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Payments for ecosystem services

A short introduction

October 2010



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Contents

| | Page |
|--|-------------|
| 1. Introduction | 2 |
| 2. What is PES and why are we interested? | 3 |
| 3. Key concepts | 6 |
| 4. Key questions for use of PES | 9 |
| 5. Next steps - what work is being planned? | 11 |

1. Introduction

Our natural environment provides many different kinds of services that contribute to our wellbeing and economic prosperity, from provision of timber and other natural resources, to regulating systems such as carbon storage in soils or water regulation to opportunities for recreation. The fact that these services are often not valued or considered in decision-making is a key factor affecting ecosystem loss and degradation. Against this background, there has been a growing interest in mechanisms that can better recognise the value of ecosystem services in practice; payments for ecosystem services (PES) constitutes one such innovative approach.

PES can be defined in terms of payments to undertake actions that increase the levels of desired ecosystem services, and can therefore be broadly defined within market-based approaches. PES provides some key opportunities to link up those involved in 'supplying' ecosystem services more closely to those benefiting from the same ecosystem services and in doing so, potentially provide cost-effective ways of developing new streams of financing. This requires considerable innovation as, for many ecosystem services, both 'suppliers' and 'beneficiaries' may not currently be aware of their roles.

This paper describes work in progress regarding payments for ecosystem services and its application to a domestic context and seeks to stimulate discussion about this topic. Defra would therefore welcome comments on any aspects of this paper at: nee@defra.gsi.gov.uk

The overall aim of this short paper is to provide a brief introduction to PES and to the ongoing analytical work that Defra is currently undertaking on the potential for greater use of these instruments in England.

Specifically:

- Section 2 explains what PES are and why Defra is interested in these type of instruments;
- Section 3 introduces the key concepts;
- Section 4 highlights some the key questions for taking forward such instruments in practice; and finally
- Section 5 outlines the work that Defra is planning to undertake on PES over the next few months.

2. What is PES and why are we interested?

2.1 Understanding and capturing the value of ecosystem services

There is growing evidence of the value of the natural environment and the diverse range of benefits that it delivers including food, clean water, healthy soil and carbon storage, recreational opportunities, valued landscapes and the cycling of nutrients. Over the last few years, considerable research effort has been undertaken to demonstrate these values more clearly, and the implications of ecosystem loss for delivery of these key services. For example:

- Internationally, the work of TEEB (The Economics of Ecosystems and Biodiversity) has been assessing the global economic benefits of ecosystems and biodiversity and the economic case for investment in natural capital¹.
- In the UK, the National Ecosystem Assessment (NEA) (expected in the Spring of 2011²) will provide the first comprehensive analysis of the UK's natural environment in terms of the benefits it provides to society and continuing economic prosperity.

Understanding the value of ecosystem services is an important first step. But, in order to make a difference to the environment and economic welfare, it is important to ensure that this value is reflected in decision-making and to understand the different mechanisms that can help in securing those values.

2.2 Definition of PES

Payments for ecosystem services (PES) are one of the principal ways in which a market for ecosystem services can be established. They can be essentially defined in terms of payments to land 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, effectively, provide incentives to address market failure³, by altering the economic incentives faced by land managers or others who can affect delivery of ecosystem services. In this sense, PES can be argued to fit within the broad category of market-based (economic) instruments which include taxes and charges, subsidies and tradable permits.

¹ Its final synthesis of approach, conclusions and recommendations will be launched at COP10 of the Convention on Biological Diversity in Nagoya, Japan. See <http://www.teebweb.org/>.

² <http://uknea.unep-wcmc.org/>

³ For example, not all services that society demands are marketable which leads to under-supply.

But there are two characteristics that have to be present for a mechanism to be classified as PES according to a popular definition⁴:

- PES involves **direct payments** from the beneficiaries to the providers of enhanced ecosystem services;
- The nature of the transaction has to be **voluntary** (i.e. participants are not forced to trade by regulation or in order to meet a mandatory cap).

PES schemes are sometimes seen mainly as **government** financed (on behalf of the public). However, there are an increasing number of PES schemes that are financed voluntarily by **private** companies and individuals (private PES). These include, for example, downstream water users paying for watershed management on upstream land. Some examples are provided in Box 1 below.

Box 1: Case study examples of payments for ecosystem services

One of the best known examples of a payment for ecosystem services relates to the New York City paying for water services in the **Catskills and Delaware catchments**. The programme to conserve the Catskills watershed forests cost the City about US\$1.5 billion—a considerable saving over the US\$8-10 billion that a water filtration plant would have cost – and is administered through a formal urban-rural partnership constituting a true market.

