Forest Research

RESEARCH SUMMARY

Characterising land managers to support woodland creation efforts in Scotland

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This research summary reviews the available evidence about land managers and woodland creation. After reviewing key messages from literature covering the UK, Europe and North America, a detailed examination of research in Scotland is undertaken. Most research deals with farmers, other land managers are rarely considered and urban and peri-urban managers are absent. The research presents three different ways of understanding land managers woodland creation attitudes and actions. Large surveys use statistical methods to identify associations between socio-economic and attitudinal variables of land managers and their holdings and willingness to plant trees. Typologies of different land manager types show the general motivations and attitudes of different groups towards woodland creation. Segmentation models use a combination of large surveys and qualitative behavioural data to identify land manager types with some clearer explanatory power around their situations and resources, motivations, values and beliefs affecting their woodland creation decisions. There is an even mix of statistical studies and typology generation across the undertaken in Scotland. These generally show that both socio-economic and attitudinal or values driven behavioural factors are important to understanding land managers willingness and intention to plant trees. Evidence that lessons from these studies and other segmentation studies conducted outside of Scotland have been applied by policy makers and practitioners is weak. However, there are important insights around the crafting of messages, information and knowledge exchange that is persuasive to different managers, and how best to target resources in efforts to increase woodland creation rates.

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Introduction

The Scottish Government has a clearly stated intention to increase woodland cover from 18% to 25% of land area by 2050. This target for woodland expansion, whether the creation of woodland on new land, expanding existing areas of woodland, restoring forest land, or increasing the urban canopy, represents both a policy and practical challenge. Data suggests that the rate of woodland expansion has still not reached national targets of 10,000 ha per year in Scotland (Slee, 2014, Scottish Government, 2013) and rates of planting are particularly low across the Central Belt (SRDP data presented in Lawrence and Edwards, 2013).

The potential for woodland expansion varies across Scotland. Recent opportunity mapping has identified 2.7 million hectares with potential for planting mostly on farmland, with much distributed across the Central Belt and around centres of population (Sing et al., 2013). However, woodland expansion is not only about site suitability. A key challenge is building approaches to understanding the complexity and heterogeneous nature of land managers across Scottish landscapes and regions, and then identifying the most effective ways of engaging with those managers to realise the planting targets. This is a particular concern in the Central Belt which has a complex mix of rural, urban or peri-urban land uses and a corresponding variety of different kinds of land owners and managers.

Over the years there have been a significant number of studies in Scotland, the UK, Ireland and more widely across Europa and north America investigating the reasons why land managers create new woodlands, and why they might be resistant to tree planting. The most recent studies have used ideas from social and behavioural sciences to differentiate between land managers by factors known to influence decisions and actions. Such research characterises different owners according to their beliefs, attitudes, motivations and preferences. Different methods are used to identify groups of land managers sharing similar characteristics.

Small scale studies using qualitative data tend to generate typologies using in depth interview or case study data. Large scale studies have used surveys and quantitative statistical analytical techniques such as regression or factor analysis, to generate models of different land owner types. Segmentation models are one such method, which have been developed by business and marketing professions to better understand the behaviours of specific audiences and customers.

Segmentation approaches usually apply a cluster analysis to group together participants by responses to survey questions. The groupings or segments within the model are then normally tested by, e.g. deliberation amongst experts, or by conducting 'ground truthing' research interviews with a sample from each segment. Where segmentation models are based on a large enough sample, they have some predictive power, and can place new customers within a segment based on the key variables that explain the segmentation model. These key variables are often described as the "golden questions".

For example, Visit Scotland has successfully used customer segmentation modelling to market the Scottish tourism offer to a variety of different consumers, and the Scottish Government has used a segmentation of climate change behaviours amongst 2.3 million households in Scotland[1] to identify which groups may be more receptive to changing certain behaviours and less receptive to others. In a land-based industries context, this type of segmentation research and modelling has been used by the Welsh Government to effectively target communications and policy delivery mechanisms for specific groups within the agricultural industry in a context of CAP reform (Lee-Woolf et al., 2014); and by Defra in England to influence policy design around farm diversification (Garforth et al., 2006).

