Do public attitudes towards forestry align with government policy objectives? Insights from a case study in north west Scotland

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Summary

The 2019 Forestry Strategy outlines Scottish Government's objectives to increase the economic, environmental and social contribution of forests delivered through afforestation, restoration and sustainable management. Public attitudes to forests and forest expansion will be important in meeting these targets. However, despite forming a key stakeholder group, public engagement in the existing consultation process for new land and forest management plans is limited, and societal views are not well represented. We surveyed 212 forest users and local residents in Lochaber, north west Scotland, to understand attitudes towards different types of forestry. The results show public preferences are most closely aligned towards biodiversity and health and wellbeing policies rather than other environmental and economic benefits. Using a novel landscape visualisation tool we found that people do like forested landscapes, especially native woodlands. Furthermore, the responses to a series of photographs representing forestry also revealed predominantly positive attitudes towards all stages of commercial forests except clearfelled sites. Diversified management approaches, particularly where recreation is an important objective, and increased public engagement are recommended to demonstrate the multiple benefits of productive as well as native forests and support landowners and the forestry sector in delivering on key policy objectives.

1. Introduction

The current forest resource in Scotland is largely the product of Government led afforestation policies over the last century to increase timber production and reverse its declining extent, which had fallen to 5% of the UK land area in 1919 (Quine *et al*, 2011). These policies initially supported the establishment of non-native conifer plantations but shifted to include broadleaved species during the 1980s following taxation changes and an increased awareness of the ecological and cultural impact of forest management (Quine *et al*, 2013). In Scotland, forest cover has now reached

19%, approximately three quarters of which is conifer (Forestry Commission, 2018), and forests, woods and trees are recognised as key natural resources delivering a variety of public benefits and ecosystem goods and services. There is no formal definition to differentiate forests and woodlands, and forests are often used to describe large woodland areas, particularly conifers (Forest Research, 2019); this is how the terms are applied in this paper.

Forests and woodlands are influenced by several policy areas, notably forestry (Forestry and Land (Scotland) Act, 2018, and Forestry Strategy (Scottish Government, 2019), climate change (Climate Change (Scotland) Act, 2009), land use (Scottish Government, 2016) and biodiversity (Scottish Government, 2013), as well as water quality (Water Environment (Controlled Activities) (Scotland) Regulations, 2011), flood risk management (Flood Risk Management (Scotland) Act, 2009) and soil (Scottish Government, 2009). The 2019 Forestry Strategy has three primary goals: afforestation, restoration and sustainable management. These goals are intended to protect biodiversity, support rural development and provide health and wellbeing benefits for the wider population. At the same time, domestic demand for wood products is increasing, offering the potential to grow the UK forestry sector. The UK is one of the largest importers of timber in the world: in 2016 it was the world's second largest net importer of forest products by value (Forestry Commission, 2018).

Recent research has shown that the forest and woodland expansion policy is well supported among Scottish interest groups (Burton *et al*, 2018a), although the benefits that new woodlands deliver can take time to accrue and will vary depending on the type and location of new planting and the interests and needs of different beneficiary groups (Vesk *et al*, 2008; Thomas *et al*, 2015; Burton *et al*, 2018b). The Forestry Strategy target of 21% cover by 2032 will also contribute towards achieving the target reduction of net greenhouse gas emissions levels by 80% by 2050 through carbon sequestration as the trees grow, long term storage in wood products such as building materials, and substitution of fossil fuels through the supply of bioenergy.

Decisions about forest management and conversion of land to forestry need to consider the resulting trade-offs among ecosystem services (ES) that forests can provide. Understanding the nature and extent of trade-offs requires an understanding of the different values that there are for ES. Valuation methods capture the importance or worth of something either in units (including monetary or biophysical

units) or using alternative indicators such as weightings, ratings or rankings. Many ES are difficult to quantify and to take into consideration in management decisions (Quine *et al*, 2013; Sing *et al*, 2018). Some, particularly carbon and timber values, are readily calculated based on existing financial markets. For other ES, alternative methods to calculate the financial value have been developed. For example, the value of recreation in forests has been estimated by inferring value from the cost and time spent travelling to a forest site (Zandersen & Tol, 2009), the amount that people are willing to pay to use a woodland or forest for recreation (Christie & Hynes, 2007), and the financial value of the health benefits from forest recreation (Moseley *et al*, 2018).

However financial values cannot capture, or are not appropriate for expressing, the wider social and cultural value of ES, such as intrinsic and existence values of nature and landscape aesthetics (Scholte *et al*, 2015). These alternative value domains are essential for fully capturing the importance of biodiversity and ES for human wellbeing, particularly for Scotland's National Forest Estate which is owned and managed on behalf of the nation. This was recently demonstrated by the public response to the British government's consultation on the future of the Public Forest Estate in England, where objections to changing ownership arose from concerns about continued access to and protection of ES from a highly valued, shared resource (Kenter *et al*, 2015).