A small number of schemes have been purely private sector initiatives. For example, PES schemes have been developed for both **Vittel** and **Perrier**, demonstrating that there is a strong business case for private sector investment in water-related PES (particularly linked to water quality). The PES scheme, developed and implemented by Vittel in north-eastern France addressed the risk of nitrate contamination caused by agricultural intensification by financing farmers in the catchment to de-intensify their farming practices. The Perrier bottled water company pays fees to landowners in watersheds upstream of their springs to retain forests, guaranteeing a clean, reliable water source.

In the UK, there are a number of examples of PES. **SCaMP** (Sustainable Catchment Management Programme) aims to develop an integrated approach to catchment management in the North West, England. The SCaMP project is being undertaken by United Utilities in partnership with the RSPB and is a good example of a partnership approach with private, public and non-governmental organisations managing the land for a wider range of ecosystem services and benefits⁵. Examples of government financed-PES include: **Environmental Stewardship**, a key

⁴ Wunder S. 2005. Payments for environmental services: Some nuts and bolts. CIFOR Occasional Paper No. 42, Center for International Forestry Research, Bogor, Indonesia.

⁵ Note: HLS funding was an important component of the overall funding along with water company investment.

mechanism for rewarding those who deliver a wide range of environmental outcomes from the farmed environment in England.

In the US, the **Conservation Reserve Program (CRP)** is an example of a large-scale initiative that used competitive tenders from landowners to deliver environmental gains, ranked against an environmental benefits index; evidence suggests substantial net economic gains from the approach⁶.

2.3 Why are we interested?

There are therefore a number of reasons why we might be interested in PES:

- These market approaches provide opportunities not only for recognising the importance of these services but linking more directly those who benefit from ecosystem services to those who can deliver them and to do so in cost-effective ways.
- By linking up beneficiaries and providers, these approaches can strengthen the integration between the natural environment and economy and society.
- Of particular interest is in understanding the opportunities for new financing streams and considering the potential for private PES schemes to emerge. If more ecosystem services could be incorporated in the formal economy, opportunities for innovation and investment in their provision might increasingly become mainstreamed.
- By linking up beneficiaries and providers, PES also provide opportunities for engaging a broad spectrum of stakeholders which could deliver improved outcomes for the natural environment and its many beneficiaries at local, catchment, national, and, in the case of climate regulation and biodiversity, potentially international level.

At the same time, we recognise there are a number of challenging issues; we plan to look in more detail at both the barriers and opportunities for use of PES in work that we are currently taking forward. Finally, payments for ecosystem services will not replace our current range of activities, but should be seen within the context of a broad range of policy instruments that are important in protecting and enhancing the natural environment.

⁶ For a good review of this case study and others, see “Paying for biodiversity: enhancing the cost effectiveness of payments for ecosystem services”, OECD 2010.

3. Key concepts

3.1 Scope of PES

While the PES concept is relatively new, PES-type instruments have been in use in specific contexts for quite a while. Some examples are provided in Table 1.

Table 1: Range of payment for ecosystem services-type schemes

| Policy context | Examples |
|-------------------------------|--|
| Agri-environment schemes | England Environmental Stewardship, US Conservation Reserve Program, Australia BushTender |
| Watershed protection | US Wetlands Reserve Program, UK SCaMP, French Vittel, New York City water supply, Lesotho Highlands project (South Africa/Lesotho) |
| Carbon sequestration | Voluntary Agriculture, Forestry & Land Use (AFOLU) Carbon Market |
| Habitat/wildlife conservation | Costa Rica payments for ecosystem services, Voluntary biodiversity offsets (BBOP) |
| Bio-prospecting | Costa Rica – INBio (National Biodiversity Institute) and Merck Pharmaceuticals |

However, new examples of PES are increasingly emerging or under suggestion. For example, could PES initiatives help to address invasive non-native species or to deal with sediment deposition in fresh water systems to avoid costs of dredging downstream? Using an ecosystem services framework provides opportunities to think more widely and innovatively about application of PES approaches to environmental management.