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[1] https://www.webarchive.org.uk/wayback/archive/20170124144359/http://www.gov.scot/Topics/Environment/climatechange/resource-materials/segmentationtool/segmentationmodel accessed March 22nd 2019

Research approach

This research summary is based on a rapid review of recent work in the UK and Scotland which provides evidence about land manager characterisations including segmentation models, and specific evidence about woodland creation or tree planting in rural and urban contexts.

A search of scientific literature and other evidence-based reports was undertaken on Google Scholar, Science Direct and Scopus using search terms (((wood* OR forest*) AND creation) OR tree planting) AND (farmer OR manager OR owner) AND (segmentation OR characteri* OR typology).

A total of 57 studies were included in the review. Of those 10 studies were specific to Scottish land managers, and covered tree planting, including some element of characterisation or a discussion of the barriers to tree planting. These 10 studies were examined in detail.

Findings from the review

What the review revealed about the UK and European literature is that:

- Even though there is a substantial amount of research characterising land managers in a forest management context, there is generally less research of this kind dealing specifically with **woodland creation**.

- Nearly all of the found research of this kind looks at either the attitudes of different types of farmers towards tree planting, or those of estate managers who have traditionally had some interaction with forestry.

- Although some farmers in these studies include 'hobbyists' and new farm or forest owners, found in peri-urban areas, other types of land managers from the urban context are largely neglected. Detailed characterisations and behavioural insights connected with urban managers involved in tree planting

or woodland creation do not appear to exist.

- There is a surprising degree of agreement across studies about the key features of typologies and segmentations which may vary in the context specific detail, but distinguish between groups with a more financial and productive focus, amenity or conservation concerns, or a multifunctional approach (Deuffic et al., 2018, Ficko et al., 2017, Gregory et al., 2003).

- Even though characterisations provide useful generalised descriptions of land manager types, there is often a very complex interaction of beliefs, preferences, land management goals and social, economic and environmental values structuring behaviour. This means that at an individual level there will be some variation against the detail of the typologies or the segmentation models.

- Studies testing the reliability and effectiveness of characterisations and segmentation models showed that different methodologies provided slightly different results, but models based on behavioural science approaches e.g. Theory of Planned Behaviour (TpB) were the most robust (Dayer et al., 2014, Ficko and Bončina, 2014).

- However, land manager characterisations and segmentation studies might be used by policy makers as they frame policy options, but they seem only rarely to be applied by operations and delivery managers working with land managers themselves (Ficko et al., 2017).

Characterising land managers in Scotland

The following section summarises the key findings of the review of specific significance to Scotland. The key characteristics of the studies of significant interest to this research summary are summarised in Table 1 below.

Table 1. Summary of studies investigating woodland creation and tree planting in Scotland