As the existing stock of spruce plantations established during the 1960s and 1970s reach economic maturity, restocking decisions must now meet UK Forestry Standard requirements to improve species and structural diversity (Forestry Commission, 2017b). As a result there are opportunities and obligations to engage communities in forest design and establishment and address longstanding negative associations with monoculture spruce forests (Nijnik *et al*, 2016). Forests are a valued national asset: Public Opinion of Forestry (PoF) surveys have shown that more people are visiting woodlands over time and forests are experiencing the highest levels of support for public funding since the survey reports began in 2005 (Forestry Commission, 2017a). In terms of forest management, previous research has revealed public preferences for forests that are visually and physically accessible, and structurally diversity (Lee, 2001; Edwards *et al.*, 2012; Petucco *et al*, 2013). However, the importance of these factors is not necessarily strong: Petucco et al (2013: 672) found a "high level of indifference in the general public", and there is still a lack of information on how forest type provides cultural benefits (Irvine and Herrett,

2018). Furthermore, for forest planning it remains a challenge to involve the public in the stakeholder consultation processes that are undertaken for new forest and land management plans (*pers. comm.* Chris Tracey, Forestry and Land Scotland). Consequently their attitudes towards prioritising management goals and trade-offs among land uses are largely unknown. The aim of this study, therefore, was to gather insights into public attitudes to and values for a range of forest ES, and how these attitudes and values align with the wider policy drivers for forestry in Scotland. Using a case study forest in Lochaber, north west Scotland, we focused on three questions:

1. Which forest ES do people value now and for the future, and how do they vary in respect of demographics and distance travelled to the forest?
2. How do different management and silvicultural decisions affect people's enjoyment of forests?
3. What are their preferences for the amount and types of forestry as part of the wider landscape in the region?

2. Methods

2.1 Case study site

Leanachan forest in the north west Highland region of Scotland (Figure 1) is part of the National Forest Estate. It covers 3,100 hectares and is predominantly conifer plantation managed on a clearfell-restock system of single-aged stands. Principal species are Sitka spruce (*Picea sitchensis)*, lodgepole pine (*Pinus contorta)* and larch (*Larix spp)*, with areas of native broadleaved woodland and riparian strips. Leanachan forest was selected as the survey location because of its importance for delivering multiple ES, in particular recreation and biodiversity along with timber production, giving a requirement to balance objectives. The forest is located within the Nevis Range mountain recreation resort for skiing and mountain biking that contributes to the local economy and is accessible by public transport. It also has important biodiversity and conservation designations, in particular habitat for three high-priority protected species (red squirrels *Sciurus vulgaris*, chequered skipper *Carterocephalus palaemon* and pearl bordered fritillary *Boloria euphrosyne* butterflies), and a scheduled blanket bog that is a Site of Special Scientific Interest.

2.2 Data collection and survey design

Surveys were conducted over a three-week period during July and August 2016 at seven locations close to Leanach forest (Figure 1): two forest locations (Nevis Range and the North Face car parks) and four local community locations (Spean Bridge, Corpach, Caol and Inverlochy). A simple random sample method was adopted in the forest car parks and community locations in which the first person encountered following the completion of the preceding interview was approached. Surveys were carried out in varying shifts between 0900 – 2000, seven days a week. The time and day of the week was varied among the locations to increase the representativeness of the community members or forest users interviewed. Two largely identical surveys were developed for the community and forest interview locations, with the only difference between them explained in Section 1 (below). Overall, the surveys were organised into four sections: familiarity and use; non-monetary valuation of ES; attitudes towards different stand management approaches; and land use preferences for the Lochaber region. Demographic information (gender, age group and postcode) was collected to help assess social trends.

Section 1: Familiarity and use

Questions related to the participant's familiarity with the forest and recreational activity. In the community version participants were asked if they had visited the forest (since use of the forest was not a requirement of taking part in the survey) and if so, what activities were undertaken on their most recent visit. For the forest visitor version, participants were asked about their activities on that particular day.

Section 2: Non-monetary valuation of ecosystem services

Perceived importance of ES were collected using a two-step approach that asked: (1) which benefits the forest currently provides from a list of ten; and (2) how to weight these benefits based on how strongly participants prioritised them for the future. Prioritisation was done using a simple scoring procedure which we adapted from the method described by Schmidt *et al* (2017), whereby participants were asked to allocate a total of 10 units across the benefits. For example, they could ‘spend’ all 10 units on a single benefit, or spread them across several. An explanation of each benefit was provided to them (Table 1), based on a similar survey methodology (Clement & Cheng, 2011).

