

Environment and Rural Affairs Monitoring & Modelling Programme (ERAMMP) Sustainable Farming Scheme Evidence Review Technical Annex

Annex 6: Public and private funding

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1 Introduction

This task differs in scope and format from the others covered by the Evidence Review. The WG brief is to:

- *Identify examples of best practice where a combination of public and private funding is securing environmental outcomes*
- *Identify through case studies how and where such approaches could be operationalised within Wales as a mechanism for securing environmental outcomes. In undertaking this task identification of potential funders and beneficiaries is required.*

1.1 Scope of the brief

Most environmental outcomes have characteristics of both public and private goods, including many of those considered by this Evidence Review (e.g. water quality, soil carbon, woodland management and peatland restoration). Therefore, despite the potential conflict, it is within this area of overlap between public and private goods that most opportunities to combine funding sources are likely to exist.

Most of the public-private funding schemes in Wales where the outputs (but not always the outcomes) have been well-documented have both characteristics (e.g. Pontbren, the Pumlumon Project). Indeed it is hard to see how it will be possible to attract private funding from commercial companies unless there is an actual (or perceived) benefit for them, or the funding source has altruistic motives.

1.2 Finding examples of best practice

The Annex illustrates a range of examples from literature of different types of PES, but it is not possible to evaluate the impact of these on the provision of environmental outcomes, or to judge how 'good' they are as models, for several reasons:

- the payments are for actions rather than measurable outcomes/results
- the projects have not been monitored for environmental impacts
- the projects are still in the inception stage or have not been running long enough to monitor environmental outcomes.

The examples have been assembled from both published and unpublished reports (mostly grey literature) and are referred to in the text where appropriate, but no attempt has been made to categorise the examples by environmental (and other) objectives, lead organisations, funding sources, governance mechanisms, geographical scale and other characteristics, as this would not provide a representative picture of funding examples.

2 Rationale of public/private funding for environmental outcomes

There are several different types of market-based instruments which may be used to secure environmental outcomes. CASCADE & etec (2014) identified three situations where market-based instruments are used in the context of ecosystem service provision, all of them with current examples in the UK:

- to correct a **market failure**, when ecosystem services are not taken into account (e.g. water companies in England paying for ecosystem services in their catchments);
- to correct an **information failure** so that a premium can be charged for products associated with more environmentally friendly management (e.g. organic certification, protected designation of origin (PDO) labelling); and
- to **raise revenue** which is used to invest in environmental protection and enhancement and to raise awareness (e.g. environmental NGOs including the National Trust, RSPB, Welsh Wildlife Trusts, Coed Cymru and the Woodland Trust).

There are many different market-based instruments with potential to be used in these situations. They include payment for ecosystem services (PES), private equities, green bonds, environmental certification, biodiversity offsets and compensatory measures, licensing rights and sponsorship. However, during the past 20 years the concept of paying for ecosystem services has become much more prominent in discourse about environmental policy for rural land management. The 2014 study for the Welsh Government assessing the potential for ecosystems market mechanisms concluded that PES was one of the most relevant mechanisms for Wales (CASCADE & etec 2014). The authors defined PES as:

“voluntary payments to land-owners, managers and others to undertake actions that increase the quantity and quality of desired ecosystem services, which benefit specific or general users, often remotely”.

PES has been the basis of many of the recent practice-based efforts to combine public and private funding for land management, both here and elsewhere in the EU. It is worth pointing out that PES are not new, and in the UK have been the basis of agri-environment payments to farmers since the 1980s and of individual contractual arrangements for much longer – for example, management contracts with farmers managing NNRs, or restrictive environmental requirements in tenancy agreements (reflected in the rent) where the landowner is an environmental NGO.

2.1 Role and motivation of different actors in PES

Defra's Best Practice Guide for PES (Smith et al, 2014) identifies four groups of PES actors:

- buyers - the beneficiaries of ecosystem services, who are willing to pay for them to be safeguarded, enhanced or restored
- sellers - the land and resource managers whose actions potentially can secure the supply of the ecosystem services
- intermediaries - who act as agents linking buyers and sellers and can provide guidance on scheme design and implementation, act as the “honest broker” in

negotiation, and provide finance in terms of loans for feasibility and start-up costs, promotion, collecting and transferring payments, and

- knowledge providers - including resource management experts, legal advisors and others provide knowledge essential to scheme development, monitoring, evaluation.

The bodies which fulfil each of these roles are very diverse and it is worth considering what their motivations may be.

2.1.1 Buyers of PES

Matzdorf et al (2014) point out that the user-financed or beneficiary funded payments described as ideal in the economic theories have so far occurred very rarely in practice – especially if only those in which government plays no role whatsoever are considered to be the ‘ideal’ user-financed PES (i.e. as real alternatives to governmental action).

One of the underlying reasons for this scarcity of user-financed PES is fairly obvious, in that a clear business case for the private sector exists only when the private company is dependent on the ecosystem service for its business model. This explains the prevalence of PES involving a water company paying for land management in their catchment area.

However, a business case is not the only motivation for potential buyers. There are some who expect to improve their image by paying for biodiversity and ecosystem services, thus seeking a more indirect commercial benefit from the PES (especially if their business activities have negative external effects on ecosystem services and biodiversity). However, it is unclear how long-lived this motivation will be, once the initial publicity benefits have been achieved. Some businesses (and charitable Trusts or Foundations set up by business owners) may have altruistic motives, where the interests of others or the well-being of the community, including future generations, are the driving force, or if they simply want to preserve nature for its own sake (Matzdorf et al (2014). It is noticeable that many of the examples from the UK and elsewhere include private funding from charitable trusts or other non-commercial sources (e.g. the National Lottery).