Study	Focus	Sample size	Data & analysis	Model	Who is likely to create woodland?
Burton et al (2018)	Building visions of woodland futures with stakeholders	18 stakeholders from land management organisations	Workshop and interviews: content analysis	• Green gold • Multiple benefits • Native networks • Woodland culture • Wildwood	• Different visions for woodland expansion positioned along two axes, i.e. utility-conservation, and land sharing – land sparing • Not focused on land owner engagement but still provides insight into ways of classifying multiple functions and types of woodland acceptable to different kinds of managers. This has saliency in terms of messaging, targeting different land managers.
Hemery et al (2018)	UK survey of woodland owners and managers	Specific Scottish module - 74 woodland owners	Survey on-line: descriptive statistics	N/A	Confirms the view that planting grants alone are not enough to persuade land managers to expand woodland, information, advice and knowledge are also important to persuading land managers to plant
Hopkins et al (2017)	Farmers intentions to afforest	1,735 farmers	Survey by telephone: statistical analysis of association	• Future Increasers • Non Increasers – (traditional aversion to forestry) • Past Increasers	The Future Increasers were the best bets and they were: • Those who already have woodland • Active in management and diversified income generating non-agricultural activities • Well educated and/or relatively new to farming • Involved in environmental schemes
Sutherland et al (2016)	Farmer uptake of agri-environmental schemes including forestry	2,416 farmers	Survey by telephone: descriptive stats and structural equation modelling (SEM)	N/A	• Uptake of agri-environmental schemes correlates with uptake of afforestation and renewable energy schemes. This is linked with land managers diversification strategies. • Productivist farmers are constrained by incompatibility of particular agricultural grants with forestry incentives. • Commercial farmers on larger holdings are interested in afforestation where it can be integrated into renewable energy production. • Hobby farmers are more likely to take up woodland creation for lifestyle and amenity values but may be constrained by small size of holdings and poor links with traditional information and knowledge networks.
Slee et al (2014)	Reasons farmers engage in woodland planting	12 farmers who had engaged in woodland creation	In-depth case studies	N/A	• Different types of farmer are motivated to undertake different types of forestry. • Amenity woodland creation was the strongest motivation. • Customised messages to different farmer groups will help encourage tree planting.
Lawrence	Understand	33	Semi-	N/A	Explored the reasons why land managers were not creating

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and Edwards (2013)	why land managers less likely to create productive woodland	stakeholders including 11 agents and 6 woodland owners	structured interviews: qualitative content analysis		productive woodland. The main factors were associated with: • The design of financial incentives • The package of support bundled with grants and easily available to managers e.g. knowledge exchange, information, extension • The application and approval process around grant applications • Political, trusted intermediary and community leadership
Sutherland et al (2011)	Understanding the drivers of land use change	600 land managers	Survey by telephone and 24 follow-up interviews:	• Ecological land stewards • Economic land stewards • Multi-functionalists • Community stewards • Others	• Most managers seek some economic success before acting on other motivations or goals. • No type of decision-maker emphasised economic priorities in isolation from environmental or social attitudes. • Responsibility for the environment was very important for the majority. • Forestry and woodland creation for an option amongst all land manager types but for different reasons and different expected outcomes
McMorran (2008)	Understanding land managers approaches to woodland planting in the Cairngorms	52 land managers	Survey and follow-up interviews: descriptive statistics and qualitative content analysis	• Diversified land based rural businesses • Private sporting residences • Farm businesses • Dual function	• Diversified rural businesses and sporting interests were the most interested in woodland expansion and creation • Dual function entities (i.e. public access and conservation) were interested in woodland creation through restoration
Crabtree et al (1998)	Understanding why farmers entered woodland creation grant schemes	farmers	Logit model i.e. regression analysis	N/A	The model performs well identifying factors which predispose farmers entry to woodland creation grant schemes, e.g. • The presence of existing woodland on farmland is associated with further woodland creation as is woodland on neighbouring properties • Size of farm is positively associated with the uptake of grants and interest in forestry schemes
Crabtree and Appleton (1992)	Economic evaluating of farm woodland scheme	farmers	Econometric valuation	N/A	Motivations for planting were primarily for 'environmental' benefits such as landscape, amenity, wildlife and sport. Income and timber production were much less important.

Attitudes and barriers to woodland expansion

Lawrence and Dandy (2014) synthesised the available evidence about land managers approaches to woodland management and woodland creation in the UK. Of the 42 UK studies they reviewed, 9 were conducted in Scotland, of which 4 related specifically to the attitudes of farmers towards woodland creation. None of these 4 studies develop characterisations or segmentation models. Lawrence and Dandy's (2014: 358) general conclusions were that "the majority of private landowners are not doing what forestry policy makers would like them to be doing. Private landowners have their own objectives, and respond (or not) to a wide range of policies, among which forestry often plays a minor role". They also pointed out that the availability of financial incentives for planting, has to be understood as one decision making factor amongst others. These include the rate grants are offered at, the perceived difficulty of applying for grants, how far land manager objectives and attitudes are incorporated into grant schemes, and land managers need for more appropriate knowledge and information about woodland creation and becoming a woodland manager.