[Table 1]

Section 3: Attitudes towards different stand management approaches

Participants' preferences for stand characteristics were measured by asking how they perceived a series of photographs representing different forest management approaches. The photographs showed stands at different ages and included a range of species. Preferences were recorded using a 5-point scale (Likert, 1932), where 1 = I do not like it at all, 2 = I do not like it, 3 = I am indifferent (neither like nor dislike it), 4 = I quite like it, 5 = I like it a lot (Figure 3). Photographs were selected from the Forestry Commission's picture library to represent aspects of typical upland forests in Scotland, with one photograph representing an open moorland landscape as a contrasting land cover type in the area.

Section 4: Land use preferences

Participants were asked what combination of woodland and other land uses they would like to see in the future in the Lochaber region. The question was presented using the LANDPREF visualisation tool (Schmidt *et al*, 2017). The interactive tool allows respondents to adjust a virtual landscape using rich images rather than photographs or photorealistic montages (https://oppla.eu/product/2099). The user could specify 6 possible quantity levels (0 – 5) for a range of potential rural land uses. For this study the original LANDPREF tool and images were modified for the Lochaber region and included six land uses (wind turbines, recreation, sheep farming, commercial forestry, native woodland and habitat for wildlife). A carbon sequestration indicator was used to represent the carbon storage potential for the chosen quantities of forest and woodland. The available combinations were constrained through a rule-based algorithm to represent the trade-offs and synergies among the different land uses, forcing the participants to deliberate and explore options to find their desired future landscape.

2.3 Data analysis

Local residents were defined as those whose home postcode was located within the Lochaber geographic region (the Lochaber region as defined by the Nomenclature of Territorial Units for Statistics (NUTS) European Union region subdivisions). We further analysed their postcodes to differentiate between those living in predominantly urban (all settlements from the 2001 census) and rural locations using the Degree of Urbanisation dataset (Dijkstra & Poelman, 2014). Statistical tests for the effects of gender, age and user type on ecosystem weightings and photograph responses were carried out using the statistical programme R (R Core Team, 2017). We used the non-parametric Mann Whitney Wilcoxon test to explore differences

between responses by gender, home location, degree of urbanisation, primary activity and forest visits. We used the Kruskal Wallis method to test for differences by age group and primary forest activity. Groups of respondents with similar land use preferences were identified from the LANDPREF data using Hierarchical Cluster Analysis (HCA) in R. To explore differences among the group members and their preferences, we analysed their demographic characteristics and used the Kruskal Wallis method to test whether there were statistically significant differences between the groups.

3. Results

In total, 212 surveys were completed, of which 70% (*n=149*) were conducted within the forest. According to their postcodes 43% (*n=92*) of the interviewees lived within the Lochaber region. The remaining participants came from across Great Britain, with clusters originating in Scotland's central belt and north east region (Figure 1). Of those who provided an accurate postcode (*n=181*), more than half of the participants from outside the Lochaber region lived in urban areas, while 75% of those within the Lochaber region lived in rural areas (Table 2). We surveyed more young males (up to age 35) in the forest and more older people (age 65+) at the community locations (Figure 2), and 42% (*n=88*) of the interviewees were female.

[Table 2]

[Figure 1]

[Figure 2]

One quarter of the community participants (*n=16*) had not visited Leanachan forest (termed non-users). In addition several people were approached during the survey who did not wish to take part because they had not visited the forest, even though it was explained that this was not necessary for survey participation. Reasons given for not visiting the forest were lack of awareness, lack of transport, and the belief that recreation is focused on cycling. For the remaining participants (*n=196*), the most frequent reasons for visiting the forest were exercise (63% of participants) and fresh air (34%), with recreation facilities, particularly cycle tracks (30% of participants), footpaths (27%) and availability of car parking (17%), being the main factors in

deciding to visit. Trees were less important: only 10% of the participants selected them as a reason for visiting.

3.2. Ecosystem services values for future management prioritisation

People gave more weight to cultural ES (recreation, experience of nature, therapeutic and wellbeing benefits, symbolic importance) and habitat for biodiversity compared with regulating (carbon sequestration, slope protection, water quality) and provisioning (timber, economy) ES (Table 3). Only a small number of demographic variations in responses were identified through the statistical analyses, which revealed that the experience of nature was more important to visitors to Lochaber, forest users, and younger people (25 - 34 years) compared with those aged over 65. Therapeutic benefits were more important to women than men. Water supply was more important for young people (16 - 24 years) than those aged over 65. Unsurprisingly, forest users weighted recreation provision as the most important management priority for the future; they also weighted this higher than non-forest users.

