Payments for ecosystem services, land manager networks and social learning

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Executive summary

1. There is increasing interest in understanding, valuing and supporting the variety of ecosystem services that forests and woodlands can provide in the United Kingdom. Land owners and managers can play a key role in the delivery of forest ecosystem services through active woodland management and woodland creation.

2. This report explores evidence for land manager perceptions and understandings of the concept of payments for ecosystem services, the existing use of formal and informal networks to support land managers' decision making, and the existing ways in which land managers learn from others.

3. The report draws on data from semi-structured interviews with land managers (*n*=44), further analysis of the British Woodlands Survey 2015, narrative analysis from 4 workshops with stakeholders (*n*=48) and the British Woodlands Survey 2017.

4. We adapt an existing land manager segmentation which draws on motivations, size of woodland and preferences that suggest the key segments include: Multifunctional Managers; Timber Producers; Enterprise Focused Managers; Eco-Centric Managers and Individualists.

5. Many land managers were not familiar with the term ecosystem services or the concept of payments for ecosystem services. However, they did often recognise that their woodlands could provide a range of benefits to society. This suggests that attention is paid to accessible descriptions of 'ecosystem services', 'payments for ecosystem services' and 'natural capital' to land owners and managers.

6. Quantifying forest services and benefits was thought to be particularly difficult in considering the design of any schemes that might provide payment for these services and benefits.

7. The research identified key networks of importance: 1) networks related to place *i.e.* those in land managers immediate locality; 2) networks related to woodland management and associated institutions *e.g.* land managers gravitate towards those organisations whose mission most closely matches their own objectives; 3) networks related to social and personal identity which reflect land managers own social connections, beliefs and values.

8. In terms of individual and social learning, land managers were interested in learning about strategies for maintaining sustainability of their forests in the face of climate change, pest and diseases, or for ensuring economic stability.

9. Social learning is important as a process that can change individual and group behaviour and practice. This should be a key consideration in land management where new schemes may rely on landscape and community change.

10. In order for individual and social learning to lead to changes in behaviour, learning could be usefully combined with other approaches such as advice, support, and financial incentives.

11. There is some evidence of Timber Producers and Enterprise Focused Managers experimenting at a small scale to explore suitability, performance and risks associated with planting 'novel' species.

12. It is important to understand and engage with land managers and involve them in the design of the mix of approaches that might encourage and enable more active woodland management, woodland creation and the delivery of a range of forest ecosystem services.

1. Introduction

This report provides an overview of research investigating land managers perceptions, knowledge and understanding about payments for ecosystem services (PES); the networks (organisational/peer) they engaged with and are linked into, and the social learning that can take place via these networks, as well as through other means. The research aims to generate insights into how land managers can be engaged and encouraged to manage for a range of ecosystem services from their woodlands and potentially create and expand woodlands to meet aspirations for increasing woodland cover in the United Kingdom. Mechanisms such as PES, networks and social learning are potential ways in which current policy aspirations can be met. The work builds on previous land manager research in this area by Forest Research and others (e.g. Church and Ravenscroft, 2008; Urquhart *et al.* 2010; Urquhart and Courtney, 2011; Lawrence *et al.* 2011, Dandy, 2012; Molteno and Lawrence, 2013; Lawrence *et al.* 2014; Lawrence and Edwards, 2013; Ambrose-Oji, 2016).

We use the term land manager rather than woodland manager or owner in this report as woodland is not always the only habitat being managed by the respondents included in the research, and not all of the respondents owned the woodland they were managing. About three quarters, by area, of woodland in Britain is privately-owned (Forestry Commission, 2017) and there is much interest in the objectives, motivations and attitudes of land managers as to why they own or manage woodland, and about their views on woodland management. A large majority of these private woodlands are below 10 hectares in size: about 90% (Forest Europe, 2015). The British Woodlands Survey (BWS) 2015 (Hemery *et al.* 2015) found that the four top motivations for woodland owners to own their woodland were: 1) to protect/improve nature, biological diversity, wildlife habitat, 2) for personal pleasure, 3) to protect and improve the landscape, 4) for wood products (timber, bioenergy, woodfuel). The BWS 2017 identified the same top 3 motivations as the 2015 survey; however a new fourth motivation was about owners managing and owning woodland for their own health and wellbeing (Hemery *et al.* 2018).

The United Kingdom's (UK) departure from the European Union offers the opportunity to debate and change the way land is used and managed. A Defra (Department for Food, Farming and Rural Affairs) consultation published in February 2018 focuses on a post-Common Agricultural Policy settlement for agriculture (Defra, 2018). It suggests an opportunity for public money to pay for public goods, acknowledging that a range of ecosystem services arise from farming and forestry. This would likely come about via a new environmental land management scheme. However, the way in which new approaches (to manage or create woodland) and schemes (to encourage the delivery of ecosystem services) are taken up and work will depend to a large extent on the actions of private land managers. Therefore, a greater understanding of how land managers learn and take on board information, the networks they engage with and use to keep

them informed and their perceptions of the benefits or ecosystem services they provide and how these might or could be funded is important.

1.1. Woodland expansion and creation

Government policies in England and the devolved administrations of Wales and Scotland have strong foci on woodland management, and woodland creation and expansion. There is concern that planting targets are not being met, and that many woodlands are not being actively managed (Dandy, 2012; Lawrence and Dandy, 2014). The Forestry Commission England corporate plan calls for significantly more woodland in England via growth in private sector investment in woodland to move from an average increase of woodland cover from 2,000 hectares (ha) per year to 5,000 ha in order to reach a target of 12% woodland cover by 2060, up from the current woodland cover of 10% (Forestry Commission England, 2015). The creation of a new Northern Forest was announced in the government's 25-year plan to improve the environment (HM Government, 2018); this will stretch from Liverpool in the North West to Hull in the North East. A national tree champion was also announced in the 25-year plan to promote the mix of environmental, social and economic benefits of trees and forests. Woodland expansion in Scotland is also high on the Scottish Government's agenda with the aim of increasing woodland cover from 17% to 25% of land area by the second half of the century (Forestry Commission Scotland, 2010). A new strategy for forestry in Scotland is currently being developed. In Wales, the Welsh Government set an aspiration to increase woodland cover by at least 2,000ha per annum from 2020-2030 up from the 15% woodland cover it has at present (Natural Resources Wales, 2017; Welsh Government, 2018). The recent 'Wellbeing of future generations (Wales) Act 2015 is a new law requiring public bodies in Wales to work together towards seven wellbeing goals. The new Environment Act (Wales) 2016 puts in place legislation to protect and manage the natural resources of Wales. Area based statements will be created by Natural Resources Wales to provide evidence on priorities and opportunities for natural resources at a local level and should be linked to the wellbeing agenda.

1.2. Ecosystem services

There is increasingly widespread agreement that forests and woodlands can provide a wide range of ecosystem services (Sing *et al.* 2015) related to all four of the categories identified in the United Kingdom (UK) National Ecosystem Assessment (NEA) (UK NEA, 2017) of provisioning, supporting, regulating and cultural ecosystem services. Natural capital accounting is one of the ways in which natural stocks such as carbon and biodiversity are given a monetary value with the recognition that forests provide important ecosystem services. The recent natural capital accounts of the Public Forest Estate in England provide examples of this approach (Forest Enterprise England, 2016), however, O'Brien *et al.* (2017) and others (Chan *et al.* 2011; Levine *et al.* 2015) critique monetisation approaches and identify the particular difficulties of quantifying and

monetising all of the cultural ecosystem benefits of trees and woodlands. The recent government 25-year plan to improve the environment in the UK (HM Government, 2018) also outlines the importance of the ecosystem services provided by nature and suggests the need for different mixes of funding mechanisms both public and private to pay for some of these services. The consultation on the future for food, farming and the environment mentioned above (Defra, 2018) suggests that farming and forestry can be incentivised through simplified schemes to create and provide new habitats and a range of ecosystem services such as an increase in biodiversity, mitigation of climate change and reduced flood risk.

1.2.1. Different mechanisms that can assist in the delivery of forest ecosystem services

There is action being taken using different mechanisms to try and encourage active woodland management as well as woodland creation and expansion. These mechanisms can range from regulation, grants and incentives, guidance, training, membership of professional networks, advice and support, peer networks to events and campaigns. Lawrence and Dandy (2014) identify the main policy instruments for encouraging woodland management and creation in the UK as grants and advice, and these as well as regulations are used to influence land managers decisions and behaviours.

Forestry Commission England as part of its 'Woodlands into Management Programme' developed a series of engagement activities focused on forestry businesses to provide them with information for developing their enterprises and link them to potential funding streams. Different types of engagement events were organised including: 'pie and pint' introductions and networking, masterclass events to look at grant applications, follow on business advice from a Forestry Advisory Consortium England (FACE) advisor and machinery demonstrations. An evaluation of these engagement activities (Ambrose-Oji, 2016) found that businesses attended the events to: meet others and businesses like themselves, find ways to meet their business objectives, and to get general advice and update their knowledge. Their business objectives included growing and developing their small scale forestry businesses, or bringing woodland into more productive management. The five most frequently citied sources of business advice were: 1) Forestry Commission, 2) other woodland owners, 3) forestry agents and consultants, 4) the Royal Forestry Society, and 5) Confor (Confederation of Forest Industries). 'Grown in Britain is a campaign to encourage creation of new sustainably managed woodlands and increase the production and supply of British timber for use by local businesses and people (Grown in Britain, 2017). It provides a range of publications and information for woodland owners, processors, retailers, construction industry, publics, as well as running an annual 'Grown in Britain' week.

1.2.1.1 Payments for Ecosystem Services

Payments for ecosystem services (PES) are increasingly being talked about as potential market mechanisms to support land managers in managing to deliver a variety of

ecosystem services (URS, 2015). These would overcome some current issues relating to non-market services, where the manager at present may not receive any payment for delivery. PES schemes are sometimes used to describe a range of economic approaches for rewarding conservation of ecosystem services. They are also thought of as schemes in which beneficiaries or users of ecosystem services pay those who provide those services. They can be schemes to reduce degradation of the environment. Schemes can be via public payments, *e.g.* by government to land managers, or via private payment schemes or public-private payment schemes (Defra, 2013). Key principles for PES schemes have been identified to include the following: they should be voluntary; the beneficiary pays; payment is to the provider of the ecosystem service; payments are usually for actions over and above those required of land managers, *i.e.* they should not be made to a provider for meeting regulatory standards; and they are conditional on the delivery of the service or the actions taken to deliver that service (Defra, 2013). The major PES schemes to date have focused on catchment-based investment by water companies. Defra (2016) funded three rounds of pilot projects to test the practical application of PES and identified some of the challenges as:

- Time and resources needed to build trusted relationships between beneficiaries (buyers) and providers (sellers);
- Limited quantitative evidence on the links between the land management undertaken and changes in ecosystem services;
- New legal and institutional structures are needed to facilitate PES schemes;
- Identifying and engaging potential beneficiaries;
- The length of contracts that might be required;
- Reluctance to pay polluters.