A recent analysis of PES in the EU revealed that public funding is still currently the main financial source for most PES projects and, of the schemes reviewed, just 38% involved private funding, although private businesses and individuals are the main service providers (EY and Biotope, 2017).

All funding options have a major interaction between the minimum standards for scheme entry and the additionality of maintaining (against likely degradation) or improving the environment. This additionality is important to demonstrate to any third party private funder, and is a necessary part of business plans which need to have a system for telling funders what will be monitored to demonstrate their impact.

2.1.2 Sellers or suppliers and their intermediaries

In their empirical review featuring 19 PES in the UK, Germany and the US, Matzdorf et al, (2014) found no suppliers who acted solely out of commercial considerations; this is particularly true for ‘intermediary’ suppliers who are highly self-motivated when it comes to the conservation and improvement of ecosystem services and biodiversity.

These intermediaries implement PES at the regional or local level, and generate a spirit of trust and cooperation among the final service providers (if they are not the final providers themselves) while integrating them into the development and implementation process. To engage the involvement of the service providers, Matzdorf et al, (2014) argue that it is essential to have committed intermediaries, recognized by the stakeholders and rooted in the region or locality, in different functions. In the examples they studied, the initiative for the development of successful PES comes mainly from the supply side.

2.1.3 Knowledge providers

In the UK and Wales much of the innovative PES work has been supported by knowledge providers who may be the brokers themselves (for example in the case of an NGO), local authorities including National Parks, research and advisory services and specialist consultants and legal advisers.

3 Potential for a public and private funding in Wales

3.1 Future buyers of PES

The most obvious motivation for private funders is that shared by all the water company examples we have looked at, the clear business case for them to buy ecosystem services in the expectation that this will reduce current or potential costs of water treatment. In the future there may be similar business motivations driven by climate policy and carbon markets, but it is difficult to envisage such a clear cut business case for ecosystem services that are public rather than private goods. For example, air quality, clean rivers and beaches, attractive landscapes, and the biodiversity that underpin these goods also has value for many people independent of their use.

3.1.1 Water quality

Examples of the business case for water companies to buy ecosystem services include reducing their ‘end of pipe’ treatment costs (United Utilities in the UK) or minimising the risk of groundwater nitrate levels breaching regulatory maxima (Vittel in France). Welsh Water is not currently involved in any schemes of this type, although in the past they have had to invest in improving water treatment facilities to address problems in agricultural catchments (e.g. following the 2005 outbreak of *Cryptosporidiosis* in North Wales¹).

Although water utilities may have a direct business interest in water quality there could be other indirect business motivations for cleaner water, for example from processing industries which individually draw water or discharge waste water into rivers or estuaries within legal limits, but where the collective impact could limit the provision of ecosystem services. PES cannot pay for pollution which should be enforced through regulation, but Box 1 describes a scoping study in South Wales for a PES nutrient offsetting scheme for farmers in a catchment where further business development is inhibited unless the existing nutrient load can be reduced. Hence, businesses which might move into or expand within the area, and the government agencies seeking to stimulate the local economy would both be potential buyers of PES.

Box 1: Potential to deliver PES to reduce nutrient loading in Milford Haven/Cleddau catchment

The problem: The Milford Haven catchment is rich in wildlife resources and also has some of the most fertile agricultural soils in Wales. Nutrient loading into the catchment is a significant contributor to this problem. The current ‘unfavourable’ conservation status of the SAC is also directly attributed to diffuse agricultural sources outside the SAC itself. The regulator, Natural Resources Wales (NRW), considers that there is no scope for additional loading in the catchment, which impedes commercial and industrial development.

Initial research into PES feasibility: previous work has shown that the combination of rich natural capital and high concentrations of industrial economic activity generates the ideal conditions for the development of PES schemes. The Welsh Government’s 2014 Nature Fund supported the creation of an Ecosystem Enterprise Partnership (EEP) to investigate alternative and nature based solutions to the problems. The Partnership commissioned a report to investigate the potential for a market-based nutrient offsetting scheme for the

¹ Public Health Wales (2006)

Milford Haven and Cleddau catchments. The idea was that if farmers could be incentivised, through a PES approach, to adopt and maintain different land management practices then the agriculturally linked nutrient loading entering the Catchment would decline, allowing the development of new (polluting) industrial/commercial ventures without breaching the upper limit on nutrient levels. The broader aim was also to effect overall reductions in diffuse and point source pollution levels. The EEP commissioned a report (Cascade and ADAS, 2015) which concluded that the catchment had many of the required elements in place for a viable PES scheme, but there was no suitable 'off the shelf' model – a bespoke scheme would be required.