[Table 3]

3.4 Attitudes towards management intensity

Aside from clearfelled harvest sites, people responded positively to the many aspects of forest management represented in the photographs (Figure 3). The clearfelled conifer site (Figure 3, image 1) elicited the strongest negative and neutral response. More interestingly, people responded positively to the remaining photographs: the most frequent response to each image was either 4 (I quite like it) or 5 (I like it a lot). Some variations in responses to monoculture stands were observed: young and dense spruce images received lower score, whereas those representing mature stands which were well lit or included other natural features scored highly (Figure 3, images 8, 9 and 11). Finally, the open moorland photograph also scored highly (Figure 3, image 14).

[Figure 3]

3.5 Land use preferences

Figure 4 shows the frequency distribution of LANDPREF quantity levels for each of the land use types. The distribution of quantity levels for native forest and habitat for wildlife are positively skewed towards higher levels showing that a greater area of these land uses was most desired in the landscape. Preferred recreation levels are

normally distributed around the mid value of 3, while commercial forestry, wind turbines and sheep farming scores are negatively skewed towards the lowest levels. Wind turbines received the most null values (*n=115*) and therefore were the least supported land use for the region's landscape.

[Figure 4]

Three clusters of landscape visions were generated using HCA and the median scores for each cluster were used to generate landscape visualisations (Figure 5a-c). We found that all clusters included native forest, recreation and habitat for biodiversity in their landscapes, reflecting their popularity amongst the respondents (Figure 4). The median values of clusters 1 and 3 showed a preference for landscapes that deliver multiple benefits, compared to the narrow range of benefits associated with those of cluster 2.

Cluster 1 – *a landscape for open scenery.* This is the most open landscape, demonstrating more conservative levels of multifunctionality than cluster 3. The landscape comprises a medium amount of native forests and recreation, low-medium amount of habitat for wildlife and low amount of sheep farming and commercial forestry, with no wind turbines (*n=78*; *54% male*).

Cluster 2 – *a landscape for nature and wildlife.* This landscape comprises high to very high amounts of biodiversity and native forests, and a low-medium amount of recreation and no wind turbines, sheep farming or commercial forestry. This is the smallest cluster of respondents (*n=48*) who were mostly male (73%). When the relationship between ES values of the respondents in each cluster were tested, this cluster was found to have given statistically higher scores for the experience of nature compared with the other groups (*p=0.01)*.

Cluster 3 – *a landscape for trees and multiple benefits*. This landscape includes all land uses available.This cluster has the largest quantity of trees in the landscape, mostly comprising native species mixed with a smaller amount of commercial forestry. It is the only cluster that contains wind turbines. Habitat for biodiversity was also strongly prioritised, while a medium amount of recreation and low amount of sheep farming were also included. This is the largest cluster (*n=86, 55% male*).

[Figure 5]

4. Discussion

Our results indicate that survey respondents' priorities for management objectives were more closely aligned to environmental and health and wellbeing policy goals than those for economic development and climate change mitigation. We also found that diverse landscapes were generally preferred, though there was a strong preference for native woodlands. Physical and mental health benefits from time spent in the forest, the experience of nature and provision of habitat for biodiversity were most important, yet these are some of the ES that are most difficult to quantify and incorporate in decision making (Quine *et al*, 2013).

Experience of nature was weighted higher by those visiting the area, a greater proportion of whom live in urban areas compared with those living in Lochaber. Intentional time spent in nature is an increasingly rare experience amongst urban dwellers that has important public health implications (Cox *et al*, 2018). Time spent in forests and greenspaces is important for maintaining healthy blood pressure, protecting against diabetes and heart disease, and reducing stress (Twohig-Bennett & Jones, 2018). Recreation facilities are a key determinant of public use, more so than tree species for this type of forest. Indeed, our findings suggest that preconceptions of commercially managed forests do not necessarily translate into negative responses when shown visual representations of the same forest types at all stages of its lifecycle. This has been observed in another study (Tahvanainen *et al,* 2001). Nevertheless, stand characteristics such as tree age and visual and physical accessibility do affect visitor enjoyment, and structural diversity is preferred (Edwards *et al*, 2012; Filyushkina *et al*, 2017; Petucco *et al*, 2013). Other research has shown that maintaining wooded views, for example through the retention of a scenic buffer comprising unharvested trees, improves visitor enjoyment (Juutinen *et al*, 2017).