PES schemes are diverse and have been growing in number in recent years (Borner *et al.* 2018; Marino and Pellegrino, 2018), there are currently thought to be 550 PES schemes in operation worldwide (Salzman *et al.* 2018). Smith *et al.* (2012) suggest they could appeal to impact investors looking for projects to deliver ecological and social benefits along with financial returns. A new European Network[1] is exploring PES in relation to woodlands for water quality and will identify a range of schemes across different countries.

However, existing schemes that provide funding for ecosystem services, woodland management or creation, such as grants, are often viewed as complex and overly-bureaucratic. Work exploring those who dropped out of the woodland creation grant application process in England in 2016/17 found that the reasons for this drop out included: the scope and design of the grant, the grant rules and administration process, financial reasons such as the cost of preparing the application, changes in the applicants

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[1] The network is part of an EU Cost Action and will run for four years. https://www.forestresearch.gov.uk/research/pesforw/

circumstances, and the impact on other existing land based grants (Ambrose-Oji and Tidey, 2017).

Lawrence and Edwards (2013) studied the constraints and options for increasing new productive woodland in Scotland via interviews with owners, managers, advisors, regulators and policy makers. They identified four key factors which influence decisions on woodland creation. These include incentives with respondents talking about the complexity and rigid conditions of the grant schemes that discourage some of them from applying. The approvals process for planting applications which was seen as lengthy, unpredictable and did not favour planting for timber production. The advisory system did not always meet the needs of woodland owners and tended to support those already interested in forestry and not reach out to others, such as farmers. Finally a lack of leadership by Forestry Commission Scotland was raised as there is a clear aspiration in Scotland for woodland creation and expansion; however, respondents felt there was a lack of commitment to this at a policy level, and in terms of on-the-ground decision making.

2. Methods

2.1. Research aims

This research focused on land managers across the UK and explores the following research questions:

1) What evidence is there of land managers perceptions and understandings of the concept of payments for ecosystem services?
2) What evidence is there of land managers using a range of formal and informal networks to support their management and decision making processes?
3) What are the ways in which land managers learn from others and through more informal and formal mechanisms?

A mixed methods approach was taken for this research involving a range of data sources.

2.2. Data sources

The research synthesised findings from four sets of evidence and empirical data, as follows:

i. Semi-structured interviews conducted with 44 individuals representing different types of private woodland owners and land managers across Britain between autumn 2016 and summer 2017.

ii. A further analysis of the British Woodlands Survey (BWS) 2015 dataset, using data from 1,009 private woodland owners and managers.

iii. Narrative evidence collected at four workshops involving 48 woodland owners, land managers and other forestry stakeholders involved in the development of the British Woodlands Survey 2017.

iv. The BWS 2017 published data.

2.3. Semi-structured interviews

A total of 44 semi-structured interviews were conducted with woodland owners and managers over the telephone (Appendix 1). The majority of interviewees were recruited using a database of respondents who stated they were willing to take part in further research about woodland management and resilience as a follow-on from participation in the BWS 2015. Key information about each of the respondents collected as part of BWS 2015 allowed the sample to be codified using the segmentation model for woodland managers developed by Eves *et al*. (2015a) (see section 2.3.1). Interviewees were selected according to country location, and inferred segment membership which was based on their management objectives, motivations, use of management plans, size and

type of woodland. Written informed consent was sought from all interviewees and where this was not written, verbal consent was sought.

The semi structured interviews explored: respondent management objectives and forestry background; their understanding of resilience and any translation of this knowledge into practice; and, what measures or information sources influenced their perceptions and their behaviour, including their social networks and knowledge sources. The interviews lasted between 40 minutes and 1.5 hours and were digitally recorded and transcribed verbatim, then coded in NVivo using a deductive coding framework based on the interview protocol outlined in Appendix 1. Further inductive coding was undertaken to focus on PES, land manager networks and social learning. Two different researchers coded the data. Consistency of interpretation between researchers was tested, and returned a Kappa value of >0.7 which was considered an acceptable level of consistency. Queries were generated in NVivo to discover patterns in perceptions, understandings and behaviour common to the manager groupings.

2.3.1. Applying a segmentation model

Recent work by Eves *et al.* (2015a and 2015b) led to the development of two separate segmentations, one characterising woodland managers around the issue of productive woodland management and the other, focused on woodland creation, which characterised farmers as the group of land owners with most potential for additional woodland planting. The segmentation models were developed in response to two surveys with a sample of approximately 1,000 respondents in each. The work identified shared characteristics based on motivations, size of woodland and preferences. Ambrose-Oji *et al.* (2018a) refined the woodland manager segmentation based on an analysis of the BWS 2015 data, renaming two of the five Eves *et al.* (2015a) segments, and reclassifying another. This refined Eves *et al.* (2015a) model is used in this report (Table 1).

The relevance of using this segmentation model is to cluster land managers by similar objectives, motivations and approaches to woodland management as a tool that can provide insights about how these different groups perceived particular forestry issues, and by extension, the opportunities for targeting communications, materials and policy tools at particular kinds of land managers. As well as this approach having the potential to facilitate increases in woodland management and creation, it may also provide the opportunity for exploring the perspectives different land managers have about ecosystem services, PES, and whether they have an interest in learning more about the ecosystem services approach within their woodland and forest management practice.

Table 1 Characteristics of the 44 land owners/managers interviewed applying Eves et al (2015) segmentation model

Land manager segment	Description of key characteristics	Exemplary quote(s)	Woodland size class* (Ha)				TOTAL (%)
			0-6	6-15	15-50	50+	
Multifunctional Managers	Manage their woodlands for a broad range of private and social benefits. Woodland holdings include both small and relatively large classes, and most are in long-term private ownership.	*"Well it's for various reasons, we have this for recreation, so we can walk our dogs there every day and as a source of firewood, and timber and for a bit of landscape impact, and for the flora and fauna"*	8	3	2	5	18 (41)
Timber Producers	Main objective timber production. Desire to make a profit, 'break even' or to "manage woodland properly" are strong motives. Woodlands most likely to be large. Ownership private or in Trust.	*"…. you get the satisfaction of having something where you've created some value because you have a crop that is useful"*			1	8	9 (20)
Enterprise Focused Managers[1]	Manage woodland for private and public goods and services. Woodland often part of larger land holding, e.g. estates or farms. Clearly aim to make a profit across the business, so may be cross-subsidisation with other land parcels.	*"The main business of the estate, it's integrated land management. So it is management to be sustainable and to make a profit, the woodland falls into that"*			2	5	7 (16)
Eco-centric Managers[2]	Value their woodland for many reasons, but tend to manage for ecological benefits or have strong views about "letting nature take its course". They are the least likely to engage in any income-generating activities. Their woodlands are the smallest average size and are privately owned.	*"I tend not to do anything and when trees fall, I just let them fall where they fall or whatever. And, so it's… I suppose what a forester would call it, unmanaged"*	3	2	1		6 (14)
Individualists[3]	Many are relatively new to woodland ownership, and may have low levels of management other than tree planting. Their attitudes suggest they are keen to be woodland managers, but they have poor forestry knowledge and lower skill levels. Their woodlands are small, and relatively recently purchased or inherited.	*"Number one I hate regulation, number two I love grants because if that will enable me to plant more trees I want to take up a grant. In the county of Rutland the county emblem is the acorn, so I try to grow as many Oak trees as possible. But I like variety so we have Lime trees as well for the bees, and I grow walnut"*	2		2		4 (9)
TOTAL			13	5	8	18	44

* The uneven intervals in woodland size are related to the Eves *et al.* (2015) segmentation model which draws an associated between segment and woodland size class and was an association confirmed by the additional analysis of the BWS2015 data (Forster, 2016)

[1] Renames "Profit-seeking guardians" in Eves *et al*.(2015) model

[2] Renames "Disengaged Conservationists" in Eves *et al*. (2015) model

[3] Renames "Aspiring manager" in Eves *et al*. (2015) model

2.3.2. Characteristics of the interview sample

The sample in each country is outlined in Figure 1. Figure 2 shows the type of land manager and Figure 3 shows how the sample fits into the segments identified by Eves *et al.* (2015) and Figure 4 shows the size of woodland applying the same categories used in the Eves *et al.* (2105) segmentation study. Figure 4 shows the size of woodlands managed by interviewees using the size categories used in Eves *et al.* 2015.

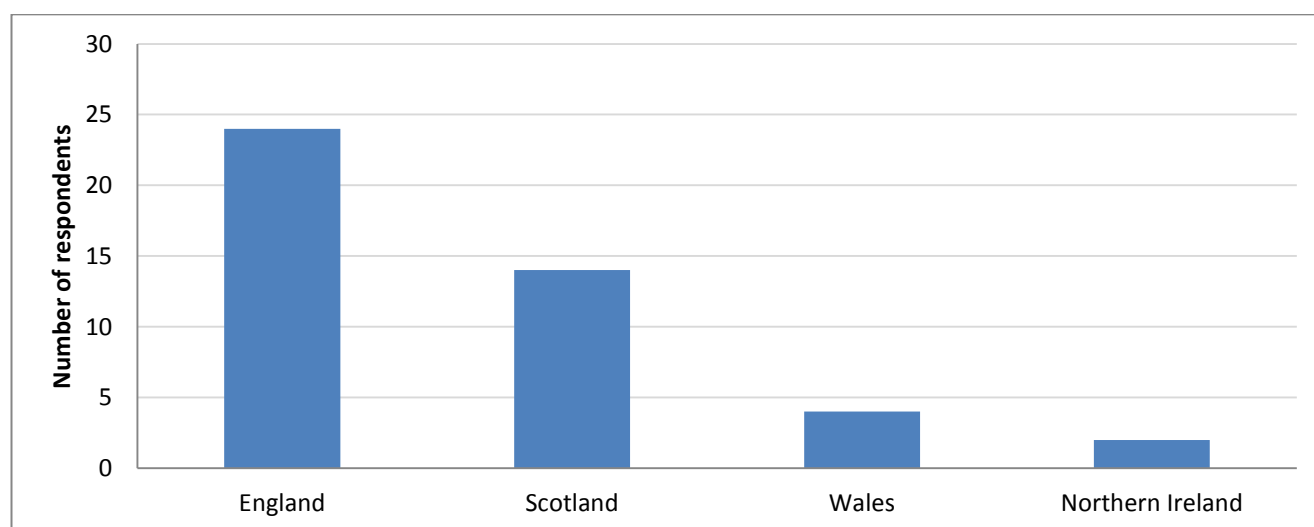**Figure 1** Interviewee sample by country (n=44)

