

# Land Management Networks Project

Work Package 2 Final Report

Network Analysis and Segmentation

Norman Dandy, Bianca Ambrose-Oji, Phil Handley &  
Kevin Watts

The Research Agency of the  
Forestry Commission

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## Research Highlights

### **Work Package 1 – Identifying Owners** (see Work Package 1 Final Report)

- The use of a systematic spatially-referenced method for obtaining woodland management information is feasible and can generate significant data and insight relevant to users at a landscape scale.
- Evidence indicates that full implementation of the proposed method (Stages 1 – 5) can identify ownership and/or management information for between 80 and 90% of woodlands above 5 ha in area.
- Effective implementation of the method will require development of an efficient process of information exchange between users (e.g. Woodland Officers) and support staff (e.g. spatial analysts). This may require software development.
- Effective implementation of the method will require an increase in capacity (skilled staff) to process spatial data – either located in central services or locally.
- The method requires users to have capacity to engage organisations beyond the Forestry Commission in systematic information exchange.
- For effective implementation of the method, the *Customer and Land Database* (CLAD, administered by the RPA & DEFRA) should be utilised more effectively. Currently, perceived data protection concerns override its effective use.

### **Work Package 2 – Owner Networks and Segments**

- Evidence suggests that approximately 80% of woodland owners are linked to the local 'professional' network – through contacts with agents and NGOs, land registration, or via membership of forestry or environmental organisations.
- Forestry agents possess significant information on local managers and management. Literature indicates that forestry professionals (e.g. agents and organisational representatives) are critical actors in management networks – as disseminators of information and providers of advice to decision-makers.
- Some woodland managers are more 'central' to management networks than others. Literature suggests that these 'central' managers have larger than average woodland holdings and actively establish relationships with others.
- Land-managers can be 'segmented' according to their social connectivity. Segments are created by managers' dominant activity (which constructs their social 'world') and interactional drivers (everyday interactions via which knowledge exchange occurs).
- Existing research and experience generated 12 land manager profiles which were grouped into 4 general 'segments': *On-board*; *Tied*; *Ready for (some) change*; *Hard to reach*.

## 1. Background

In order to achieve its principle land-management objectives, namely afforestation and the sustainable management of existing forests, the Forestry Commission engages with many land-managers. This includes the provision of advice and grant aid, along with regulatory services. However, there is persistent concern that this engagement focuses (often repeatedly) on a limited proportion and number of land-managers. Recent policy (such as that relating to carbon management, ecosystem service provision, biomass for energy, and deer management) has led to the need to *expand* the breadth and number of land-managers engaged. In a landscape of fragmented land-ownership and management this high level of engagement with land-managers can be a substantial challenge for public agencies. Knowledge relating to *who* land-managers are, along with *what* land and *where* they manage, is a particularly significant obstacle. Details of only a limited number (and proportion) of land-managers are known to individual agencies, and many land-managers who cannot or do not want to formally engage with public agencies remain unknown. Further difficulties are encountered in *engaging* with a diverse set of land-managers. Different forms of communication will suit different land-managers, management objectives vary considerably, and managers may already be engaged with established networks and organisations within which knowledge exchange is effective and satisfies their perceived needs. This pilot project provides baseline information with which the Forestry Commission can adapt the organisation's practices to achieve wide-scale engagement with woodland managers at a landscape scale.

This Second Project Report (the final report from this project) reports work done to complete a woodland manager social network analysis, and construct an outline woodland manager segmentation focused on social connectivity. After briefly noting what is known about factors influencing land management decision making (for full discussions of these see Lawrence et al 2010; Dandy 2012), we describe our network analysis. This includes a brief summary of the contemporary literature on woodland and forest owners from a social network analytic perspective. The final section lays out (primarily through tables) our proposed outline segmentation, and using a simple sorting process to stimulate thoughts around critical segments – and components thereof.

## Common Factors Influencing Land-manager Decision-making

The literature on woodland owners and other land-managers identifies a number of key factors influencing their decision-making processes. The evidence supporting these findings can be found in Lawrence et al (2010).

Management objectives:

- Managers often have multiple objectives for their woodland – wildlife and landscape are nearly always key.
- Consistently, a proportion of managers have *no* explicit objectives for their woodland.
- Timber production and other economic motives tend to be low priority but increase with size of ownership.

- Land-managers commonly feel a 'responsibility' for taking care of their woods (a sense of custodianship).

Influences on decision-making:

- There are always multiple influences upon decisions.
- A positive economic context is usually *necessary but not sufficient* to motivate management.
- There is a consistent desire to avoid loss through woodland management (rather than make profit, which is a far less common motivation).
- Financial incentives (e.g. grants) can contribute to the positive economic context but are only rarely a dominant motivating factor in decision-making.
- Interpersonal interactions (peers, professionals & family) are important influences on decisions and actions.
- Advice from 'expert' peers or professionals can be a key influence on decisions and actions.
- Commitments to shared practices and values ('culture') often place boundaries around decisions (these commitments can span generations).
- Potential outcomes of action must match manager's existing objectives.
- Managers are reluctant to cede control of the management of their woodlands.