Increasing structural and species diversity within conifer plantations for health and wellbeing benefits can also support other ES. Public preference for structural diversity can be achieved through the retention of mature trees. This could maintain habitat corridors through forests for woodland species and sustain onsite carbon stocks (Sing *et al*, 2018). Habitat provision for biodiversity and carbon were the next most importantly weighted benefits after cultural ES (Table 3). In addition, there may

be synergies with other forest management objectives. Mixed forests have been shown to improve productivity on some sites (Mason & Connolly, 2016) and can increase the resilience of forests to pests, diseases and future climate uncertainty (Jactel *et al,* 2017, Ray *et al*, 2017), one of the key objectives of the recent Forestry Strategy (Scottish Government, 2019).

Most people were supportive of a combination of native and commercial forests in this region, agreeing with other research findings in Scotland that showed public preferences for diverse, multi-functional landscapes (Bullock & Kay, 1997; Schmidt *et al*, 2017), and heterogeneous landscapes elsewhere in Europe and North America (Hahn *et al*, 2018). Scottish Government policy seeks to increase the area of both native and non-native forests, and the latter are expected to comprise the greater proportion of new planting (Scottish Government, 2019). Delivering new productive conifer forests at the desired rate will require community support (Moffat *et al*, 2016). Commercially managed forests have previously been found to have a negative image for many (Nijnik *et al*, 2016) particularly for their ecological impacts (Bliss, 2000; Bunce *et al*, 2014; Campbell-Arvai, 2019).We found that, whilst the responses to visual representations of these forest types were generally favourable, timber and woodfuel production were not prioritised in our survey. These ES may be viewed as financial gains that accrue to the few, particularly landowners and timber businesses rather than delivering wider benefits (Anderson *et al*, 2017; Morgan-Davies *et al*, 2015; Williams, 2014). Furthermore, carbon did not score highly as a future management priority in our study, yet 60% of respondents in the PoF survey supported the use of public money to tackle climate change. This suggests that many people still do not recognise the sequestration process or its importance at the local forest scale. There is a need for the sector to communicate to the public the important benefits beyond recreation; expanding knowledge about multiple objective forestry through tools such as LANDPREF could improve the public perception of productive forestry and support land owners and the forestry sector in delivering key policy objectives.

Methodological implications

Given the challenge of involving the public in forest management and planning, our survey was designed to engage with a wide spectrum of forest visitors and local residents for a short time in order to maximise the response rate. We acknowledge that there is a trade-off between achieving a larger sample size through this method and the richness of discussion that can be achieved through longer interviews. Our

survey was designed to maximise both the views of those living close to or visiting the forest, given time and budget available. As the survey period was restricted to three weeks during the summer months this may have influenced the responses through interviewing a higher proportion of tourists to the area than might be expected at other times. It was also beyond the resources of this study to test whether views expressed would be different for forests under different ownership types, such as private and community ownership.

Participants were invited only to provide their personal views rather than those for wider society. Other research has shown that this affects values: in a similar survey, Schmidt *et al* (2017) found that individuals distributed points more equally when weighting preferences for wider society benefits than for their own benefit. Repeating this research with a wider cross section of stakeholders and geographical areas, as well as in workshop settings, would allow us to develop further case studies and draw more nuanced local detail and a richer picture of shared social values.

Our research has demonstrated the use of weighting as a method for obtaining public values towards ES and forest management that are not normally captured by existing stakeholder engagement processes. Even though participants were asked only about Leanachan forest and the Lochaber region, our findings can be useful in informing wider Scottish forest management and policy as our survey respondents originate from across Scotland and the UK (Figure 1) and their attitudes represent a wide geographical distribution. However, Leanachan forest is situated in a relatively forested region, where social perceptions of land use change from open ground to forest may be different to other regions where a different land use dominates. Furthermore, while our survey design was intended to capture views from both forest users and non-users, we surveyed only a small number of non-users. Therefore it is perhaps not surprising to find results biased in favour of recreation and other forest use based benefits.

Finally, the decision to use photographs was intended to enable us to collect quantitative data on forest management preferences in these circumstances, building on previous studies (e.g. Ford *et al*, 2009). The photographs were selected to represent management practises, however participants may respond to unintended aspects within the photographs. It was beyond the scope and resources of this study to formally test this, and participants did not explicitly raise this.

5. Conclusion

Scottish Government is keen to increase the economic, environmental and social contribution of forests delivered through afforestation, restoration and sustainable management. Findings from our public attitude survey in Lochaber indicate that there is general support for environmental, health and wellbeing policy objectives, while timber production, climate mitigation and economic growth have lower priority. We found that the public appreciate and value native woodlands and do not strongly object to commercial planting if the forest is accessible for recreation and the overall landscape is structurally diverse. These findings add to the current pool of knowledge regarding public attitudes towards commercially managed forests, particularly those of forest users. As such, they are useful for supporing forest planners and managers in making decisions about future management and can inform new woodland creation projects. However, to increase public support for forests, the sector should consider how it engages with the public and communicates the full range of social and environment benefits. Innovative engagement and communication tools such as LANDPREF offer the opportunity for exploring landscape scale issues and furthering people's understanding of the contribution that forests make within a wider mosaic of land uses.