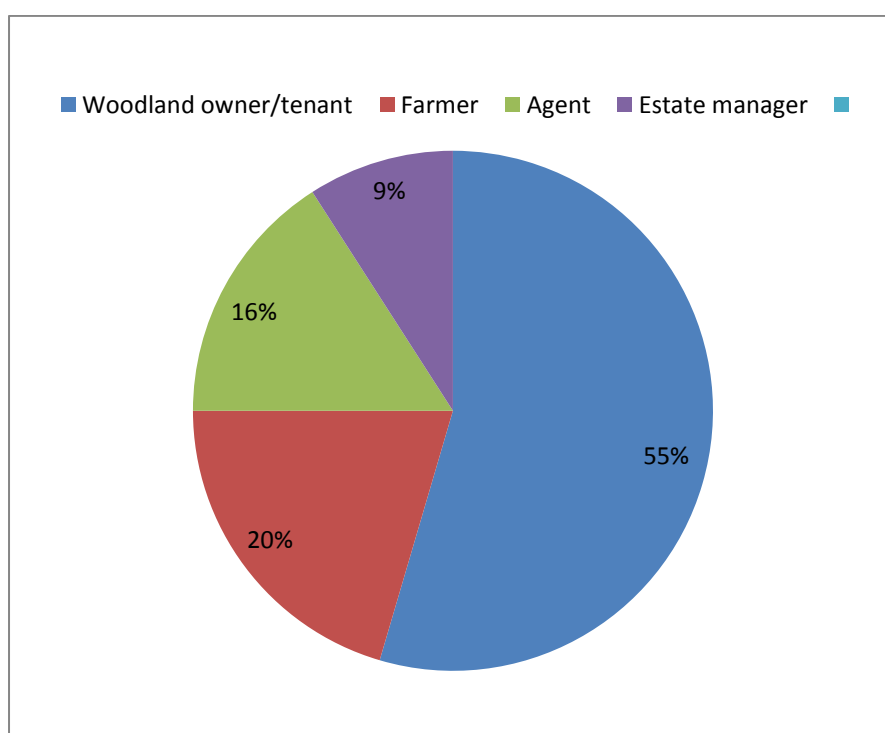**Figure 2** Type of land manager in the sample (n=44)

Figure 3 Numbers of interviewees (n=44) by segment using an adapted Eves *et al.* (2015) segmentation model
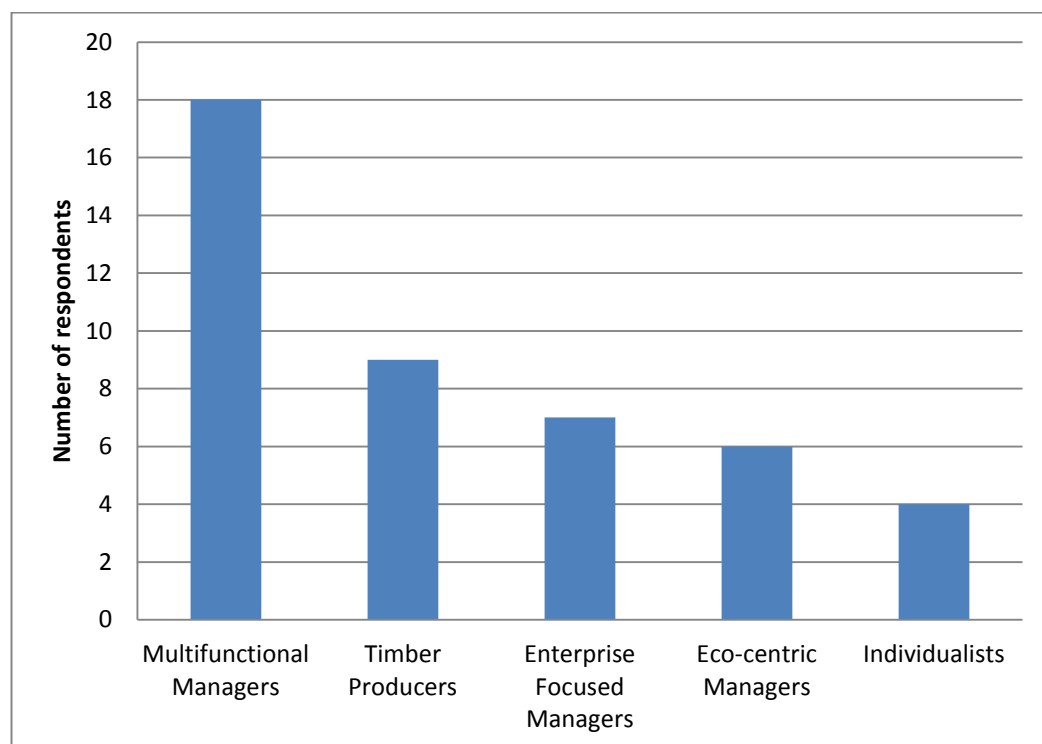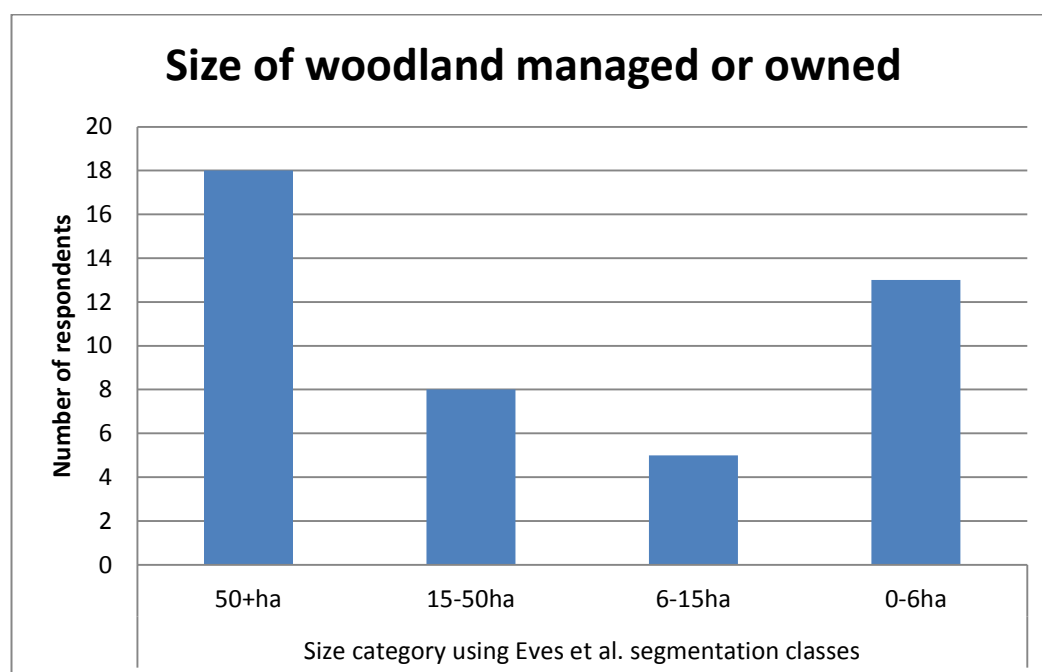

Figure 4 Size of woodland managed /owned (n=44), using the size categories utilised in the Eves *et al.* 2015 segmentation study

Whether or not a land manager has a woodland management plan could provide some insights into whether or not they are likely to take up grants, and perhaps provides an opportunity for them to explicitly outline what ecosystem services the managers think they are providing. Management Plans may be formal (*i.e.* a recognised format suitable for submitting as part of a grant application), informal (*i.e.* a plan that provides strategic guidance or operational guidance but is not in a format suitable for submission as part of a grant application), or plans might not exist as written documents at all. Looking at the land managers who took part in the interviews, twenty-five (*i.e.* 57%) had a formal forest management plan, 7 had an informal plan, a further 7 had no plan while 5 stated that they had a plan '*in their head*'. Those with smaller woodlands were more likely to have no plan, an informal plan or some ideas but nothing written down.

When testing for differences associated with the land manager segmentation model there is a significant difference (p=0.032) in the proportion of respondents that have different kinds of management plans according to segment. Enterprise Focused Managers and Timber Producers most frequently held formal management plans, whereas Individualists and Eco-centric Managers most frequently had no form of management plan at all. Analysis of the BWS 2015 data showed that owners of smaller woodlands ($p<0.001$ across size range) and those motivated by amenity ($p<0.001$) and personal pleasure ($p<0.05$) objectives were less likely to have management plans than others.

This evidence suggests that Timber Producers and Enterprise Focused Managers are more likely to be engaging with the formal grant system and are likely to be managing for the ecosystem services provisioning and regulating, rather than for cultural ecosystem services or supporting services. Conversely the Eco-centric managers are less likely to be engaged with the formal grant system but have strong beliefs about the ecological integrity of their woodlands and are motivated to manage for a wide range of ecological benefits and ecosystem services. The Multifunctional Managers are more difficult to understand as a group since they include land managers with multiple objectives mixing timber production with biodiversity, amenity and natural heritage aims, and include a mix of individuals with and without either formal or informal management plans.