Slee (2014) also noted deeply embedded cultural factors influencing Scottish farmers reluctance to plant trees. There remains a deep division between the forestry and agricultural sectors. Strongly held negative attitudes and emotions against trees and woodland are common amongst farmers and attributed in part, to past conditions, where trees and woods remained the property of landlords rather than tenant farmers. This built perceptions that trees provide little benefit but could lead to dis-benefits, e.g. by sheltering vermin. In addition, farmers have strongly held beliefs that farmland should be used to support the production of food and ensure food security, so planting trees is seen as taking farmland out of productive use. Although there may be an economic rationale for woodland creation, shifting these cultural concerns continues to present a particular challenge.

Thomas et al (2015) undertook a review of the evidence around woodland expansion in Scotland and used the Theory of Planned Behaviour (TpB) to structure their exploration of the social research. They found evidence that external conditions including economic and non-financial incentives, e.g. rate of grant payment, level of bureaucracy associated with grant applications, the amount of advice available to land managers, and social norms, e.g. farmer productivist identities and culture, were all shaping land manager attitudes and their decision making around tree planting. They also looked at ownership characteristics as determinants of behaviour and found evidence that younger rather than older farms were more positive towards woodland creation; farmers were more likely to plant woodland if they already had woodland or if there was woodland on the neighbouring property; and that farmers were unlikely to put down woodland on more than 10-20% of their holdings. Thomas et al believed that research gaps still remain and called for new research into attitudes and motivations for woodland creation factors, determinants they felt may well have changed over the last 20 years of studies. They also believed there was a gap in understanding how social norms and the community farmers and others are situated influences their land management choices.

The British Woodlands Survey 2017 (Hemery et al., 2018) collected responses from 645 woodland owners, 74 were Scottish (11.5% of the sample). Across the total sample, about 25% said grants would be an incentive to plant more woodland, but low-cost advice was also important. Amongst Scottish woodland owners there were some comments about the direction of land use policy, a feeling that commercial forestry might not be valued enough, and one Scottish owner felt they required to plant broadleaves which they felt had no commercial value. When asked about potential land use change on their holdings over the next 5 years, land managers ranked agriculture highest (86%

of land would be available, on average), compared with 85% for game management/shooting, and 61% for forestry. Their motivations for doing so in order of importance were environmental enhancement; income generation; environmental protection, and land value.

Characterisations and segmentation models around woodland creation

Burton et al (2018) undertook a series of interviews and a workshop with stakeholders to investigate different woodland expansion visions. Even though the stakeholders included not only private land managers but representatives from organisations (largely Scottish NGOs) it is worth mentioning the visions created through the work. These are likely to have salience amongst Scottish land managers, providing some insights into the way different kinds of land managers view woodland expansion and by inference how woodland creation could be presented and messaged. Burton et al describe five woodland expansion visions. Of those 'Green gold' is productionist and largely receptive to grants and woodland expansion of commercial plantations. 'Multiple benefits', 'Woodland culture' and 'Wild wood' visions were about creating woodland or regenerate woodland across the landscape in an intimate mix over land with designations, upland and lowland farms, productive as well as conservation focused.