Preparing a detailed outline: The Building Resilience in Catchments Sustainable Management Scheme (BRICS SMS) project, managed by the Pembrokeshire Coastal Forum (PCF) which is a partnership framework between land managers, industry, commerce, government and third sector, is leading the next stage in the process. This will be a detailed outline of how a bespoke nutrient trading scheme should be designed, implemented, operated, monitored and also how it could potentially be rolled out elsewhere. A project team comprising ADAS, EnTrade and the Ecosystems Knowledge Network will work collaboratively with the BRICS Steering Group to deliver a business development plan for the Milford Haven/Cleddau Catchment and beyond, consisting of:

- a report on drivers and structures
- a report quantifying nutrient reductions and management actions
- an implementation plan

Source: ADAS (pers.comm)

3.1.2 Woodland carbon

The Woodland Carbon Code (WCC), introduced in 2011, is the UK standard for woodland creation projects which in time will generate verifiable, tradable Woodland Carbon Units (WCU). Each WCU is a tonne of CO₂ which has been sequestered in a WCC-verified woodland. Projects are checked every 10 years and, if performing well, are verified. Until that point companies can plan to compensate for future emissions, based on Pending Issuance Units (PIU) - effectively a 'promise to deliver' WCUs in the future, based on predicted growth. PIU are available now from a growing number of new woodland projects, and there are several verified projects with a small amount of WCU which can be used by UK companies to report against emissions or use in claims of carbon neutrality, as soon as the units are purchased².

3.1.3 Peatland carbon

The Peatland Code version 1.1³ is a new voluntary standard for UK peatland projects wishing to market the climate benefit of restoration and to facilitate private investment motivated by corporate social responsibility. Launched in 2017, the current version is not intended for use in carbon offset schemes, corporate carbon reporting or to be traded on international carbon markets. The Code sets out a series of best practice requirements including a standard method of quantification which, when validated by an independent body, will give assurance to buyers that their purchase will return verifiable climate benefit over the project duration.

Research during the development of the Code showed that potential business sponsors want quantitative, robust information about GHG emission reduction benefits, and are attracted to other benefits of peatland restoration, particularly for

² <https://www.woodlandcarboncode.org.uk/buy-carbon/what-are-woodland-carbon-units> accessed 31 May 2019

³ For details see <http://www.iucn-uk-peatlandprogramme.org/node/325>

biodiversity and water. This research also suggests that ‘early adopters’ of the Code are likely to be NGO peatland owners, because they may be more competitive on price than private landowners, due to lower operational/profit deductions and a lower perception of risk (IUCN, 2015). The first project to be certified, at Dryhope in the Scottish Borders in 2017, was developed by Forest Carbon (the company which had achieved the first project registrations under the Woodland Carbon Code six years earlier). In Wales, the owners of a total of over 345ha of peatland where restoration is planned or taking place have applied for certification (at Abergwesyn Hill in the Cambrian Mountains, by the National Trust; at Glaslyn Nature reserve, by the Montgomeryshire Wildlife Trust; and at Blaen y Coed in Snowdonia, by the Welsh Peatlands Sustainable Management Scheme)⁴.

3.2 Potential suppliers of PES

3.2.1 Example of supply chain analysis - Pumlumon

Building on the Pumlumon Project, a new study (Image and Lewis-Reddy, 2018) has collected evidence on the current state and potential of markets for ecosystem services from the area, by exploring potential supply chains from the perspective of potential beneficiaries of each service. This takes into consideration how beneficiaries could form contractual or semi-formal relationships with those supplying the service, recognising that these relationships may involve intermediate steps and external actors.

The authors explain that the reasons for taking this approach include:

- ecosystem services are seldom provided in isolation, because sustainable land management activity usually provides concurrent benefits for different services. It is not practicable or desirable to disaggregate each ESS into a separate contractual arrangement, and a supply chain approach can reflect multiple services, bundled together
- beneficiaries find the standard ecosystem service terminology and categorisation rather dry and distant, and a supply chain approach reflects the experiences more realistically and may be better aligned to a buyer’s perspective
- some supply chains already exist and might offer both insights and the possibility of bundling other ecosystem service into existing supply chains, and
- reducing a large and complex set of ecosystem services into a smaller and more manageable number of supply chains could simplify both the market assessment and buyer identification.

The project’s overall assessment of the feasibility of delivering a PES for more sustainable management of natural resources in the Pumlumon project area is summarised in below in Table 3.2.1.1. The study concludes that the potential scale of supply of land for peatland management and woodland creation is significant, but for water quality only a small area is relevant (linked to two point sources). The potential scale of demand for carbon offsets is good (but not necessarily for Welsh carbon), and woodland carbon has not yet taken off in Wales. Demand for water quality is limited, and by far the largest demand in the project area is for recreation.

⁴ <http://www.iucn-uk-peatlandprogramme.org/node/2522> accessed 31 May 2019.

Table3.2.1.1: Pumlumon Supply Chain Analysis: Overall assessment of feasibility

Supply Chain	Scale of Supply	Scale of Demand	Monetary value of PES	Other value generated	Readiness of Buyers	Readiness of Institutions	Feasibility of PES
Phys. Goods	High	Low	Moderate	Low	High	Moderate	Moderate
Peatland Carbon	Low	Moderate	Low	High	Moderate	Moderate	Moderate
Woodland Carbon	Moderate	Moderate	Moderate	High	High	Moderate	High
Recreation (Tourism)	Moderate	High	High	Moderate	High	Low	Moderate
Water Quality	Moderate	Low	Low	High	Not Known	Moderate	Low
Flood Risk Mitigation	High	Not Known	Not Known	High	Low	Low	Low
Community Natural Spaces	Low	Low	Low	High	Not Known	High	High
Green Prescribing	Moderate	Moderate	Low	High	Low	Moderate	Low
Social Responsibility	Variable	High	Variable	High	Moderate	Variable	Moderate
Planning Consent	Low	Low	Moderate	Moderate	Moderate	High	Moderate

(Source: Image and Lewis-Reddy, 2018)

3.2.2 Brokering supply by farmers and land managers

It is not possible at this stage in the project to attempt to extrapolate the Pumlumon findings to other upland areas in Wales, or to draw conclusions on the potential buyers. However, the supply chain assessment from Pumlumon suggests that, in terms of the land management interventions in the uplands considered elsewhere in this Evidence Review, it might be worth further investigation of the possibility of using 'top-up' private funding alongside public funding to support intermediary brokers and knowledge providers (e.g. environmental NGOs, land management specialists). For example, private funders interested in future carbon credits and water quality might be one potential source of funding to help to plan and facilitate the landscape scale uptake of SFS-funded land management required to achieve government objectives for woodland and peatland carbon, water quality and possibly flood risk management.

