechanisms alongside the beneficiary-pays approach which characterises the water company schemes. Nevertheless, Ofwat does see a role for PES schemes, saying "Water customers could legitimately expect to pay for those elements of catchment management that bring direct and measurable benefits to them, under the principle of paying for ecosystem services" (Ofwat 2011).

References

National Audit Office, 2010 – Tackling diffuse water pollution in England, Report by the Comptroller and Auditor General, July 2010.

Environment Agency, 2015 – Impact Assessment; Update to the river basin management plans for England's water environment, October 2015.

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