Hopkins et al (2017) conducted a telephone survey of 1,735 farmers sampled using the Scottish June Agricultural Census (JAC). Farmers were asked about their past behaviours and future intentions to change their area of forestry by 2020. Other questions collected data on 51 variables important to land manager decision making (Dandy, 2012). Statistical analysis identified differences between Non-increasers, Past increasers and Future increasers. Non-increasers were characterised by traditional farming views and negative perceptions of forestry and farm woodland, Past increasers had created woodland in the past but were unlikely to in the future. Future increasers were most likely to

plant woodland in future. Significant associations defined Future increasers as a group: they were better educated than Non-increasers and Past increasers (e.g. 36% of Future increasers had a university degree compared with 18% Non-increasers); they were more likely to be younger (under 45 years); they were more diverse and active in their farm management (e.g. 3 times more likely than the others to be involved in tourism, 5 times more likely to be selling their own produce); they were marginally more likely to be in LFA but more likely to be involved in environmental schemes (61% involved compared with 38& of Non-increasers). Attitudinal associations defining the farmer segment were weak. However, knowledge of the benefits and returns from forestry had an impact: Future increasers were 6 times more likely to already have woodland. Newer owners were more prominent amongst Future increasers and they generally had less negative attitudes to forestry, so were more willing to consider planting trees.

Sutherland et al (2016) looked at enrolment in agri-environment schemes as a route to diversification with afforestation being one of those options. They found that 70% of those expanding or creating woodland on their farms were also involved in other environmental schemes. They confirmed previous findings that afforestation associated with land ownership, and all but the most recent afforestation has been on larger land holdings. In terms of attitudinal factors, they also found that future behaviours of farmers were associated more strongly with respondents seeing the environmental benefits engaging in a scheme rather than with personal environmental values *per se*.

Sutherland et al. (2011) investigated rural land managers across Scotland and their priorities for land use. Their typology found 5 groups which cut across land use sectors, with woodland creation and forestry an option for all of them but for different reasons and expected outcomes. Sutherland et al also noted that there is a significant difference in the decision making strategies of individuals, households or

those running larger businesses and between professionalised and non-professional land managers which needs to be addressed when framing messages and assessing the need for and means to extend advice and information in support of policy objectives such as woodland creation.

McMorran (2008) developed a typology of land manager types in the Cairngorms in the context of investigating woodland management. However, he also found that there were variations across the types of managers he identified, in their interests for woodland expansion. Those most likely to engage in woodland creation were farmers and land managers with diversified businesses and particularly those with sporting interests. Individuals and organisations with an interest in conservation and amenity were much more interested in woodland expansion through forest restoration. He also noted that environmental considerations were usually stronger drivers to action than social values, and that productionist values varied most widely across land manager types.

Crabtree et al. (1998) used logit regression models to find associations between land manager characteristics and entry into woodland creation schemes. Their findings have been reflected in the more recent studies and showed that farm ownership, farm size and the presence of woodland on farm and adjacent land were important predictors of entry into farm woodland creation schemes.

Ways forward in other countries

In England, Eves et al. (2015) undertook a significant segmentation study around farmers and woodland creation for Defra. They identified five different farmer types based on a combination of socio-demographic and business variables, and attitudinal and values-based factors connected with woodland and tree planting. The five segments were: Pragmatic Planters; Willing Woodland Owners; Business Oriented Farmers; Casual Farmers and Farmers First. They were able to comment on the likelihood of each segment to respond to

targeted incentives. Pragmatic Planters and Willing Woodland Owners were the two most likely to plant trees in future, but incentives and messaging to facilitate woodland creation were different in each case. Pragmatic Planters (as well as Business Oriented Farmers) were interested in economic and financial benefits, whereas Willing Woodland Owners (along with Casual Farmers) were motivated by planting for public benefit. Farmers First were the least likely to have any interest in trees and woodland planting. They saw public benefits in terms of agricultural production and generally only perceived dis-benefits from trees. Despite having farm characteristics that might suggest a likely interest in woodland creation, Farmers First represent a category that it is not efficient to direct efforts at. Eves et al found that larger and freehold farms were more likely to be interested in woodland creation, and farmers with woodland on their land were more than twice as likely to be interested in additional planting.