Although the focus of most PES analysis and pilot schemes is on drawing in additional third party private funding, it is important to remember that often the funding 'mix' already includes substantial private funding from the farmers or land managers themselves. These include actions and input costs that benefit the environment but are not required or fully funded by either the market or public payments, but may be associated with or motivated by these payments. Such farmer funding is not the focus of this paper, but overlooking it risks ignoring farmers' existing efforts and damaging trust and communications with them.

3.2.3 The role of NGOs

Private funds from conservation NGOs can play a number of important roles in securing environmental outcomes from land management.

It is very common for NGOs to directly contribute private funding for habitat management and access, complementing the public funding they receive. They may

provide in-time contributions from staff and volunteers, which can increase biodiversity and recreational outcomes at no extra cost to the public purse. NGOs are also an important resource for knowledge, training and education related to environmental outcomes e.g. Coed Cymru and the Woodland Trust. In addition to the work of the well-known NGOs that are major landowners, such as the National Trust and the RSPB, examples of contributions by smaller NGOs include:

- Wiltshire Wildlife Trust are currently collecting for a Nature Reserves Management Fund⁵
- the Trees for Life crowd-funding project, mediated by NGOs, under which Trees for Life volunteers have paid for and planted over a million trees in the Scottish Highlands⁶
- in Wales, the Wales Wild Land Foundation secured funding to buy land near the village of Glaspwll near Machynlleth, with support from The Waterloo Foundation and from donations to the Woodland Trust, their project partners. They also secured funding from the Welsh Government through the RDP 2014-2020
- many of the collaborative projects approved for RDP 2014-20 funding under the Welsh Government's Sustainable Management Scheme are managed by NGOs including the Wildlife Trusts, Coed Cymru and others.

3.3 Public funding

Public funding may be used in many different ways in PES, not just as buyer of the service but also, for example, to fund feasibility studies, project initiation, facilitation and technical or research support, as well as drawing in private buyers of services.

Although PES has been the focus of this review there are other ways in which public funding could be used in Wales to deliver environmental outcomes that depend on the actions of farmers and other landowners. These include:

- promoting certification standards (organic, FSC, PDO) and local badging of sustainable production, and also supporting improvements in suppliers' access to markets where premiums can be achieved
- improving the potential for participation in the carbon and water markets, through uptake of the Woodland and Peatland Codes and joint working with Welsh Water and major industrial users of water
- public procurement by government departments and agencies;
- financial instruments, such as investment funds, and providing support to suppliers of ecosystem services and their brokers to acquire the specialist skills needed to prepare business plans tailored to accessing corporate funds
- risk sharing financial instruments could be used to underwrite/lever multilateral deals to manage green infrastructure. However, at this early (and therefore high-risk) stage in the development of green infrastructure projects, public finance may need to make first-loss commitments in such projects.

⁵ <https://www.wiltshirewildlife.org/loveyourlocalreserve>

⁶ <https://treesforlife.org.uk/>

4 Summary

The inherent conflict between purchasing environmental outcomes and the need to motivate a third party funder by quantifiable private benefits for them significantly limits the use of private funding for environmental outcomes that have a major public goods element. This applies particularly to biodiversity outcomes which are usually majority public goods and therefore much harder to fund with private finance.

At present, the main opportunities for combining public and private funding appear to be in the water sector, where Wales has lagged behind developments elsewhere in the UK. In the future, there may be opportunities to supplement government funding for woodland creation and peatland restoration through the potential for trading in woodland and peatland carbon (although the Peatland Code has not yet developed to this stage) as indicated in Table 4.1.

Nevertheless, the major source of funding to deliver the Welsh Government's objectives for provision of ecosystem services and environmental outcomes, particularly those linked to biodiversity, is likely to remain the Welsh Government itself, directly through contracts with land managers under the SFS.

Table 4.1 Summary of opportunities to use public and private funding

Confidence	Funding Opportunity	Key Outcomes	Key Benefits	Critical Concerns
Amber	Certification (e.g. FSC, Organic)	Premium for producers in return for higher environmental standards (not always achieved for Organic). (Also need separate supply chain capacity)	Can link to support - e.g. woodland management and planting to UKFS)	International standards (organic, FSC, PDO) The potential of these and badging approaches must be constrained by competition, because products badged in different ways are likely to be seeking to appeal to the same set of people/consumer values.
Amber	Local badging of environmental sustainability	Associating environmental outcomes with location of production in product marketing	Motivating and rewarding local sustainable production clusters	Combination of origin and standards (possibly from within payment scheme administration)
Amber	Carbon market	Purchase of biocarbon credits from land managers	Synergy with variety of measures (e.g. Woodland Carbon Code for new woodland, Peatland Code	Welsh bio-carbon support? Farmer property rights or governments? scope for link to systems approach? Additionality only (as with WCC)?
Blue	Water market	Welsh Water as co-purchaser of water quality improvements (copying extensive	Reduced capital investment in	Funding mechanisms in scheme need to be able to work with private