## 2. Social Networks in Land-management

### Existing Network Analyses

There are significant bodies of literature dedicated to identifying the social **non**-economic influences upon decisions and practices of land managers such as farmers and foresters. Much of this work has analysed the role of specific types of social actor, such as families or peers, and their interpersonal interaction with the 'decision-maker(s)'. Other work focuses upon innovations and practices themselves and highlights how these are transferred between peers. More recently, structured social network analyses have been conducted on land-managers – including foresters. These literatures provide a number of key insights into land-management decision-making.

Families can have a particularly strong impact on land use decisions and practices. This is especially evident in analyses of agriculturalists (Gasson et al., 1988). Some studies have illustrated how family actors can bring new ideas to the management of land. Cater (1994), for example, noted how it is often family members less occupied by farming who generate an interest in forestry within a family unit or business. Further to this, pre-existing family values have been shown to affect decisions regarding land use change. For example, Salamon et al. (1997) illustrated that farming families with existing traditions of environmentalism and experimentation were most likely to adopt sustainable agricultural practices.

Intergenerational family ties have been shown to be especially influential amongst agriculturalists with perceptions of what previous generations would have considered appropriate land-use, along with preferences to pass on particular practices to successors, being critical. Considering the specific relationship between farming and forestry, Neumann et al (2007) and Raedeke et al (2003) both found that planting trees on farmland was strongly resisted by farmers with a commitment to family. They concluded such activities were seen as a 'break in ... tradition' (Neumann et al 2007: 129) or as 'erasing an important symbol of previous generations and of a person's family heritage' (Raedeke et al 2003:73).

The importance of succession to land managers is evident from studies such as those by Potter and Lobley (1992; 1996a; 1996b). They show how succession practices have evolved in the UK to ensure a smooth transfer of control between generations through the expansion of family farm businesses that incorporate successors well prior to any hand-over. This is a response to the need to reconcile a desire for familial continuity with the demands of capitalist agriculture, but critically also facilitates the progressive transfer of farming skills and culture between generations. Similarly, Salamon (1992) demonstrates how the transfer of land between generations serves as a mechanism through which agricultural identities are recreated and perpetuated, hence shaping farming practices and management in the US.

Another area of literature describes the spread of specific innovations and practices between land managers and this emphasises the role of peers in decision-making. This research has its roots in studies of agricultural technology uptake in the post-war US (e.g. Ryan and Gross 1943; Bohlen et al. 1958) and highlights that fact that close interpersonal communications play a key role in the spread of new practices. The key claim is that innovations are evaluated "through the subjective valuations of near peers" rather than via experts or scientific analyses (Rogers 2003: 36). Whilst communication is, in general, most likely to occur within social groups with strongly similar members, for the spread of *new* practices and ideas it is argued that at least some difference between social group members is important. This area of work very much highlights one of the critical dimensions of social networks: their role as *routes* or *pathways* via which information, ideas, innovations and culture (e.g. shared practices, attitudes and beliefs) reach land-managers. As Nybakk et al (2009) state in a forestry context "Networking can contribute to innovative capacity and innovativeness among local forest owners ... by giving them novel ideas and access to resources, and by transferring knowledge".

Recently, analysts have turned towards generating detailed descriptions of the structure and function of land management social networks *per se*, including forestry networks. Specific social network analyses (SNA) have investigated timber harvest and sales (Knoot and Rickenbach 2011; Korhonen et al 2013 ), biodiversity protection (Korhonen et al. 2012), forest planning (Paletto et al 2012), forest co-operatives (Rickenbach 2009), provision of non-timber forest products and services (Nybakk et al. 2009), and firewood production (Nybakk et al. 2012). This literature has, in common with other studies of land management decision making, most frequently focused around decisions to participate in publicly funded schemes, but is beginning to reveal some useful basic structural information. For example, studies repeatedly identify that forest owners discuss management decisions with about 3 or 4 others. The network size of owners

appears linked positively to their innovativeness, which is itself linked positively to economic performance (Nybakk et al 2009, 2012<sup>1</sup>). Landowners with larger forest holdings generally have larger social networks (Sagor 2011).