The basic idea in PES schemes is that the users/beneficiaries of a service compensate the providers. Beyond this, PES can vary according to a number of characteristics, including:

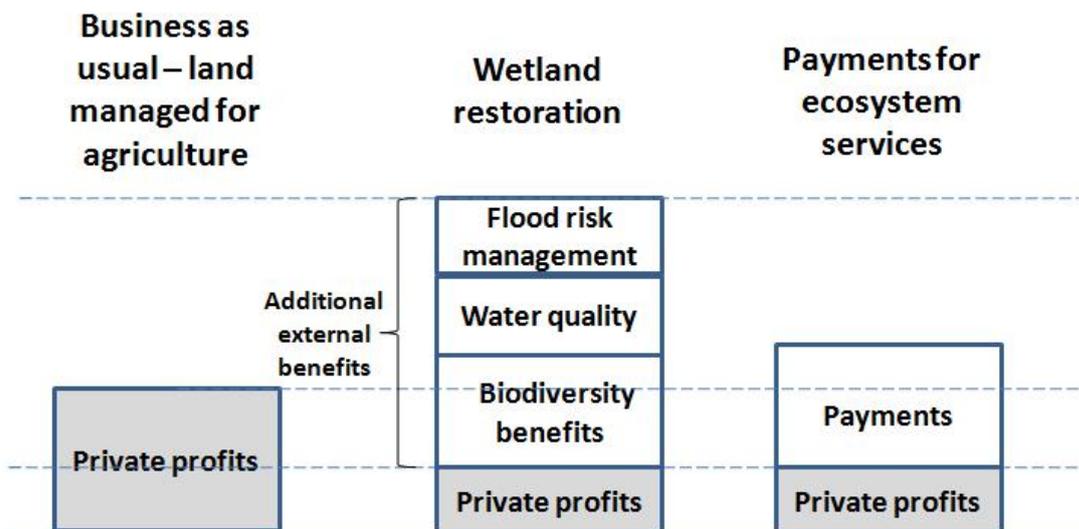
- **provision of ecosystem service**, which can be based on:
 - ✓ one specific service (e.g. carbon sequestration)
 - ✓ bundles of ecosystem services (e.g. carbon sequestration plus biodiversity enhancement)
- **financing**, which can come from different sources, including:
 - ✓ government effectively purchasing on behalf of a large number of beneficiaries, for example public benefits purchased through Environmental Stewardship relating to landscape and biodiversity on behalf of the English public
 - ✓ private companies and individuals (private PES), for example, downstream water users paying for watershed management on upstream land

- **payment approaches**, which can be classified into two main categories:
 - ✓ output-based payments based directly on the delivery of ecosystem services (can also be referred to as payments for results)
 - ✓ input-based payments for the adoption of particular land uses or land management practices that are expected to deliver additional ecosystem services and benefits (typical of many agri-environment subsidies)

3.2 A simple example of a PES

A simple example of a PES is presented in **Figure 1** below where land is being managed primarily for agricultural purposes but opportunities for wetland restoration could achieve an enhanced level of ecosystem services and deliver downstream benefits to water companies as well as other potential benefits. For example, activities could include creating buffer zones along rivers for wildlife and re-flooding wetlands to improve water carrying capacity. This might lead to additional ecosystem service benefits in terms of biodiversity, improved water quality and flood risk management. However, in order to encourage these activities to be taken forward, an incentive to land managers is required which could take the form of a PES. This payment would compensate the farmer for loss of income from traditional activities and the change in land management practices.

Figure 1: A simple example of a PES



As noted above, a PES scheme is a voluntary agreement between sellers and buyers to deliver actions that increase or enhance ecosystem service delivery. In this example, the ‘seller’ or provider is the land manager who will deliver these different actions on their land leading to enhanced ecosystem service delivery. The ‘buyer’ is generally linked to beneficiaries or users of ecosystem services that would

be enhanced under PES. In this example, there are a number of different potential beneficiaries including:

- ✓ water companies: improving water quality and hydrology
- ✓ local residents: interest in reduced flooding
- ✓ insurance groups: interest in reduced flooding or storm/hazard regulation
- ✓ recreational users: interest in enhanced recreational opportunities
- ✓ conservation groups: interest in enhanced wetland habitat

3.3. Early experiences of private PES schemes in England

We now have some successful examples of PES schemes in the UK and internationally (see Box 1 for examples). This is also an area where parts of the Defra network are already busy developing and delivering important pilot schemes here in England. For example:

- Natural England launched three Uplands ecosystem service pilots at the end of 2009 in Cumbria, Yorkshire and South West England. The pilot projects are aiming to demonstrate how provision of a broader range of ecosystem services, including water quality, flooding and carbon storage, can be turned into genuine business opportunities by adopting an ecosystems and PES approach in the future.
- In the South West, a partnership including various Rivers Trusts, the Environment Agency and South West Water are taking forward a market-based catchment restoration scheme based on a payment for ecosystem services model – called the WATER project – which aims to identify mechanisms to attract private investment for catchment restoration.
- The Defra ‘multi-objective demonstrator projects’ seek to apply the ecosystem services approach to three flood risk management schemes – Pickering, Honicote and the Derwent – with the aim of increasing the delivery of ecosystem services through modification of flood risk management activities.
- Opportunities similar to the Defra ‘multi-objective demonstrator project’ may be achieved on the Seart managed realignment project on the River Parrett (Somerset) estuary.
- ‘Nurture Lakeland’ – the Lake District initiative where people (users of the park) are invited to make voluntary donations which in turn are re-invested back into the Lakes (akin to a voluntary user charge).