		practice across UK water industry, e.g. SCAMP, ENTRADE).	water quality treatment. More cost-effective achievement of bathing water standards.	funds - legally and for additionality
Amber	Supporting financial instruments: - Investment mechanisms - Business planning skills	Scalability is key requirement, with potential access to funders who would not be interested in individual small projects	Leverage of 3rd party funds	Little used in natural environment, but experience in other environmental objectives (e.g. FIT for solar panels)
Amber	Public procurement measures by Welsh Government and local authorities	Uses public procurement to favour sustainable Welsh Produce (food, timber)	Farmers and their suppliers and processors have more market security	Potential to link to standards and specifications within payment scheme
Amber	NGO roles are a combination of channelling existing public funding (some of which may be additional to agricultural or land use sectors), and leveraging other sources, either from members or other funders (e.g. HLF)	Support innovative approaches and communication to land managers	additional funding Can lever new funding, (e.g. membership appeals for land purchase or: crowd funding)	Some controversy about changing objectives of land use when taken into NGO management
Amber	Corporate social responsibility (CSR) -motivated funds	Often fund innovative environmental pilots	Demonstration of environmental actions	May not scale because there are diminishing CSR returns for funders

Colour Key:

- **Blue** = well tested at multiple sites with outcomes consistent with accepted logic chain. No reasonable dis-benefits or practical limitations relating to successful implementation.
- **Amber** = agreement in the expert community there is an intervention logic chain which can be supported but either evidence is currently limited and/or there are some trade-offs or dis-benefits which WG need to consider.
- **Pink** = either expert judgement does not support logic chain and/or whilst logic chain would suggest it should work there is evidence of one or more of the following:
 - its practical potential is limited due to a range of issues (e.g. beyond reasonable expectation of advisory support which can be supplied and/or highly variable outcome beyond current understanding or ability to target),
 - the outcome/benefit is so small in magnitude with few co-benefits that it may not be worth the administration costs,
 - there are significant trade-offs.

5 Appendix: Examples of public and private funding

5.1 Working Wetlands Project – Devon, UK.

The aim of the scheme, led by the Devon Wildlife Trust, is to reverse habitat decline across the four river catchments that make up the Culm National Character Area (NCA) by encouraging and supporting landowners to carry out targeted habitat management, creation and restoration projects. The project involves 450 landowners, who own 25,209ha of farmland. In total, Working Wetlands has cost around £3m over the past 7 years, all of which has been provided by a complex partnership of organisations with funding from agri-environment schemes (£7.4 million between 2008 and 2015) and from capital projects (£162,600 in the same period). The latter are financed by the Devon Waste Management (private company, £80,000), the South West Water (Upstream Thinking, £15,000), Defra via the Wildlife Trusts (£16,000), the Environment Agency Catchment Restoration Fund (public funding, £30,000) and BIFFA Flagship Award (private funding from landfill tax credits donated by Biffa Group Limited, £21,600). (Sources:

<http://www.devonwildlifetrust.org/sites/default/files/files/About%20us/Working-Wetlands-the-first-7-years-2008-15.pdf>, EY and Biotope (2017))

5.2 North Pennines Multi-Stakeholder Partnership (UK)

The North Pennines Area of Outstanding Natural Beauty (NPAONB) covers just under 2,000 km². It is a wild and remote area of England comprising high open moorland and broad enclosed valleys. The primary purpose of the AONB designation is to conserve and enhance natural and cultural heritage. The case study focuses on the Allen Valleys Landscape Partnership Scheme (AVLPS) that aims to conserve and restore important heritage assets, to make them accessible for learning, training and recreation, and to develop capacity within the community to conserve and use these heritage assets for a more sustainable future. The AVLPS is funded by the Heritage Lottery Fund (HLF) and delivered by the NPAONB Partnership. A key area of interest for the NPAONB is the social capital delivered by, and required from, farmers and other landowners in the area and its links to natural and cultural capital as typified by the presence of High Nature Value (HNV) farmland. The farming community, mainly based around full-time farmers but also a significant number of smallholders, is the main actor involved in managing the enclosed farmland of meadows and pastures. The game-keeping community, working for the grouse shooting estates, is the main actor managing the open moorland.

(Source: PEGASUS case studies <http://pegasus.ieep.eu/case-studies/introduction>)

5.3 Pumlumon Project and PES

The Pumlumon Project (PP) is a place-based project named after the Pumlumon Mountain in mid-Wales. It covers a watershed of 40,000ha, contains the highest part of the Cambrian Mountain range and straddles the counties of Powys and Ceredigion. The whole Project area is home to 15,000 people, spread across 11 local communities. There are 250 farms in the Project area with farming, forestry and tourism listed as the area's main economic activities. It is also the largest watershed in Wales with the reservoirs and streams that drain into the Wye, Severn, Rheidol, Dyfi and Leri river catchments supplying water to four million people in England. Encompassing over 9,000ha of key habitats including river valleys, semi-natural

woodland, species-rich grassland, heather moorland and blanket bog, at the heart of the project area sits the 5,000ha Pumlumon SSSI, currently in unfavourable condition and declining. For the past 10 years the PP has piloted an integrated approach to improving the delivery of ecosystem services (i.e. water quality, flood risk reduction, carbon safeguarding) through more sustainable land management. The PP received charitable funding from Biffaward and Waterloo Foundation, and central funding as part of WG's REF, ERDF and most recently, the WG Nature Fund. Achievements of the project included active engagement for farming and land-owning community, investigation of the potential for novel economic models, and land management changes including 2km of species-rich hedgerow and riparian buffer strips on 24 ha of species-poor grassland enclosed by an NRW conifer plantation (Hafren Forest). Planting over 7,000 hedge trees within this hydrologically active system will help to slow the flow of water as it moves from the forestry stands into the adjacent watercourse, reduce the sediment load, buffer acidity and reduce the volume of water flowing into the system whilst enhancing habitat connectivity.