Although the importance of land management professionals (such as advisors, agents and other organisation representatives) has been acknowledged previously (e.g. Hujala et al. 2007), they are increasingly being identified as important actors – including for forestry – within this specific social network analysis literature. Various studies place professional land management advisors at the centre of forestry networks and connected to those owners most likely to harvest wood or enter into forestry agreements (see Rickenbach 2009; Knoot and Rickenbach 2011; Korhonen et al 2012). Praestholm et al. (2006), suggest that low awareness of agri-environmental incentive schemes amongst certain sections of the farming community is a consequence of their lack of membership of traditional information networks, and in particular their limited capacity to draw on professional advisors. Having said this, in a study *not* using network analysis, Joshi and Arano (2009) found no statistically significant correlation between seeking help from professional foresters and any of the four types of decision about forestry management activities they investigated. This study did, however, identify a link between the existence of a formal written management plan and land-managers' harvesting and silvicultural decisions.

Studies using SNA methods have also re-emphasised the importance of family members in forest management. For example, Nybakk et al. (2012) conclude that 'The single most important actors with whom the firewood producers cooperate, regardless of whether they are small or large businesses, are family members'. In a finding that echoes the conclusions of the agricultural literature on intergenerational influences, Korhonen et al. (2013) state:

Most owners included their spouse into making the decision, even though the spouse was not always a forest owner. Owners' children, as future forest owners, often participated in the decision making as well. In addition, if the holding was inherited from parents who were still alive, they were asked for approval. (p. 86)

Korhonen et al (2013) also illustrate that the boundaries between family and professional sources of advice are not always firm:

Owners also requested information or opinions from acquaintances they considered as experts or peers with knowledge. These people were typically relatives. (p. 86)

Although this evidence shows that family members are amongst those social actors most *commonly* consulted by land managers in their decision-making processes (see also Sagor 2011), there is evidence to suggest that they are not necessarily the most important (or influential). Rickenbach (2009), for example, finds that professionals play a relatively stronger role.

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<sup>1</sup> Nybakk et al (2012) also interestingly found that owners with few active family members benefitted most (in terms of innovativeness) from large social networks.

Network analysis has generated some conflicting evidence on the role of peers in the decision-making processes of land managers. Whilst peers are a common feature of these social networks (Korhonen et al 2011; Sagor 2011), it appears that direct or active discussion of land management is relatively infrequent amongst direct peers, and in some cases even actively avoided. Influence is instead felt in less obvious ways. For example Korhonen et al. (2013) note that 'only a few owners got their idea from other forest owners' but 'owners *read experiences* of those owners who had already started to protect their forests' (p. 86, emphasis added). Furthermore:

Although several owners had mentioned the protection to their neighbours, there were only a few who had really discussed or recommended the protection to their acquaintances. Contrary to open-minded owners, some even wanted to keep quiet because they were afraid to become marked as conservationists. Despite the fact that owners thought that protection is a positive thing, not all of them wanted to spread the "gospel" of voluntary protection. ... a few owners thought that negative feelings could be seen from the face of the neighbour even though they were not spoken aloud (p. 86-7)

Korhonen et al. (2012) highlight the limited role of peers in timber decisions noting that 'less than 20% of the forest owners have been in contact with [neighbouring or expert forest owners] during the latest timber sale'.

Having said this, 'peers' vary considerably with some seemingly more important within social networks than others in terms of influencing decisions and actions. Kueper et al. (2012) highlight the differences amongst 'peers' and the consequences:

Some self-described "rookies," while inexperienced, brought fresh perspectives and were eager to learn and willing to innovate. Others had a wealth of knowledge and experience to bring to the group. These more experienced members played an integral role in the learning dynamic of the group, providing examples of well-managed properties, answering questions, and serving as liaisons between less experienced members and professionals. (p. 11)

Korhonen et al. (2012) identified a group of forest owners as 'relationship builders'. These have an above average network size which includes not only neighbouring and peer forest owners but also forestry professionals. This study asserts that these 'relationship builders' "could be channels to reach passive forest owners" (Korhonen et al. 2012).

The literature on peer-to-peer learning processes (perhaps unsurprisingly) provides contrasting evidence on the importance of peers in the social networks of land managers. This literature also identifies those 'peers' perceived as expert by others as key actors – hence blurring the boundary between 'experts', 'professionals', and 'peers' (Korhonen et al 2011).

Schraml (2003) illustrates the scale of forest owner networks – noting that some three-quarters of general public respondents in Germany know a forest owner personally – but

also the rather limited extent of active communication about forests and forest management within these broad social networks. This study concluded that individuals personally acquainted with a forest owner were slightly *less* likely to believe that timber harvesting has a detrimental impact on forest 'health'. However, Tindall et al. (2011) found no support for a related hypothesis that social ties to forestry professionals would be positively associated with satisfaction with forest management (whilst ties to environmental organisations were to some extent associated with *dissatisfaction* with forest management).