Figure 5 Respondents with a forest management plan (*n*=44)
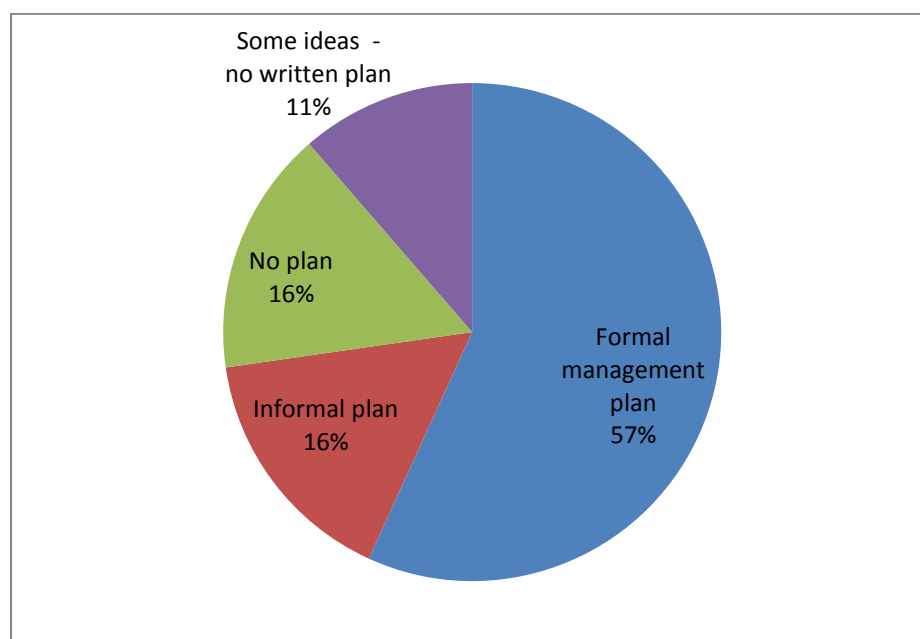
2.4. Additional analysis of the British Woodlands Survey (BWS) 2015 dataset

The BWS 2015 used an on-line questionnaire to explore private woodland owners'/managers', awareness, action and aspiration relating to environmental change. The survey was framed around the adaptation elements of the UK Forestry Standard (UKFS), and asked stakeholders involved in the forest sector about their intended and actual behaviours (Hemery *et al.*, 2015). A subset of this dataset which isolated the owners and 'hands-on' managers of woodland lent itself to additional statistical analyses. The '*R*' statistical programme functions were used to test for: associations between owner/manager motivations, woodland size class and woodland type (a full report of the analyses and tests applied is given in Forster, 2016).

2.5. Narrative evidence from workshops involving owners, managers and policy stakeholders

Four workshops across England, Scotland, and Wales were organised in partnership with the Sylva Foundation as part of the 360 degree research and consultation process that was used to develop the questionnaire for BWS 2017 (see Hemery *et al.* 2018). Active Listening (Given, 2008) was undertaken at these workshops to collect additional evidence about owners/managers understanding of the key issues for the future of forestry. Active listening is a technique developed in psychology and behavioural sciences, with the goal of focusing on the speaker and accurately hearing and interpreting their verbal and nonverbal communication. Using participant observation

and close listening to the content and meaning of conversations, the active listener recorded key themes and phrases against a predefined set of questions (Given 2008). Which type of participant expressed a particular view was noted, i.e. whether they were woodland owners, estate managers or forest agents. The active listening notes were coded for key phrases and concepts using NVivo and following a coding framework related to the research questions. The land manager/owner sample in this qualitative dataset was 25, and representatives from organisations representing land owners/managers was 11 (Table 2).

Table 2 Workshop participants by type and country (taken from Hemery *et al.* 2018)

	England	Scotland	Wales	TOTAL
Woodland owners	7	4	3	**14**
Forestry managers and businesses	6	2	3	**11**
Sector organisations	5	3	3	**11**
Government	1	1	2	**4**
Researchers	1	2	2	**5**
Other	1	1	1	**3**
TOTAL	**21**	**13**	**14**	**48**

2.6. Results of the BWS 2017 survey

The BWS 2017 took a very different approach from the BWS 2015. In the 2017 survey a 360-degree approach was taken in which stakeholders were invited to a series of workshops (see above) which contributed to the development of the key themes and questions administered via the survey. 1,630 responses were received.

The majority of respondents were private woodland owners; other respondents included forestry agents, forestry professionals, tree nursery and wood-processing businesses.

3. Results

3.1. Ecosystem Services and PES

3.1.1. Services and benefits

The qualitative data illustrates that many land managers talk about the benefits that their woodlands provide, however very few use the term ecosystem services. This term was used more in the four workshops than it was in the semi-structured interviews, due to the workshop leaders using this term explicitly in the workshop questions and discussions. The ecosystem services identified during the workshops were wide ranging covering timber production (provisioning ecosystem services), carbon sequestration (regulating services), recreation, health and wellbeing (cultural services), biodiversity (supporting services), and water regulation (regulating services).

The interview data does not provide explicit evidence of what ecosystem services land managers thought they were providing. However, the interviewees did outline their management objectives from which some ecosystem services can be inferred via the type of management approach being undertaken. There were a range of objectives that managers were considering and wanting to achieve for the woodlands they managed and these differed by segment.

Multifunctional Managers unsurprisingly had multiple objectives which meant they were potentially providing a range of provisioning, cultural, regulating and supporting ecosystem services. For example their objectives often included conservation, manging for timber and fuelwood, also sometimes this included coppicing. As an example, one Multifunctional Manager who wanted to diversify talked about wanting to manage in a low intensity way, this included taking a continuous cover forestry approach, with coppicing, some intensive management for timber, managing for fuelwood, leisure access and housing bee hives. Another felt that having a variety of objectives could be beneficial in the long term for the woodland:

> *There's no formal management plan, but my approach is informed by reference to management planning guidelines. In particular continuous cover and the woodland as a whole is managed in a very low intensity and diverse way. Because the size and productivity of the woodland, some things are not appropriate for any more systematic methods. It has been very much to the benefit of the woodland, but I've adopted an approach that really does nothing, not too much of anything, but a consistent degree of variety in my approach. That variety appears to have been to the benefit of the woodland in the long-term. (LM3 Multifunctional Manager)*

While another wanted to restore the woodland to a more natural state, placing an emphasis on game management and biodiversity, and also had a biomass boiler. Another Multifunctional Manager focused on natural regeneration with coppicing for firewood and sustainable heating. While another wanted to move from softwoods to encouraging regeneration of hardwoods to be more in keeping with the landscape; as the estate was an historic park. This person also had a rather more personal objective of managing the woodland to keep active as they had had a heart condition in previous years. One interviewee also talked about having an educational focus as the following quote illustrates:

> *We encourage young people to come down here and look at vocational careers rather than academic careers, because not everyone is suited to an academic or science based career. So here we encourage young people, particularly young people who are disillusioned and have been excluded from education, children with special needs if you like, we encourage them to come down here and work with us to look at the alternatives to their future lives. (LM12 Multifunctional Manager)*

Timber Producers were mainly providing provisioning services via timber production and wanted to maximise output for profitability. However, timber was not the only service they were providing. One manager was aiming to move from clear felling to continuous cover forestry, while another manager was considering putting in a river hydro-scheme (regulating services) and is also interested in deer stalking.

> *The stuff we manage is either conifer plantations or mixed woodlands and we have started the process of putting all of the woodlands, some in recent times but we're now starting the process of moving them into continuous cover, once the current clear-fell management plan has been completed. (LM24 Timber Producer)*

This interviewee both owned woodland and managed woodland for clients in England and was interested in planting more over the next few years:

> *The main objective is to forest as much land over the next decade as we possibly can, so we would be looking to be getting involved in the development of I don't know, probably a few thousand hectares of forestry, that's our intention, what we want to do is create a few thousand hectares of new forestry over the next decade or so. (LM24 Timber Producer)*

While another Timber Producer was interested in economic sustainability:

> *Yes, each wood is different and my ambition would be to get the woods to be managed in such a way that they are sustainable for the future and*

hopefully producing enough income on the way. (LM25 Enterprise Focused Manager)

However, some Timber Producers also outlined wider benefits (supporting services) that their woodlands provided.

Enterprise Focused Managers were looking to continue to develop income streams from the woodlands they managed. One manager of a community woodland, that was part agroforestry, was also managing for firewood for the local community and wanted to diversify further.

Yes, I would say in the past it was mainly sheep farming. Where it had up to 1000 sheep at one time, now they're down to about 150 sheep and they're concentrating on firewood, so I wouldn't say it's exactly agroforestry here but it's quite close to it. So they do have a lot of woodland and they like to diversify. (PT12 Enterprise Focused)

Others were more focused on long term commercial management of the woodlands, or on integrated land management as the following interviewee illustrated (including cultural ecosystem services from wanting to contribute to quality of life):

The main business of the estate is integrated land management. So it is management to be sustainable development, and to retain it in family ownership, to farm it/manage it sustainably, to make a profit, and to contribute to quality of life locally. (PT3 Enterprise Focused)

Eco-centric Managers often wanted to manage woodlands for biodiversity (supporting services), and keep them in as natural a state as possible, with some interested in coppicing.

The reason for planting it was that I wanted to do my bit for conservation and for biodiversity. The idea of planting a wood was an attempt to put something back into the environment, so that was the objective. (LM8 Eco-centric Manager)

On the whole I think almost the wood does it on its own…it is what it is, the wildlife that comes doesn't by what plants grow there and I don't want to change it too much from what it is, because it has its own biodiversity if that makes sense (LM21 Eco-centric Manager)

Another Eco-centric Manager that said they were surrounded on three sides by Sitka Spruce plantations was determined to manage for wildlife and did not want hunting on their land:

Yes, I don't want to hurt any wildlife, I want them to thrive because everybody else seems to want to kill them, I have people coming

> *knocking on my gate, wanting to come in with guns which is always*
> *refused. (LM6 Eco-centric Manager)*

One Individualist Manager was focused on the creation of mature woodland with future plans for taking firewood from the site:

> *Ultimately the young woodland obviously the management plan is to*
> *produce a mature woodland. So that's the first 20 years really. The older*
> *woodland is to manage it and replace as necessary, taking wood for*
> *firewood. (LM17 Individualist)*

Regardless of the respondent type, the term ecosystem services still generated some uncertainty. The workshop process, that helped to identify the themes to be included in the BWS 2017, highlighted mixed reactions to the concept of ecosystem services; however, participants thought it a significant enough issue to include in the 2017 survey. The data from the BWS 2017 show that of the woodland owners who answered the question '*Do you think your land provides valuable ecosystem services*'?, 87% answered yes, 10% were unsure and 3% said no (Hemery *et al.* 2018). In addition to the question on ecosystem services, the issue of societal attitudes emerged as being important. Participants suggested that there needs to be a wider societal debate about what benefits and services society actually wants from forests, and how this fits in with expectations for wider land use. This is important as it links debates concerning issues of public support and public conflict around the ecosystems services that flow from different forms of forest management. It is critical to explore how these relate to policy tools and mechanisms such as grants that facilitate their production. A narrative from the workshops related to the profitability of woodlands, sometimes as a portfolio of land uses, with much discussion focusing on grants and the merits and problems of currently available grants and how far grants can support changes in practice around emerging issues such as silvicultural aspects of a changing climate, and the provision and maintenance of a stream of services and benefits.