However, despite significant investment in the PP and establishment of trusted working relationships, no specific agreements have been established between the providers of the ecosystem services (landowners) and the beneficiaries.

A follow-up project, the Pumlumon PES, is being funded by the WG for four years under the Sustainable Management Scheme (SMS) of the Rural Development Programme Wales 2014-2020. The primary aim is to facilitate and develop PES mechanisms in the form of medium to long term agreements within the PP between a buyer (or buyers) and a landholder (or landholders) for a defined ecosystem service or set of services. The project will address issues raised in the preceding PES pilot and the Nature Fund evaluations by focussing on buyer identification/engagement and building relationships between buyers, intermediaries, landholders and other stakeholders.

(Source: Image and Lewis-Reddy, 2018)

5.4 Water and Integrated Local Delivery Project (WILD) Project (UK)

This part of Devon is composed of rounded hills and steep slopes of oolitic limestone in the north with undulating lowland and pasture in the clay vale in south. The area is a mix of family farms, large estates and small holdings, with growth in short-term farming arrangements due to gravel extraction. There are significant Water Framework Directive (WFD) failings due to in-river sediment, point source pollution from agriculture and the impact of urban development on biodiversity. Also, in the Nitrate Vulnerable Zone, there are ground and drinking water issues. In 2010 a project was developed to demonstrate integrated delivery then, in 2013, three years of funding was secured for WILD to support facilitation and engagement on farm advice, community engagement and biodiversity. The partnership is seen as a shared problem solving network. Key environmental and social benefits are water quality, flood protection and rural vitality, but it has been difficult to show progress on these environmental and social benefits although there is evidence of adjusted environmental attitudes and behaviour change. The area lies at the headwaters of the Thames river basin, where integrated delivery of WFD objectives are being supported through partnership and facilitation through new and existing networks. The resource unit underpinning these discussions is water, in terms of water quality, its ecological status, and issues around flooding, and discussions encompasses soil,

urban development and land management. The national regulatory framework has been adjusted locally for WFD and the WILD partnership. Advice and engagement covers regulation, CAP greening requirements, cross-compliance and agri-environment schemes in combination with WFD and local flooding issues. Identified 'Farmer Guardians' work with agencies and project partners to promote sustainable land management. A PES scheme is being developed with a water company to reduce chemical pollutants in water.

(Source: PEGASUS case studies <http://pegasus.ieep.eu/case-studies/introduction>)

5.5 United Utilities projects in NW England

Information in this section is from:

<https://www.unitedutilities.com/corporate/responsibility/environment/catchment-management/>

5.5.1 SCaMP 1 & 2

United Utilities own 57,000 hectares of land in North West England, to protect the quality of water entering the 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), but many of the fragile habitats in the catchment areas have been damaged by historical industrial air pollution and agricultural activities. Years of drainage of the UK uplands has caused 5,000 year old peat bogs to dry out and erode, releasing colour and sediment into watercourses and millions of tonnes of carbon dioxide into the atmosphere contributing to climate change.

Over the last thirty years there has been a substantial increase in the levels of colour in the water sources prior to treatment from many upland catchments. The removal of colour requires additional treatment plant, chemicals, power and waste handling to meet increasingly demanding drinking water quality standards. This results in significant increases in annual operational costs.

The Sustainable Catchment Management Programme (SCaMP) began in 2005 with the aim of benefitting both water and wildlife through improved catchment management. Projects across 27,000 hectares of water catchment areas in the Peak District and the Forest of Bowland were supported by an investment of £10.6 million in moorland restoration, woodland management, farm infrastructure improvements and watercourse protection, working with farm tenants and partners, such as the RSPB, Natural England and the Forestry Commission.

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. 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. Undertaking SCaMP improvements allowed farmers to access additional agri-environment income for ten years. Natural England and the Forestry Commission provided grants totalling £2.7 million towards the cost of the work. The types of work included:

- 320 km of moorland drains blocked to allow for re-wetting
- 10,905 hectares of bare peat re-vegetated

- 258 km of fencing to allow for moorland restoration and woodland planting
- 21 new stock buildings to allow moorland restoration grazing regimes to be implemented

The vegetation on some sites is moving towards a more diverse blanket bog community with more key species present, especially *Sphagnum*, along with other desirable blanket bog species. On bare peat restoration catchments, peat cover has reduced and there is some indication of the establishment of a more diverse vegetation community.

After eight years of hydrological and water quality monitoring, SCaMP land management and interventions have had significant effects on water quality in key locations and, overall, the effects have been beneficial. Natural England has assessed the condition of the 17,500 ha of SSSI and found that 99.4% of this land is now in favourable or unfavourable recovering condition. In the Peak District before SCaMP this had been assessed at 14%.