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Figures

Figure 1. Home locations of interviewees based on their postcodes. Accurate postcode data was not collected for 31 respondents.

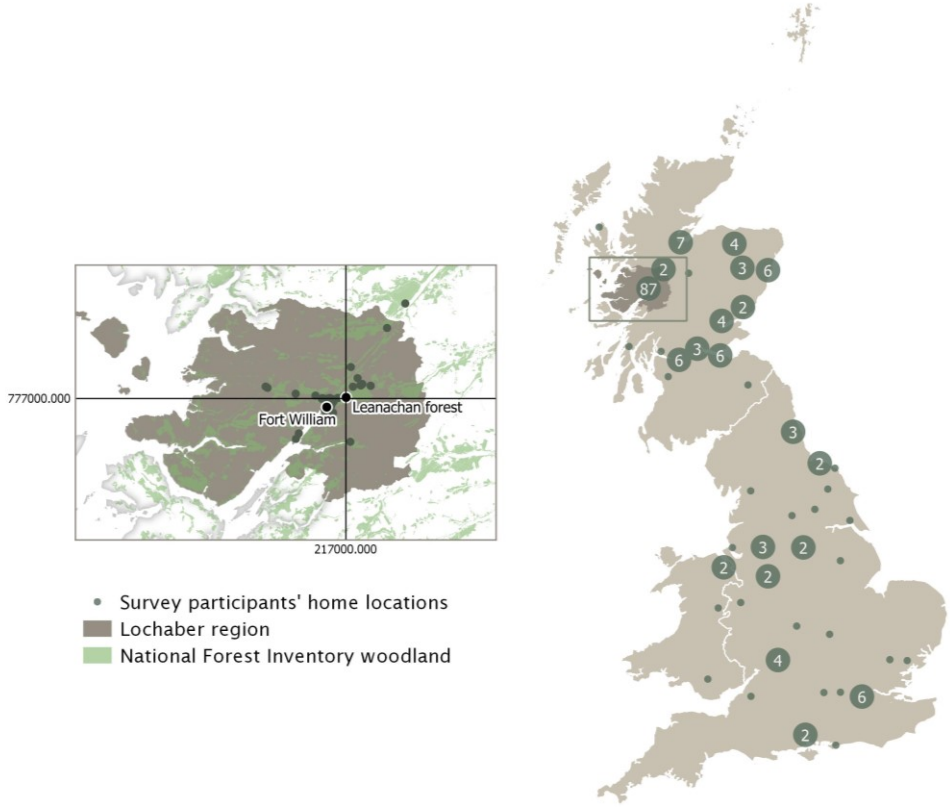


Figure 2. Age of participants by interview location.

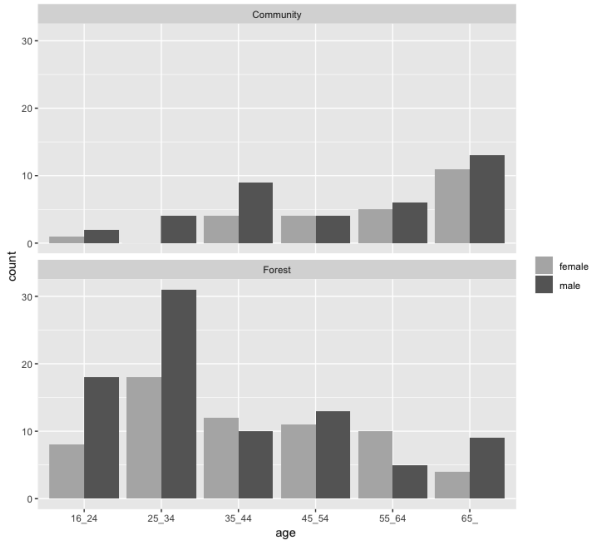


Figure 3. Photographs of different aspects of forest management shown during the survey, and frequency of responses to the photographs. Images © Crown Copyright. Forestry Commission.

Figure 4. Frequency distribution of quantity levels recorded for each LANDPREF land use type.