As one participant outlined:

> *All of the things being discussed are societal issues… you can get public backlash*
> *from not allowing access or from management… you can get public support for*
> *different types of management... (Multifunctional Manager. Workshop Active*
> *Listening Notes)*

Many in the workshops linked the issue of societal values with their concerns that public attitudes towards silvicultural and other forestry operations *e.g.* tree felling, or conversely woodland creation and afforestation, could cause conflict regardless of the positive economic and conservation values. They felt that there was a strong case to be made to promote better understanding of forestry and for knowledge exchange between land managers and representatives of the sector with the wider public about how

forestry contributes to the economy, society, and the environment through active management.

At the workshops there was discussion about the need for more tree planting (due to policy priorities and associated targets for increased cover in each country), and also disagreement about the terms undermanaged and neglected woodlands. It was argued that without more tree planting and greater management of woodlands any services and benefits would not be delivered.

The BWS 2017 asked woodland owners about their motivations for owning their woodland and the responses against a pre-determined list of potential motives, adapted from a list originally developed to survey large estate managers in the 1960s (Nicholls 1969) and used in every BWS since, does provide some evidence of the types of services owners in the survey are potentially providing. Improving biological diversity and wildlife habitat (supporting services) was the most widely-chosen motive. Other important motivations included provisioning services such as wood products/timber/woodfuel, and cultural services such as promoting health and wellbeing, and recreation, and regulating services such as protecting or improving carbon stocks; which all received a mean score of over 6 out of 10 (when 0 equals not important to 10 which is important) (Hemery *et al.* 2018).

Further analysis of the BWS 2015 showed significant differences in relation to woodland size and motivations for owning woodland, with those motivated by capital grown investment owning larger areas than those who owned woodland primarily for personal pleasure (Figure 6).

Figure 6 Woodland area owned versus motivation for owning woodland. Error bars = 95% confidence intervals. (Foster, 2016)
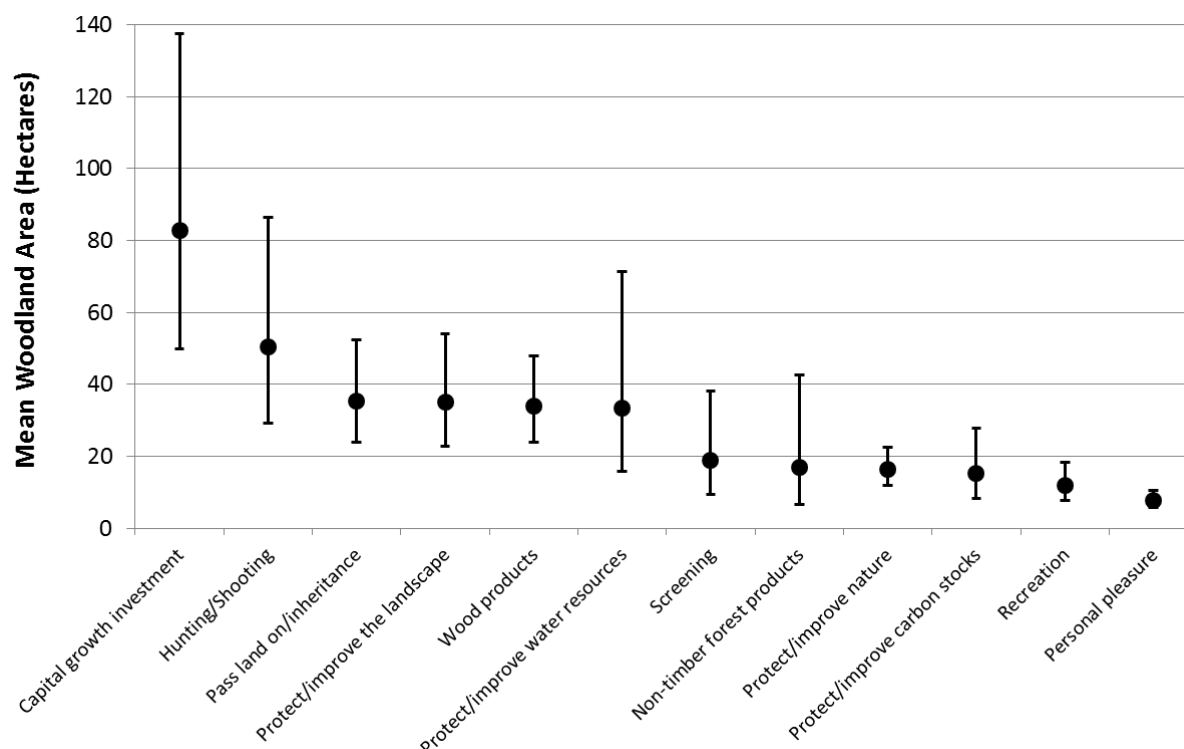
As well as recognising that woodland and forests provide such a range of ecosystem services, the workshops revealed that there was some concern about how land managers providing public benefits and ecosystem services should be supported, not only at individual site level, but also to secure benefits across landscapes.

3.1.2. Awareness, knowledge and understanding of PES

More than double the number of land managers in the interviews had not heard about PES (n=24), as had heard about this concept (n=10). Even if they had heard about PES land managers only had a limited recognition of what it was and what the term meant. Two respondents said they recalled hearing something about it either through a Forestry Commission or other organisational website. A *Fishers exact test* was used to test for any association between knowledge of PES and type of land manager. There was no significant association (i.e. $p \leq 0.05$) between knowledge of PES and the segmentation model ($p=0.094$), whether the woodland holdings were conifer, deciduous or mixed ($p=0.09$), or whether the land manager had a woodland management plan ($p=0.304$). So on the basis of the evidence from interviews there does not appear to be any link between land managers' knowledge of PES and their management objectives, the type of business they represent or the type of woodland that they manage.

There was specific interest from some concerning how useful it would be to gain PES as an additional form of support for management, and to gain recognition of the benefits that many land managers feel they are already providing.

> *No. But my ears would prick up if there was going to be payment to help me do things! (LM31 Individualist)*

Another manager suggested PES would be the formalisation of something woodland managers had been doing for generations i.e. providing benefits from managing their woodland.

> *I do think there ought to be payments for the ecosystem services that are being delivered just by maintaining woodland. I'm not sure how much active management is always necessary, but the very fact that people look after woodland and keep it as woodland should be recognised and its not. (LM18 Multifunctional Manager)*

Others outlined how they thought PES were very important but they were sceptical about how it might happen or how it could actually be made to work in practice, particularly in relation to woodlands. There were also concerns about how such a scheme could be effective and some suggestion that managers would only provide benefits for payment if it fitted with their management objectives.

The BWS 2017 asked woodland owners whether they thought they should be paid to provide ecosystem services and while 42% said yes, 27% said no and 31% were unsure (Hemery *et al.* 2018).

Making links with the types of conditionality currently applied to grants, there were questions about the position of smaller land managers including some concern about whether a particular size of woodland would be needed in order to qualify to participate in any PES scheme, as outlined by one owner in Cumbria:

> *I think the problem is it only a four acre site, it's very small for a lot of these schemes. It's part of a greater whole but I'm not at all sure whether there are any grants or schemes which would be interested in such a small area of woodland (LM4 Multi-functional manager)*

Flexibility in any PES scheme was raised by a small number of managers and was thought to be important, with some concern expressed about having binding agreements over long timescales.

3.1.3. The challenges of assessing, valuing and pricing ES

Interviewees had concerns about not only how ecosystem services and benefits are valued (in any PES scheme), but also how they could be priced, suggesting the '*devil is in the detail'.*

> *I understand and agree with the principle of PES but that's only the half of the problem. The other half is what price do you put on it that doesn't distort the market? Okay so I'm sequestering carbon… I don't think we have a sufficiently good understanding of how that equation resolves, do I get the same rate of payment for sequestering carbon in my willow or my oak. Do I get paid per tonne or per hectare, there's a huge amount of work (LM2 Multifunctional Manager)*

Quantifying services and benefits was thought to be particularly difficult, and some felt it was practically impossible to do so. A small number of interviewees suggested that valuing services and benefits was not new and the concept of placing a monetary value on what the environment provides for society was reasonably well established, with carbon a strong focus at present. This interviewee outlined how the Forestry Commission has been carrying out valuations for a number of years, however he suggested this was not a '*true marketplace*' and questioned how such a market might be developed to be '*an effective marketplace*' (PT2 Multi-functional manager).

Owners and agents in the BWS 2017 survey were also asked whether they were aware of the economic value of their land for ecosystem services such as pollination, soil erosion, water flow regulation, cultural, recreation or carbon storage or sequestration. Over three quarters did not know or were uncertain of this value (Hemery *et al.* 2018). An Enterprise Focused Manager suggested that the non-market benefits of woodlands acted as a constraint to a manger's ability to manage for maximum timber production and suggested PES type mechanisms would be a way to compensate for this. Intermittent funding streams were thought to be a reason why many woodlands were currently undermanaged. While another Multifunctional Manager involved with management of The Crown Estate outlined how they work on what they call '*total contribution*' and try to evaluate the total contribution of benefits and services provided by the land they manage, in a somewhat similar way to the approach taken by the Forestry Commission. This interviewee was somewhat ambivalent about the concept of PES, also questioning whether it would be economically sustainable.

> *I'm not convinced that society would think it's acceptable anymore for people to manage in a way which doesn't deliver those wider benefits. And maybe this is just me, I feel we have a moral obligation to do that and it strikes me that paying for ecosystem services in that way should be unnecessary' (PT1 Multifunctional Manager)*

There was discussion in the workshops concerning the values of woodlands with some Timber Producers talking about profitability from timber as a recognition of value and others suggesting that profits can also come from recreation and tourism, and highlighting that other values were important such as community value. With some participants arguing for a balance between profits and societal benefit and others questioning: '*values and profits for whom'*? (Workshop Active Listening Notes). There was some suggestion that without some sort of profit, or break even, underpinning

sustainable woodland management delivery of ecosystem services would be limited. In the BWS 2017, 71% of owners and agents expressed a view that the profitability of their woodland remained unchanged over the previous five years. From the survey the majority of woodland owners and agents reported they had not received any income from provision of any non-timber services. Some did, however, gain income and the services providing the most common non-timber income were shooting (21%), recreation (12%), education (9%) and tourism (6%).

Dealing with different farms and woodlands in various geographical locations, of varying sizes, with different soils and climatic conditions etc., was also highlight as a key issue in the development of any PES scheme. Without a differentiated approach it was thought this might lead to unintended consequences or one habitat that was providing benefits being replaced with another that provides a different set of benefits. Therefore a tailored approach was thought to be needed.