5.5.2 SCaMP 3 - Safeguard zones

SCaMP continues through a targeted approach driven by drinking water Safeguard Zones (SZ), areas of catchments where water quality in rivers, reservoirs or groundwater is deteriorating and is becoming harder to treat, due to human activities on the land. SZ can be used to target measures, advice and incentive schemes for landowners and managers to help improve water quality.

Within the North West the Environment Agency has designated 20 surface water and 9 groundwater catchments as SZ, to address issues with colour, algae and pesticides in surface waters, and nitrates, pathogens and solvents in ground waters. United Utilities are investing in 29 SZ projects across the North West, working with stakeholders such as Natural England, Rivers Trusts, National Trust, RSPB, Moors for the Future and Catchment Sensitive Farming who have overlapping interests.

The water company will combine investment on their own land with investment in partnerships on non-owned catchments to address deteriorating raw water quality, applying the SCaMP methods to moorland restoration, woodland planting, agricultural advice and diffuse pollution source-pathway investigations.

5.5.3 Catchment Wise

Catchment Wise is United Utilities' new approach to tackling water quality issues in lakes, rivers and coastal waters across North West England.

Building on the achievements of SCaMP to improve raw water quality on catchment land, Catchment Wise aims to drive a similar change around wastewater issues – sharing expertise about how land is used and managed across the region and tackling pollution at source to improve the quality of water in lakes, rivers and the sea. As with SCaMP, the water company will be working in partnership with other organisations across the North West and, as a first step, have provided additional funding to the 16 North West catchment partnerships set up by Defra. Working with local stakeholders, the partnerships will set out a long-term programme of actions and interventions to improve the status of water bodies in their catchment.

5.6 Skylark: Intensive Arable Farmers Moving Towards Sustainability

Skylark is a national-level private initiative which aims to move arable farming in the Netherlands towards a more sustainable pathway. In 2015 the Skylark initiative

gathered some 388 (mostly) conventional farmers who together manage 8.7% of the arable area in the Netherlands. There is a membership fee to become involved in Skylark and participants are required to draft an annual individual sustainability plan for their farm, in which all 10 Skylark sustainability indicators need to be addressed within four years. Skylark is organised in 40 regional groups across the Netherlands, which have at least six meetings per year. In addition, there are supra-regional meetings for knowledge-building. Various companies along the food supply chain are also involved, requiring sustainability improvements.

The Skylark approach seems effective in motivating farmers and building their knowledge and capacity. In the De Dommel area the local Skylark group develops measures for improving soil health and water quality together with officials from the Water Board agency. One of the weaknesses in the Skylark approach is that the effectiveness of the outcomes is unknown because efforts are monitored but the results are not. In the case study area more fine-grained monitoring of water quality by the Water Board would be welcomed by the farmers of the Skylark group.

(Source: PEGASUS case studies <http://pegasus.ieep.eu/case-studies/introduction>)

5.7 Boer, Bier and Water – Farmer, Beer and Water

'Farmer, Beer and Water' (FBW) is a scheme for rural actors located in Lieshout, in the Dutch North-Brabant province. The scheme involves the Bavaria Brewery, more than 50 farmers and other stakeholders including the regional water board, the municipality and the province of North-Brabant. The scheme aims to improve the quality and availability of groundwater which is used by Bavaria Brewery for beer production and also by farmers for irrigation. The main goal of the scheme is to achieve and maintain a sufficient quality and quantity of groundwater in the area. Bavaria Brewery extracts each year 2.5 million m³ of groundwater for its brewing process, which causes water risks for agriculture in the summer period (droughts). At the same time about 1.5 million m³ waste water per year is discharged into a small river. The initiative in this project is primarily taken by the private stakeholders. FBW can be characterised as a social innovation in which stakeholders constitute an organisational network that addresses local sustainability issues – issues that go well beyond the individual level, and require the collaboration of multiple actors in the area.

(Source: PEGASUS case studies <http://pegasus.ieep.eu/case-studies/introduction>)

5.8 Volvic

The catchment area of Volvic Waters covers 3,800ha across four towns in the Puy-De-Dôme in France, an area mainly of forest and agricultural land (53% and 41% of the area, respectively). Pastures are used for extensive cattle rearing with production sold through conventional markets. Since 2007, the Volvic company implements a water catchment strategy that involve public stakeholders and land managers (farmers in particular) in order to prevent water pollution, water shortage and improve its brand image. The main issues at stake are the management of the pollution risk and the brand image of Volvic, rather than solving a problem of under provision of environmental and social benefits in the region.

Interventions mostly target agriculture and are aimed to reduce the use of chemical inputs in the area and improve the management of cattle effluents. The primary benefit of this initiative is high water quality and avoidance of water scarcity, but the initiative also contributes to the conservation of iconic species such as the red kite

(*Milvus milvus*) and some species of bats. A quick overview of historical data show that there has never been any significant problem regarding water in the area (e.g. no water pollution or water shortage) but the project ensures the maintenance of those good conditions.

(Source: PEGASUS case studies <http://pegasus.ieep.eu/case-studies/introduction>)

5.9 Grass-Fed Beef in Estonia

This initiative is a whole chain approach (production-processing-marketing) to marketing grass-fed organic beef in Estonia, led by a farmer NGO Liivimaa Lihaveis (“beef of Livonia”). The NGO is closely related to a private company, Nordic Beef, whose main function is to market grass-fed beef and is responsible for the national grass-fed beef quality scheme (in which 30 farmers are involved). The main driver which motivated the initiative is the low price paid by conventional meat industries to beef farmers. The aim of this private initiative is to seek independence from conventional systems and to give more added-value to farmers through controlling the whole supply chain. Liivimaa Lihaveis also promotes the consumption of grass-fed beef and the environmental benefits related to this, e.g. management of grasslands, including biodiversity-rich semi-natural grasslands.