Some important work applying segmentation models and lessons from social marketing has been conducted for the United States Forest Service. Work by Butler et al (2007) derived non-commercial woodland owner profiles from a segmentation analysis using data in the US Forest Service's National Woodland Owner Survey and a follow-up postal survey which generated a dataset of over 8,000 responses. They used two different methods which they combined to assist their efforts targeting specific types of woodland owners. They profiled woodland owners to create a typology and found four distinct groups: Woodland Retreat Owners; Supplemental Income Owners; Working the Land; and Ready to Sell Owners. Having understood the characteristics of these groups they then undertook a segmentation model based on the level of engagement owners had with their woodlands and their attitudes to woodland stewardship. They used this to generate a Prime Prospects analysis grid with four quadrants, these were Model Owners (those already exhibiting desired behaviours), Write-Offs (the most difficult people to influence), Potential defectors (people who

could be influence with some effort but outcomes uncertain) and Prime Prospects (i.e. those where interventions are likely to be most effective in nudging owners to the desired behaviours).

Figure 1. Overview of the Prime Prospects analysis grid From Butler et al (2007: 352)
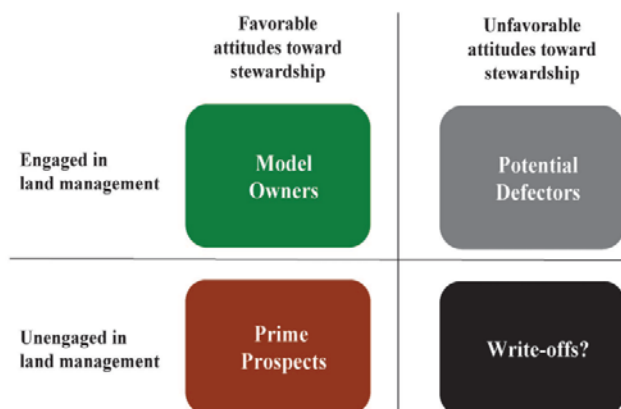
Using this grid it was possible to identify the owner type, the numbers of owners, and woodland area (by hectare), in each quadrant. They made a decision to concentrate their intervention efforts on the Prime Prospects. They were able to use their typology combined with data about Prime Prospects to craft Forest Service extension materials and key messages best suited to the different kinds of owners. They concluded that there is no single answer to communicating and influencing existing and potential woodland owners. Multifaceted, long-term approaches are needed, and the specific messages will depend on the objectives of the organisations implementing particular programs.

Conclusions

Some key messages around targeting for woodland creation have emerged from this review, but they are about land managers of farmland, not in terms of other kinds of land owners.

From the studies which use statistical methods of analysis, it is by and large, younger more educated owner farmers, on diversified holdings, with existing woodland or close to other woodland represent "best bets".

In terms of the typologies reviewed, it is clear that there are other land manager types with an interest in woodland creation but for different reasons. The studies also revealed that many different land managers do engage in tree planting despite perceiving barriers and dis-benefits, they are making complex trade-offs between different objectives and values.

So a key conclusion is that messaging is customised to resonate with the primary motivators and concerns of different kinds of land managers, as well as fitting the messaging and information to their social and operational contexts (Slee, 2014). Hopkins et al (2017) suggest that forestry and woodland expansion should therefore be repackaged as an activity that complements and benefits farming both in terms of messaging, and in terms of the kinds of planting schemes which are supported by incentives.

It is also important to recognise that facilitating behaviour change, requires understanding of the pathways and moments of change that can help to nudge land owners towards woodland creation (Moseley et al., 2014, Valatin et al., 2016). Land managers may need different forms of intervention at different stages in their decision-making process before they are ready to commit to tree planting. This may require multiple interactions with land agents, peer groups and other agents of change, and exposure to a variety of different materials communicating knowledge and information.

However, it is important to acknowledge that there are large numbers of rural land managers currently reluctant and are likely to remain reluctant to plant trees. They may be more responsive to improved financial motivation than behavioural nudge based on the results of surveys, typologies and segmentation studies.

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