3.1.4. The role of Government and existing grants

There were concerns raised by some interviewees about the role of government in developing a PES approach, with one interviewee acknowledging that Defra had run PES pilot projects, but suggesting that this was not necessarily leading to further action. Rather it was leading to more research studies in which '*lengthy reports*' were being produced that the interviewee thought were not being read.

> *I don't see a real move to make serious broadly available payments for ecosystem services. I can't see any evidence of that at the moment. Which I think is unfortunate because at the moment we still have the whole Rural Development Programme and agri-environment Schemes and it's not doing it (LM31 Individualist)*

In one of the England workshops the issue of stability was raised in relation to concerns about changes associated with the government and wider issues of Brexit. With one small woodland owner stating:

> *Can the government tell us what is stable? Things are always changing, what is stable, we need stability' (Eco-centric Manager. Workshop Active Listening Notes)*

This was also an issue for Timber Producers who were concerned about changes to grant schemes, a lack of focus on forestry and bureaucratic issues associated with applying for grants. While others (interviewees and workshop participants) were concerned about how grant systems (including potentially PES) can drive behaviour and management of woodlands, with managers undertaking actions in their woodlands because the funding required that action rather than focusing on what was best for the woodland

> *You work out what that is and then you see what grant is available, rather than saying, "Here's a cracking good grant to do something, let's try and push that something." Almost regardless of whether it's the best*

> *thing for the site and/or for the client. I think some people have got it
> the wrong way around, basically (LM5 Multifunctional manager).*

The main disadvantages linked to existing grants mentioned by the interviewees were that they provided too little money for the amount of paperwork required. Others were uncomfortable with the requirements attached to the grants, such as species choice and needing to provide public access, or they felt the grants did not support their objectives altogether. Overall there was some agreement from workshop participants of the need for integrated thinking across the farming and forestry sectors, which was partly about government giving greater recognition to forestry and the benefits it can provide.

The new Wellbeing of Future Generations (Wales) Act 2015 was highlighted in the Wales workshop as it provides a statutory requirement for public bodies to take note of the impact of their decisions on public wellbeing. It was thought this might create a useful framework for creating governance mechanisms that translate policy into integrated place-based practice.

3.1.5. Language and terminology

An issue to emerge from the workshops and interviews concerned the different language and terminology often used by policy makers, government bodies and the forestry sector. Small woodland owners, particularly newer owners talked about the need for translation of terms, advocating the need for clear language. Terms such as natural capital, ecosystem services were often felt to be confusing, ambiguous and unclear. A diagram was provided in the BWS 2017 survey to define the term natural capital and the link to a range of ecosystem services. Respondents to the survey were asked if the definitions altered their understanding with 60% stating 'no', 22% saying that it did and 18% were 'unsure'. However, many of those who stated their understanding had not changed -outlined in their comments that they already knew the term. Interviewees who did not use the term ecosystem services or were unsure about its meaning; would nevertheless often be aware of, and talk about, some of the benefits the woodland they manage can provide.

3.2. Networks important to land managers

One of the ways in which land managers had heard about or found out about PES was through the networks they were involved in. The government is considering new approaches to incentivise land managers to provide public goods which might include PES schemes. Land manager networks which facilitate learning between and amongst owners and managers may potentially be important routes to generate interest and traction for new schemes. Land manager networks emerged as a very strong feature of the empirical evidence. Networks were important to all of the land managers, regardless of segment. One of the key reasons networks and peers were seen as such an important source of information and advice was that these connections were often

informal, fluid, and responsive, and built social capital in a way that suited land managers best.

However, the evidence also highlighted that some of the smaller and newer land managers suffered from a lack of awareness about the organisations and networks (such as Small Woods or the Small Woodland Owners Group) and the kind of information that could assist them.

There were three different kinds of networks which emerged from the evidence as follows:

- **Networks related to place** – these networks included other people in the immediate locality of the woodland, or within the community the woodland manager was situated,

- **Networks related to woodland management approach and associated institutions -** i.e. land managers gravitate towards those organisations and institutions whose missions most closely match their own management objectives and values attached to woodlands and forests, so, for example, larger Timber Producers look to Confor, smaller Timber Producers and Multifunctional Managers to the Royal Forestry Society or to Small Woods Association. There are networks of like-minded land owners and managers associated with these organisations,

- **Networks by social and personal identity -** these are networks made up of friends, neighbours, and other people reflecting land managers' own social connections, demography and personal values and beliefs.

Some land managers were connected through each of these three kinds of networks - the categories are not exclusive. The evidence explicitly demonstrates that the diffusion of knowledge and information flows is an important part of network membership. There is some implicit evidence which suggests that networks may confirm the existing beliefs and values held by land managers, and whilst they may extend land manager technical knowledge, there was little evidence that networks were challenging or changing land manager values and beliefs. There did not appear to be any clear patterns of difference between land manager segment and the three types of networks they were associated with.

3.2.1. Networks of place

Communicating with neighbours and local networks was a route to networking that some land managers mentioned. Social level change can occur through connected networks of place where collaboration and cooperation between neighbours and adjoining land owners is possible.

> Well if you talk with other woodland managers or neighbours or other people that you know, that own forests (LM11 Multifunctional Manager)

Well there is the immediate local network or neighbouring land owners who happen to be professionals in their field and employed in fairly senior roles in both Natural Resources Wales and in the Pembrokeshire Forest National Park. Also in the South and West Wales Wildlife Trust. So there is a network of very skilled, very experienced land managers, botanists, herb biologists and indeed in some cases world renowned lichenologists, all in very close association. That is one of the most enriching aspects of woodland ownership. I think we all benefit greatly from the activities and communication and networking with the people that I refer to. So that definitely is the first and most effective source of knowledge. But there are others, I'm a member of the Small Woods Association, which is again an excellent source of both technical knowledge and of reference to people with woodland management and ownership experience, either in similar or in maybe sometimes quite different contexts. So that's a particularly useful source of knowledge….. But definitely I have found that the ability to network with people and with people who are in close proximity physically is far more effective from almost any other form of networking. (LM3 Multifunctional Manager)

3.2.2. Networks by woodland management approach and associated institutions

Land managers were looking for peer advice, formalised information, demonstration, peer-to-peer learning opportunities and much of this is to do with forest management, but also, to a lesser extent, to do with new opportunities such as PES, understanding what is currently happening, and sources of support and advice. Nearly half of the land managers in the interviews talked about using agents or consultants or FC staff. Evidence from the BWS 2017 found that the top five organisations that respondents (woodland owners and agents in this instance) were members of included: 1) The Royal Forestry Society (31%), 2) Country Land and Business Association (28%), 3) Confor (24%), 4) Woodland Trust (21%), and 5) Small Woods (18%).

Interviewees also outlined a range of other organisations they were linked into, where they might go to for advice, information and ideas. Linking to organisations that were felt to be legitimate was also outlined:

Firstly I would go to the FC website… as they should know what they are doing (LM19 Multifunctional manager)

I get advice from the FC and from friends and individuals and colleagues, that is people who are also involved in woodland management, other woodland owners, organisations like the Small Woods Association, they are very good, and they have a very good newsletter (LM30 Multifunctional Manager)

It's just about knowledge, it's just about knowing what the options are, listening to the Forestry Commission advice and Confor advice and implementing it, it's just about knowing what's going on and trying to keep on top of things. (LM24 Timber Producer)

We have the Game Conservancy down here and sometimes I attend open days when they're discussing woodlands and the management of shelter belts. (LM10 Individualist)

you know I'm constantly talking to the Wildlife Trust, I'm constantly talking to my forester and to the contactors and they spend their lives looking in other people's forests. So that's how I get my information. (LM20 Multifunctional Manager)

The BWS 2017 highlighted significant differences between participant's perceptions of different types of advice with having an advisor on site scoring significantly more than any other options and printed information and guidance receiving the lowest proportion of high scores (Hemery *et al.* 2018). There was also evidence of land managers changing to networks that more closely align with the scale and size of their operations:

I used to belong to the Royal Forestry Society but quite frankly, I think they were a bit outside my league, I belong to the Small Woods Association but I gave up with the Royal Forestry people because I just felt that what they were dealing with was a much larger scale than we had. …. and every so often, the Small Woods Association has a conference or have days out and when I can …. I get along to those to hear what other people are doing. (LM15 Eco-centric Manager)

Well that's the big area that is sadly missing at the moment. The Forestry Commission will give you advice, but they're usually only interested in very large woodlands that are obviously maybe conifers, give you good advice for that. …… But the main source of advice has got to come from reading at the moment. (LM17 Individualist)

There was evidence from the interviews of knowledge circulation through networks and industry clusters, and there are opportunities provided by networks for particular types of managers to come together via mediating organisations. For example, agents in Northern Ireland joined Confor and the meetings led to connections which were mobilised when the availability of grants were reduced. The agents agreed to cooperate over tendering for work rather than set themselves up in competition:

And they're quite willing to share their knowledge and their experiences. And likewise they'll come to me if they have a lowlands site near me, they will quite often ask me, "How do you do this? How do you get that through?" But that's only happened in the last three or four years. You know five years ago we weren't talking to each other at all, on your own,

nobody to share any information, nobody would talk. Now it makes a huge difference that we would actually get advice off each other and help each other out. Because nobody then gains financially, everybody's equal, so nobody's fighting each other for work: that really does help (LM26 Timber Producer)

The evidence highlights that land managers were accessing various sources of knowledge via these kinds of networks, including accessing a variety of web-based materials that they felt were relevant to their context and circumstances from organisations they felt connected with, as one person put it:

I do look at websites yes. I go through them from the Royal Forestry Society, I do go onto the Forestry Commission site from time to time, I do go on the Small Woodland Owners Group website and I do look at the Woodland Trust website again from time to time. (LM9 Multifunctional Manager)

Some land managers recognised that the information from particular organisations reflected particular points of views, and felt they benefitted from casting their eye over information that might not be part of the network they were most attached to, for example:

I want to get information from various sources, because some sources may conflict, so a diversity of sources of information is best. (LM30 Multifunctional Manager)

3.2.3. Networks of social and personal identity

Networks that land managers engage and communicate with can be a part of their identity, reinforcing and/or adapting their understandings and values. For example, the quote below outlines an interviewee who lives and breathes networking and communication and from this approach gains a rich flow of information:

I'm drawing on my own information or resources. I'm speaking to experts in the field that have been long-term friends. I talk about these things all the time. We talk a lot over dinner. At weekends and on holidays we talk about this. I go on holiday, I do exactly this wherever I go on the planet. I never stop thinking about it and never stop talking about it. All of my friends and all the people I know are people who do this and are in this industry, so I have a constant turnover and a wealth of information available to me. (LM12 Multifunctional Manager)

In one instance it was the combination of the opinions and values of the land managers' social circle which combined with grant support to prompt action:

Yeah, initially I did it because there was a grant that was offered, and so many people kept telling me, I ought to coppice it again, so it was partly

the grant. The grant was the trigger, but in the background was me being told that I should be coppicing it. (LM21 Ecocentric Manager)

Networks which reflect land managers social and personal identify, e.g. those doing similar things with their land, undertaking similar jobs, or subject to similar circumstances, ("people like me") can also be key to knowledge dissemination and learning, for example as one person put it:

The training I get is sort of these seminars where I network with other people doing the same sort of job and I learn from discussions with them. (PT3 Enterprise Focused Manager)

Contact with networks could come about by chance via work or introductions from friends.