The total area of organically managed farmland of the 41 farms involved in the initiative across Estonia is about 13,900 ha, which corresponds to 7% of total area of managed semi-natural habitats in Estonia. The farms that are part of the quality scheme own in total about 8% of total number of Estonian beef cattle. Farmers use a combination of the private marketing initiative (controlling the whole supply chain and the labelling of products) and support from various public funds (e.g. CAP Pillar 2) to make this approach economically viable.

(Source: PEGASUS case studies <http://pegasus.ieep.eu/case-studies/introduction>)

5.10 Marketing of Local, Organic And Artisan Food

This Estonian example explores the marketing of local, organic and artisan food from small-scale producers and processors through the shop-in-shop approach (special areas in 18 larger supermarkets/shopping centres in four cities across Estonia). This private initiative encompasses a supermarket chain, two shopping centres, two retailers and around 200 micro-enterprises producing local, organic, artisan/farm food. The main aims are firstly to offer marketing opportunities for micro-enterprises through mainstream marketing channels which would otherwise not be possible/very difficult to reach; and secondly to make this quality food more easily available to Estonian consumers.

(Source: PEGASUS case studies <http://pegasus.ieep.eu/case-studies/introduction>)

5.11 ‘Regionalwert AG’ (RWAG)

The ‘Regionalwert AG’ (RWAG) in Germany is a citizen’s shareholder corporation that facilitates access to shareholders’ capital for organic farms and businesses. The name translates into ‘regional value’ which reflects the objective of the initiative - creating regional value not only in financial terms but also in social and environmental terms. In total, 17 partner businesses are supported and organized by the RWAG. Land managers are located within the administrative district of Freiburg, though widely dispersed. Since its start in 2006 the initiative has enlarged through increasing the capital by issuing shares, achieving €2.9 million in shares held by 460 shareholders who are mainly located in the same district of Freiburg. RWAG

addresses the provision of environmental and social benefits generally related to organic farming (abundance and diversity of habitats and species; healthy soils; high water quality). The initiative perceives itself as a response to an observed non-performance of public policies regarding support of organic farming and regional marketing approaches, as well as providing financing mechanisms for entrepreneurs in the green business sector. Consequently, it operates explicitly outside a public policy framework and aims to be independent from policy-induced structures and funding. The RWAG aims at providing both monetary returns to shareholders and non-monetary returns to the common welfare. Shareholders thus invest explicitly in provision of public goods. The contributions of partner businesses towards the provision is reported annually, based on a set of 64 sustainability indicators.

(Source: PEGASUS case studies <http://pegasus.ieep.eu/case-studies/introduction>)

5.12 Organic Farming In Mountain Region Murau (Austria)

This example focuses on organic mountain farming in the region of Murau and a specific type of milk production known as hay-milk, which is a characteristic and long-established management system in the district. Organic hay milk is distributed throughout Austria by the retail chain Hofer which is also the proprietor of the brand Z.z.U. (back to the origin). About 33% of all organic mountain farms in the district are represented by Z.z.U. Organic hay-milk is considered the highest premium milk product in Austria at present.

At a regional level, regulations for organic mountain hay-milk production for Z.z.U go beyond the requirements of EU organic production (e.g. silage-free and soy-free fodder, 75% of fodder from on farm production, specific rules on pasture management, certified animal welfare). The resulting extensive mountain farming practices and the production of organic hay-milk which attracts a substantial price premium have improved the economic viability of these extensive dairy systems. The management also contributes to the conservation of the associated cultural landscapes and has a positive impact on the level of biodiversity.

While RDP measures in Austria are of great importance to mountain farming, combining these with private schemes makes extensive forms of agriculture in mountain areas economically more viable, reducing the threat of farm abandonment due to market developments. Consumer choices for organic hay-milk products (at the other end of the food-chain) have a direct impact the provision of relevant environmental and social benefits, illustrating how economic, social and environmental objectives can be met simultaneously.

(Source: PEGASUS case studies <http://pegasus.ieep.eu/case-studies/introduction>)

5.13 Reverse auctions for woodland management in Australia

In common with woodland in Wales and elsewhere in the UK, Australian woods are under challenge from excessive levels of browsing by livestock. Hence a key management measure is exclusion by fencing. Bond et al. (2019) investigated the success of a reverse-auction approach for landowners to manage livestock access to private woodland in order to maintain or to increase species and structural diversity of remnant native vegetation. They used a powerful Before-After-Control-Impact (BACI) monitoring design to evaluate the impacts of the intervention. Although no significant intervention effects were found on regeneration, plant litter cover, weed cover or canopy dieback, there were positive effects on native plant species richness,

log abundance and grazing pressure at impact sites compared to control sites. The log abundance and grazing pressure changes reflected direct management effects, while native plant species richness was probably influenced by reduction in grazing pressure and weed abundance.

The study provides proof-of-concept that revealed-price incentive contracts can produce biodiversity improvement compared with the business-as-usual scenario of native vegetation management on private land. However, not all target variables were affected, flagging the importance of long-term monitoring and, in principle, the value of feedback of messages from well-designed monitoring back into intervention design.

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