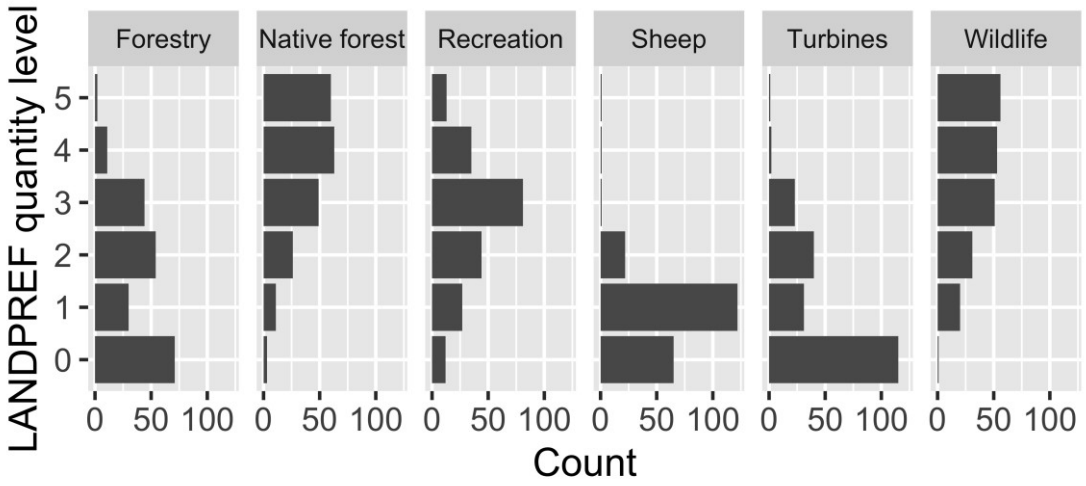
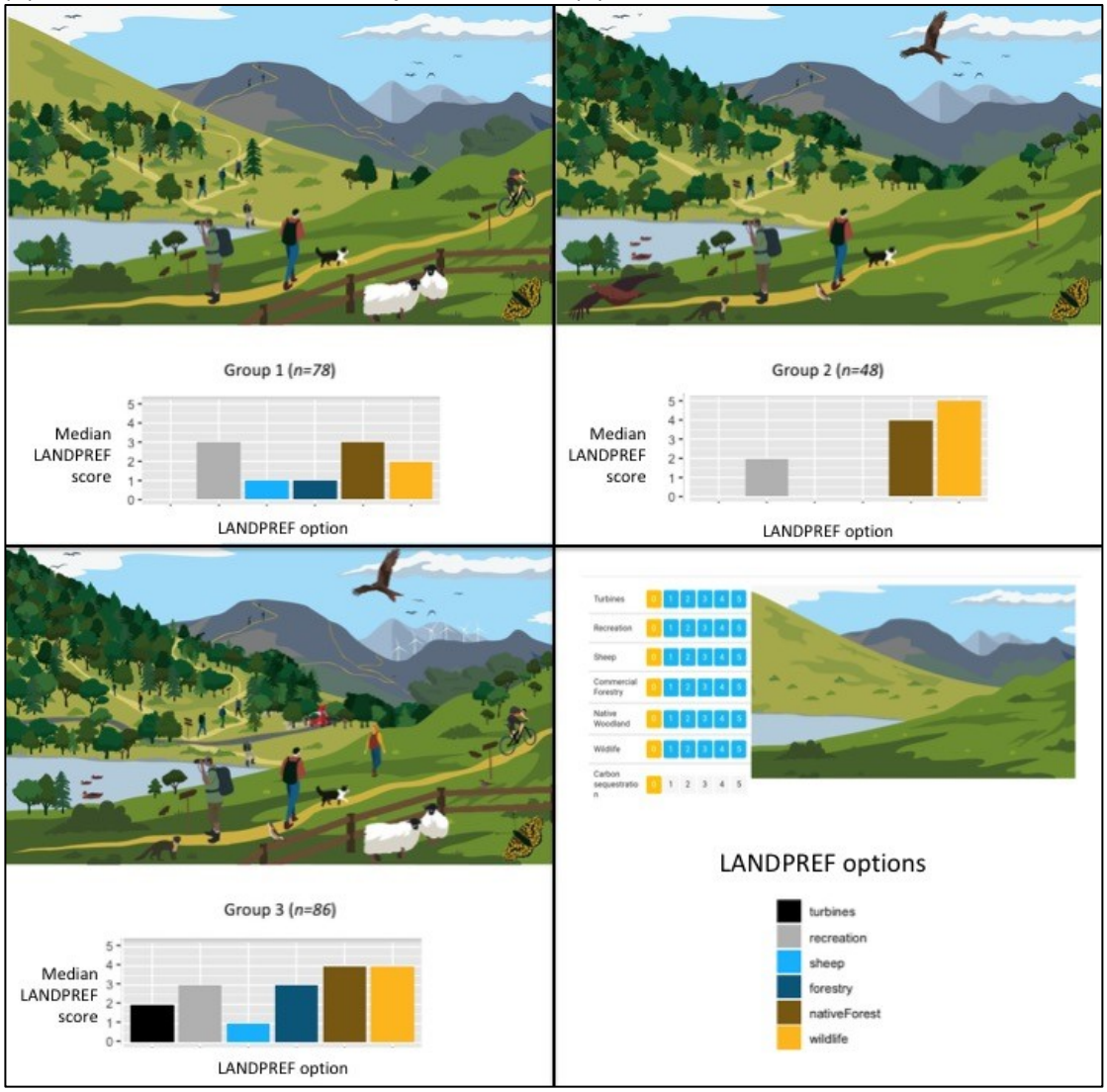