I'm an architect and work for the colleges quite often.. and I asked an ecologist I was working with if he would come and look at the wood and many any suggestions for biodiversity (LM21 Eco-centric Manager)

A friend of mine who cuts trees, he's the one who introduced me to the forester from the Ministry of Defence. (LM32 Individualist)

While another interviewee met someone involved in the forest industry from Finland and worked with him to organise a trip to Finland and speak to people in the sector in that country:

We visited Finland.. you see how they get a much better financial return from… actively thinning and managing it, rather than leaving it alone for 40 years and then coming and flattening the lot all in one go. (LM24 Timber Producer)

3.3. Evidence of learning and social learning

Individual learning as well as social learning, (*i.e.* learning in a social context were others' behaviours, ideas and knowledge can be observed, communicated and understood), are different processes, equally important to achieving policy aims around improved woodland management and woodland creation, as well as following through on new policy priorities such as woodland and forest resilience and the introduction of new concepts and schemes such as those related to PES.

At an individual level, there were differences identified in the evidence between learning and training. Training was most often associated with developing specific skills, e.g. the use of a chainsaw, pest management, woodland management planning, applying certification schemes, and the identification of tree species and birds. By contrast, learning was most often associated with conceptual and practical thinking through silvicultural and management approaches, finding out more about emerging and contentious concepts and issues, e.g. response to climate change, dealing with pests and diseases, the focus on planting resilient species, and the impacts of Brexit.

The interview and workshop evidence (see also Atkinson and Ambrose-Oji, 2017) showed that land managers were interested in learning more about effective strategies for maintaining the sustainability of their forests and woodlands in the face of climate change, dealing with the threats from pests and diseases or ensuring economic sustainability. There were differences by segment in what kind of information and learning land managers wanted, and which information sources they saw as being most suited to their needs and their own management approaches (see Ambrose-Oji et al 2018a, 2018b). Learning was not framed as being about maintaining or enhancing ecosystem services or benefits.

There was recognition from some land managers that in order for learning to lead to behaviour change and action it needed to be combined with other factors such as follow-on training, advice and, most importantly for some, financial incentives as one person summarised:

> *I think training needs to be combined with advice and incentives to do the right thing. I don't think training on its own with no incentive to do anything as a result of it is adequate. So I think if you combine training with then free advice and incentives to implement that advice, then something might change. I don't think I'm probably alone in that thought. I don't think training on its own is ... It's interesting, it's good for the mind and broadens your thoughts, but I'm not sure it results in any action necessarily, especially not with a small woodland. (LM18 Multifunctional Manager)*

The BWS 2017 asked woodland owners and agents how they shared their knowledge with other owners; hosting visits by clubs and membership organisations and student visits were the most popular methods. Respondents were also questioned about how they improved their own knowledge and skills, and membership of organisations and practical training courses were identified as the most important.

There was recognition of the importance of learning to address threats and make the most of opportunities, with some recognition that land managers need to keep up with new information and ideas.

3.3.1. Social learning via social engagement and interaction

Social learning is important not only as a process that supports individual learning, but also one that can change individual and group behaviour and practice at a community level. This is an important consideration in land management where new schemes, particularly those associated with PES, may rely on landscape and community scale change. There are a number of aspects involved in social learning, as outlined in Table 3.

Table 3 Evidence of key parameters involved in social learning (adapted from Reed *et al.* 2006)

Aspect of social learning	Description	Evidence in interviews, workshops and evaluations[2]
Intent to learn	Want to learn, recognise need to learn, looking for learning	Moderate
Looped learning	Reflection and adaptive experimentation as part of learning – not just goal and content driven	Low
Networks	Learning with others, obtaining information from networks, organisations and networks that have legitimacy	High
Social differentiation and shared values	Learn and model with people like themselves personal or professional	High
Increased capacity	Woodland management practice has changed for an individual as a result of facts, knowledge and learning through social interaction	Moderate
Changing attitudes and beliefs	Values have changed for an individual as a result of learning through social interaction – taken on the norms, attitudes and beliefs of "adaptive woodland managers"	Low
Social change	Evidence of scale of change at a community or network level not just at an individual level	Low

The interview and workshop data was interrogated for evidence of these aspects of social learning with results as indicted in the right hand column of Table 3. The most frequent and rich evidence related to **networks** and **social differentiation and shared values** as discussed in section 3.2. With regard to the other aspects of social learning:

Intent to learn – there were very few explicit comments about intentions to learn, however, an implicit assumption is that this was a significant reason why land managers participate in different networks, and join events organised by woodland and forestry organisations. The workshop data showed an intention to learn as an outcome of the discussions since more than half of those who filled in the evaluation forms said that they had been motivated to learn more about some of the issues discussed and that they would be taking up some of the points for discussion with colleagues, friends and family.

Looped learning – there was evidence from the interview data that many of the Timber Producers and Enterprise Focused Managers mentioned that they were experimenting at a small scale, as an approach to judging the suitability, performance and risks associated with planting different "novel" species. Across these two segments 35% mentioned conducting their own species trials. Some of the Multifunctional Managers, around 18%, also mentioned experimenting with new species and species mixes in their woodlands.

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[2] Identified from analysis of interview and workshop data.

Experimentation was not necessarily shared with others however; it was inspired by exposure to new ideas and tools such as Ecosystem Site Classification[3]. It is important to note that there were some comments about grants acting as a pressure against experimentation and looped learning, for example, one respondent noted that:

> Yes after we'd clear felled that 24 hectares we applied for a restructuring grant and indeed received it. Which is very welcome because it does make a significant difference to the economics. It was a little bit problematic though because I was wanting to do several hectares of intimate mixture, Sitka spruce and alder, just as an experiment, but we couldn't actually ... The terms of the grant didn't actually allow that, so what we've got now is we've got the alder, about two hectares of alder, but it's been planted separately from the Sitka spruce." (LM22 Timber Producer)

Whilst this experimentation might have been initiated on an individual basis, it was also discussed and debated between peers, with some of the ideas about what species to experiment with also coming from peers and networks.

Increased capacity - there was very little explicit data about whether or not capacity increased via social learning. In the analysis of the workshop deliberations many land managers did not feel as if their capacity had been increased, and there were particular capacity issues around responses to climate change impacts. One of the barriers to increasing capacity is the sheer volume of information that land managers are aware exists. This presents a confusing picture to many of them as they navigate their way through what is sometimes contradictory information. One land manager in talking about web based information called much of it 'rubbish information', while others felt information was in too many different places, they were also unsure which information they were accessing was the most up to date. The value of networks therefore is doubly important to many of them as a route to navigating, deliberating and validating the available information.

Changing attitudes and beliefs – there was no explicit evidence of changing attitudes and beliefs.

Social change – there was a small amount of evidence of groups of land managers working together as an outcome of networking and learning together where this was connected with networks of place.

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[3] Ecosystem Site Classification (ESC) is a decision support system to guide managers and planners to select ecologically suited species to sites.

4. Discussion

This research has drawn on a range of evidence to explore a number of different mechanisms (PES, networks and social learning) that might be effective to enable the delivery of multiple ecosystem services from woodlands, via encouraging active woodland management and woodland creation. The evidence outlines that PES is a recent concept and the terminology of ecosystem services and PES is not generally used by many of the interviewed land managers, and the terms are often considered ambiguous. These terms were used much more by government and sector organisations in the workshops due to the workshop leaders using these terms, however there were still some uncertainty about them regardless of respondent type. This confirms similar findings by other authors, for example Raum (2018) found that forestry stakeholders that were less involved in formal policy work struggled to understand the ecosystem services terminology. Land managers did however talk about, and report, some of the benefits that their woodlands provide and many of these would be classed as ecosystem services. Waterlife (2015) participatory research suggests that PES schemes are more likely to be a success if buyers and sellers are culturally and geographically linked and an appropriate level of funding is identified. While, low awareness of PES and the opportunities it presents was identified by URS (2015) and seen as an obstacle to uptake of this type of approach.

Land managers are currently facing a range of challenges often beyond their control such as the resilience of their land to pests and diseases and climate change, future wood product markets, and the UK's exit from the European Union. All of these make management more difficult and many land managers in discussing these uncertainties felt it was difficult at present to make long term decisions. It is clear that there is interest in PES particularly as it might provide more economic sustainability for land managers by unlocking new funding opportunities and providing recognition of the multiple benefits that can be provided by woodlands. It could also encourage the delivery of multiple benefits through woodland management and creation.

Trusted and knowledgeable networks (professional and personal) in which land managers can gain advice are important at all times. These especially include networks which can aid land managers in cutting through the overwhelming amount of data and information that is currently available about mechanisms such as PES. The evidence outlines that tensions exist between schemes such as PES that allow some flexibility for land managers and opportunity for adaptation while at the same time are kept as simple as possible in terms of administration and take a standardised approach that can easily be understood. There are opportunities to build a shared understanding about the concept of PES through the networks land managers engage with and through seminars, pop-up clinics or workshops that provide important opportunities for land managers to meet others and provide arenas for individual and social learning and the discussion of opportunities and challenges.