4. Key questions for use of PES

4.1 Suitability of PES as a policy instrument for delivery for ecosystem services

A number of primary considerations need to be taken into account in assessing whether PES approaches could help deliver better natural environment outcomes. Questions that we will be considering further as part of our work in Defra on payments for ecosystem services include:

Need for clarity on the case for government intervention: it is important to understand the wide range of issues affecting ecosystem service delivery including market failures. Not all PES instruments may require specific government intervention – indeed it is important the government only acts where there is a strong justification. There are examples of where voluntary private PES schemes have developed which suggests that the role of government may sometimes be that of a catalyst, especially in removing barriers to development of PES, where appropriate.

Tackling issue at appropriate level: Spatial considerations for ecosystem service delivery are critical. These relate to both the appropriate scale over which an ecosystem service is delivered as well as the spatial scale of beneficiaries. There is a potential advantage of PES mechanisms if they can target payments to land managers or owners that can affect the ecosystem services directly.

Environmental effectiveness: Important questions in relation to environmental effectiveness are linked to ‘additionality’. It is important to ensure that PES are delivering benefits beyond what are already part of ‘business as usual’ or as required by existing regulation.

Cost-effectiveness: Like other economic instruments, PES approaches can be cost-effective. However, scheme design will have an important bearing on how cost-effective these schemes are in practice. Furthermore, there may be trade-offs between better targeting of ecosystem service delivery and higher transaction costs that need to be taken into account.

Acceptability of distributional impacts: an ecosystem services approach provides a clear focus on valuing ecosystem services (in both monetary and non-monetary terms) and understanding who benefits/uses the service and who must bear the cost of delivery. Therefore, evidence on distributional impacts would be expected to be a key part of the assessment and PES design.

Care has to be taken to avoid unintended effects: as we know from past experience, management of ecosystems to optimise some ecosystem services (such as food

production or flood defence) can, without systematic planning, be achieved at a net cost to other overlooked services and their beneficiaries. Therefore, a systems-level assessment must be taken to ensure that actions by 'providers' are sustainable.

4.2 Issues relating to PES design

In those circumstances where PES could work in principle, there is then a series of design features and some complexities that need to be further assessed and resolved. These include:

- how to package multiple ecosystems services into PES schemes, e.g. single buyer for a package of services or different buyers;
- relationship between land use and ecosystem, e.g. a necessary condition for the design of 'genuine' PES is a clear relationship between the type of land use being promoted and the provision of ecosystem services;
- understanding the appropriate scale for delivery, i.e. effective and efficient from the perspective of suppliers and buyers;
- direct user versus Government-financed schemes. A user-financed PES may have greater potential to be efficient because it can be better targeted, but the potential for this type of PES will depend on various factors;
- payment arrangements, e.g: output- versus input-based; constant per hectare versus differentiated payments; time period for payment; etc.;
- measuring and monitoring, e.g. there is a need to ensure delivery of ecosystem services, so monitoring will be an important component of the design of a PES scheme;
- what are the appropriate governance mechanisms, e.g. role of intermediaries in bringing together buyers and providers?

As we learn more about these issues for application of PES, we hope to gain a clearer understanding of their potential suitability across a range of policy contexts. We also hope to understand better what actions might encourage different stakeholders and wider use of PES schemes as appropriate.

5. Next steps: what work is being planned?

Over the period leading up to publication of the Natural Environment White Paper in Spring 2011, we are planning to take forward further analytical work on payments for ecosystem services which will help to improve our evidence base and our understanding of the application of such approaches in practice.

Particular areas of work include:

- Publication of a Defra paper in December 2010 (under the Defra Evidence and Analysis Working Paper Series) exploring the analytical underpinnings of PES approaches and the challenges and opportunities for application to a domestic context;
- Taking forward external research on barriers and opportunities for use of PES. This will look in more detail at the application of PES to a domestic context and consider actions to enable and facilitate greater use of such approaches where appropriate. It is planned for this research to be published in Spring 2011;
- Across the Defra network, there are many examples of where PES approaches are being tested and implemented. These case study examples provide important 'ground truthing' for assessing the application of payment mechanisms and the issues, including barriers, being faced. We need to ensure we take on board any lessons learnt from these practical examples (and wider case studies) in developing our evidence on PES.

Comments on this short introductory paper are very welcome and should be sent to: nee@defra.gsi.gov.uk.