Figure 5. (a – c) Landscape visualisations and median scores from the LANDPREF tool. Visualisations created using the median values for each of the preference clusters identified from the Hierarchical Clustering Analysis. (d) The LANDPREF tool interface and initial landscape.

(a) *landscape* for open scenery (b) *landscape for nature and wildlife*



(c) *landscape for trees & multiple benefits* (d) The LANDPREF interface

Tables

Table 1. List of potential ecosystem services for participants to select and weight for future management in the survey (adapted from Clement & Cheng, 2011).

Benefit	Explanation
Timber	I value the forest for the timber and wood fuel it provides.
Recreation	I value the forest as a place to take part in recreation activities.
Therapeutic benefits	I value the forest as a place that makes me feel better mentally and/or physically.
Experience of nature	I value the forest for the scenery, sounds and smells.
Economy	I value the forest for role it plays in providing jobs for the local economy.
Symbolic/cultural/spiritual significance	This forest has special significance for me.
Habitat/biodiversity	I value the habitat it provides for wild plants and animals.
Carbon storage	I value the forest because it stores carbon, helping to regulate our global climate.
Slope and soil protection	I value the forest for its role in protecting the soil and stabilising slopes against landslides.
Water supply	I value the forest for its clean water supply.

Table 2. Degree of urbanisation of participants' home postcodes. Participants with a postcode within the Lochaber NUTS area were defined as 'local'. Accurate postcode data was not collected for 31 respondents.

	Local	Visitor
Rural	69	29
Urban	19	64

Table 3. Mean values and standard deviation for the demand for ecosystem services in the future, and p-values of the Mann Whitney test for differences in values between (a) the respondent's home location, (b) gender and (c) forest user/non-user. Significant values at $p < 0.05$ are highlighted in bold.

	All		a. Home location					b. Gender					c. Forest users/non-users				
Benefit	Mean	SD	Local	SD	Visitor	SD	p-value	Female	SD	Male	SD	p-Value	Non user	SD	User	SD	p-value
Recreation	3.03	2.52	3.09	2.69	2.98	2.39	0.95	2.76	2.23	3.22	2.70	0.33	1.13	1.50	3.18	2.52	**<0.001**
Therapeutic	1.44	1.87	1.34	1.82	1.52	1.90	0.22	1.85	2.01	1.15	1.70	**<0.001**	2.31	2.94	1.37	1.74	0.37
Experience	1.59	1.63	1.12	1.27	1.96	1.78	**<0.001**	1.68	1.79	1.53	1.51	0.74	0.56	0.81	1.68	1.65	**0.004**
Habitat	1.32	1.74	1.51	2.06	1.17	1.45	0.41	1.09	1.17	1.48	2.05	0.82	2.06	2.98	1.26	1.60	0.52
Carbon	0.69	1.32	0.76	1.54	0.63	1.13	0.82	0.81	1.55	0.60	1.13	0.40	1.06	2.49	0.66	1.18	0.77
Economy	0.60	1.35	0.87	1.78	0.39	0.85	0.06	0.50	1.30	0.67	1.39	0.44	1.50	2.68	0.53	1.17	0.10
Slope protection	0.42	0.87	0.46	0.82	0.38	0.91	0.34	0.34	0.66	0.47	0.99	0.76	0.56	0.81	0.40	0.87	0.24
Timber	0.38	0.95	0.41	0.90	0.35	0.98	0.36	0.41	1.01	0.35	0.90	0.64	0.63	1.20	0.36	0.93	0.42
Water supply	0.38	0.84	0.27	0.74	0.46	0.90	**0.04**	0.45	1.04	0.32	0.66	0.94	0.19	0.54	0.39	0.86	0.33
Symbolic	0.17	0.52	0.17	0.53	0.16	0.52	0.79	0.10	0.37	0.21	0.60	0.19	0.00	0.00	0.18	0.54	0.14