It is clear from the evidence that there is generally not a single mechanism that leads to changes in management practice; rather a multi-faceted approach is needed. The evidence suggests recognition of the varying motivations and objectives for management, along with a combination of promoting engagement through a range of networks and learning through others via trusted sources, as well as the provision of links to incentives (such as PES) that are not overly bureaucratic or prescriptive - might encourage and enable changes in practice. Some fundamental issues related to PES schemes have been raised. For example, there are concerns that a shift towards increasing use of PES schemes may impact previous sustainable forest management arrangements and management objectives could increasingly be driven by the supply and delivery of a small range of easily marketable ecosystem services (Quine *et al.* 2013). Chan *et al.* (2017) suggest there maybe unintended consequences that arise due to PES schemes, they might shift perceptions of rights and responsibilities towards ecosystem services, and payments and could undermine intrinsic or altruistic motivations, or crowd out motivations reducing land managers willingness to accept PES payments (Borner *et al.* 2105; Agrawal *et al.* 2015; Prokofieva, 2016; Rhode *et al.* 2015).

5. Conclusions

The evidence suggests that the three mechanisms (PES, networks and social learning) outlined in this report could:

- Be helpful approaches used to encourage greater woodland management and woodland creation and the delivery of forest ecosystem services;

- Can be considered independently or in varying combinations as part of a multi-faceted approach to the delivery of ecosystem services;

- Can be combined with other mechanisms including regulation and certification schemes to provide land managers with a mix of options through which they can be supported to carry out sustainable forest management, provide a range of forest ecosystem services, manage and create new woodlands.

PES schemes are fairly new and should be properly evaluated over a period of time to identify the most effective ways to encourage and enable uptake. Understanding and engaging with land managers and stakeholders is key to the uptake and use of different mechanisms, and space should be provided to create opportunities to reflect and discuss the form or bundle of mechanisms needed to create the desired changes to attitudes, knowledge and behaviours to realise a wider range of ecosystem services from forests (O'Brien *et al*. 2016).

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Appendix 1. Interview guide

Forest and Woodland Private Owners, Managers and Forestry Businesses Interview Schedule

Interview information				
Interviewer		Date		
Work Area or project		FC Area represented (NWWM, EEM, SW, SEL, YNE)		
Location of interview	Phone Interview	Telephone		
Classification of interviewee		Segment		

Module 1.a Information about the interviewee and their woodland/forest (for primarily private owners)

1a.1. To start off please could you provide us with some basic information about you and your woodland.

- How long have you owned your woodland?

- What kind of woodland is it? *Please use NFI categories (conifers, broadleaves, mixed, coppice and coppice with standards)*

- How big is your woodland?

- Do you employ anybody on your woodland – please explain and state how many FTEs?

1a.2. Do you have clear objectives for your woodland and do you have a management plan?

1a.3. Could you explain more about how *grants, regulations, business objectives* influence your objectives and woodland management?

1a.4. Could you explain more about how your *personal values and motivations* influence your objectives and woodland management?

1a.5. Could you explain more about whether any *other factors* influence your objectives and woodland management?

1a.6. Do you currently insure your woodland, and if so what is it insured against?

Module 1.b Information about the interviewee and their business (for primarily nurseries/contracting businesses)

1b.1. To start off please could you provide us with some basic information about the business.

- How old your/the enterprise?

- How many employees (FTEs)?

- What is the main purpose of your/the business? *Please prompt for some information about the business model.*

1b.2. Do you have clear objectives for your business and do you have a business development plan?

1b.3. Could you explain more about how *grants, regulations, business objectives* influence your objectives?

1b.4. Could you explain more about how *personal values and motivations* influence your objectives?

1b.5. Could you explain more about whether any *other factors* influence your objectives?

1b.6. Do you currently insure your business against anything beyond the usual public liability/employers liability?

Module 2. Information, advice and training

I/We would like to talk a bit about what information and advice you draw on in relation to the management of the/your woodland.

2.1. Who do you tend to go to for your forestry/business advice?

2.2. If you seek information about species choice in connection with climate change or disease management, or Timber market production and price forecasts can you explain what are the sources of information? And why do you use this source in particular?

2.3. Are there any particular campaigns or any individual people who have been a particular influence or significant help in terms of providing i. general forestry/business advice or, ii. specific advice and information about the risks and uncertainties you are affected by.

2.4. Have you undertaken any kind of training to achieve your woodland/business objectives or deal with uncertainty and risk? Please explain what the training was and how well it met your needs. Please identify any changes you made as a consequence of undertaking the training. *Please prompt for detail:*

2.5. Is there information or training that you feel would help you but you have not been able to access? Please explain. *Prompt for barriers to existing training provision as well as lack of courses – explore the need for training and how the respondent feels it would address risks/concerns/woodland management or business planning.*

2.6. Are there any others you go to for your forestry/business advice not mentioned above? *Prompt for any information in the list below that they have not already mentioned (see example grid) and the relative importance of these e.g. are there some organisations whose advice is critical?*

Mechanisms to enable or support woodland management and the delivery of forest ecosystem	*Use (yes or no)* *– What are the three most commonly*

services	used?
Forestry Commission Woodland Officer	
Directly employed or externally employed agent or consultant	
Professional body or society e.g. Royal Forestry Society, Institute of Chartered Foresters	
Campaigns e.g. Grown in Britain	
Peers e.g. other woodland managers, other business managers	
Trade or membership association	
MyForest – free service for woodland owners	
Web based information	
Toolkits e.g. FAO (Food and Agriculture Organisation) Sustainable forest management toolbox	
Guidelines e.g. United Kingdom Forestry Standard	
Woodland initiative or project	

2.7. Have you ever heard about payments for ecosystem services (PES), if so in what context, and is this something you have ever considered? Please, can you provide an example? *Prompting may be required so examples of schemes might be needed to elicit answers. PES are schemes in which the beneficiaries or users (buyers) of ecosystem services provide payment to the stewards or providers (sellers) of ecosystem services.*

Examples of PES:

Wessex Water (water service company South West England) invests in catchment management and works with farm businesses to reduce pollution and improve water quality.

Sustainable Catchment Management programme in North West England: United Utilities incentivise tenant farmers to improve land management to deliver ecosystem services.

Slowing the flow in Pickering: multiple funding sources support the project to enhance flood protection.

Module 3. Understanding of resilience

I/we would like to move on to talk about resilience

3.1 Do you use the term *"resilience"* and what do you think is meant by it?

If no response, then use the following:

"A common accessible definition of resilience is an ability to 'bounce back from disturbance whether this is from floods, pest and diseases, fire etc. This was used in the BWS 2015; or:

"The ability of a social or ecological system to absorb disturbances while retaining the same basic structure and ways of functioning, the capacity for self-organisation, and the capacity to adapt to stress and change"

3.2. What do you feel your woodland or your forestry/nursery business needs to be resilient against and why? *Please prompt for information about ecological (i.e. pests and diseases), economic (i.e. reduction in timber value, value of business) and social resilience aspects (i.e. changes in employees).*

3.3. How do you deal with the threats/ uncertainties you have mentioned above? *Please, prompt for an example in the short, medium and long term? Can the respondent be specific - is it around 5 years, 20 years, 50 years or 100 years?*

Module 4. Woodland management. Resilient practice

4.1. Have you done, or do you plan to do, anything to deal with any of these risks and uncertainties?

DEPENDING ON THE ANSWER FOLLOW BRANCH

If "Yes"

4.1. a Could you explain in some detail what those actions are. *Please guide the respondent's answers around the following three dimensions and look for evidence of actual changes to practice separating this out from planned or "I'm thinking about" answers, please be sure to identify when the changes were made as well as what was done:*

    i.   any actions to **respond** to changes that have already occurred or when they occur
    ii.   any actions to try and **prevent** changes and problems

Examples:

	Which threats are occurring now	*How do you respond?* *Are you managing your forest differently? How?*
i. Responding actions	• *Dothistroma*	• *They are removing some of pines* • *Check provenance choices* • *Planting other species (e.g.: cedar)*

		• Instead of clear felling they do continuous cover in suitable sites
	• Mortality due to chalara (ash) and cancer on silver birch	• Check provenance choices
ii. Preventive actions	• Climate change	• It seems that all above applies

4.2.a Were there any grants or regulations that enabled you to take action for resilient management? *Prompt an example*

4.2.b Were there any *social peer networks, membership of bodies, campaigns such as Grown in Britain* that enabled you to take action for resilient management? *Prompt an example*

4.2.c. Were there any *toolkits or guidelines such as UKFS* that enabled you to take action for resilient management? *Prompt an example*

4.3. If you have made changes to your woodland management or business practice was there anything which really acted as a <u>barrier</u> to that change?

4.4. We recognise that forest management is a long term process. However, if you have made changes to your woodland management or business practice have you already noticed any benefits or dis-benefits? *Please prompt for the degree of change/impact as well as the evidence which demonstrates benefits/dis-benefits, be careful to tease out expected and desired change from actual change. We are looking to map this information back to the respond/prevent actions.*

If "No"

4.1. b Could you explain in some detail why you have not made any changes to address these risks and uncertainties. *Please prompt for information about ecological, economic and social aspects, e.g. "I don't know what silvicultural practice would help", "it costs too much and my operating margins are too small", "my partner thinks it's a waste of time and doesn't want us to spend money on that kind of thing".*

Module 5. Income related questions

To ask of private owners

> 5.1.a Thinking about the role your woodland plays in generating income, could you say what share of your income comes from your woodland, what comes from any other forestry activity, and what share comes from other sources? *Please ensure the three sources add up to 100%.*

Share from woodland	%

Share from other forestry activity – please state	%
Share from other sources	%
TOTAL	100%

5.2.a. Thinking now just about the income generated by your woodland or any other forestry activity, you are involved in, could you please estimate the share of your <u>forest income profile</u> that comes from different sources. *Please ensure these sources add up to 100%.*

Forestry grants e.g. Woodland creation grant, Woodland creation planning grant, Woodland improvement grant,	%
Forestry related business grants, e.g. LEADER countryside productivity	%
Non-forestry grants e.g. small business development grant	%
Sales of timber	%
Sales of non-timber products and services	%
Tax relief	%
Other significant sources - please state	%
TOTAL	100%

To ask of businesses

5.1.b. What is your average annual turnover? *Less than £50k, £100k, £250k, £500k, £1 million, more than £1 million*

5.2.b. Thinking about the way in which your business generates income, could you identify the main income streams and what share of the total income these represent. *Prompt for any grant or tax relief elements. Please ensure the sources given add up to 100%.*

	%
	%
	%
	%
	%
	%

	TOTAL	100%

Module 6. Conclusions

6.1. Is there anything else you would like to say? Have we covered everything or have we left something, you think is import, out?

End and close

Thank you very much for taking the time to be a part of this research, the information you have provided is very important for us to better understand the challenges and issues faced by woodland managers and the steps taken to deal with these.

To confirm you will remain anonymous, we will not pass your information on to anyone else.

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