## Network Analysis in the Northern Devon Nature Improvement Area

Our aim in this project was to gather information on the whole woodland owner social network in the Northern Devon NIA, including connections to professionals, peers and families. Due to logistical problems resulting in a very limited response to the designed survey instrument, we were only able to gather empirical data relating to the professional network. This was done via the implementation of Stages 3 and 4 of a staged method designed to identify woodland owners at a landscape scale designed as part of the same project. This consisted of running map-based workshops with local forestry agents with the objective of identifying the owners of 228 local woodlands of >5 ha in size (mean= 10.25 ha) which were defined as 'unengaged' (i.e. about which the Forestry Commission has no recent ownership records available). We also distributed the same maps to local NGO staff. This provided primary data which was used to illustrate part of the professional social network. This initial data revealed the following:

- Just over a quarter of the owners of these 'unengaged' woodlands (28.5%,  $n=65$ ) **are** connected to (i.e. known by) an agent or NGO staff member (average size 12.5 ha. / 11.5 ha)
- An average agent knows management or ownership information about 9.5 woods of these woods. 8 of these are additional to those known by other agents (i.e. there is overlap between agent's knowledge).
- Agents also know owners of a number of woodlands <5 ha in size
- Many owners remained unknown ( $n=163$  'isolates')

Figure 1 (next page) illustrates this network, with the assumption that each woodland is owned separately and without making links between the individual professionals<sup>2</sup>. The figure illustrates the land-managers' (red nodes) known professional network, with agents and other advisors as central nodes (blue). Unconnected land managers (i.e. isolates) do not appear in this network.

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<sup>2</sup> The figure is therefore likely to under-represent the density of the network.

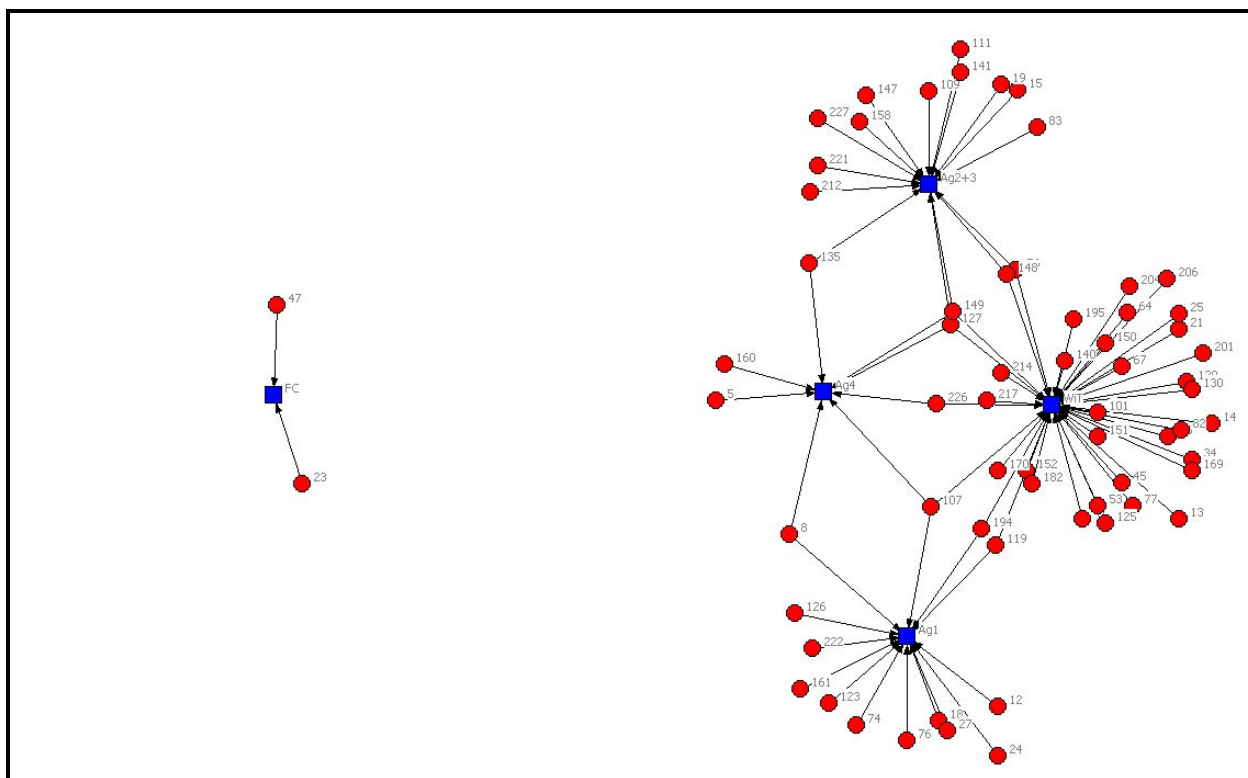


Figure 1 – Diagram Illustrating Known Professional Network in Northern Devon NIA

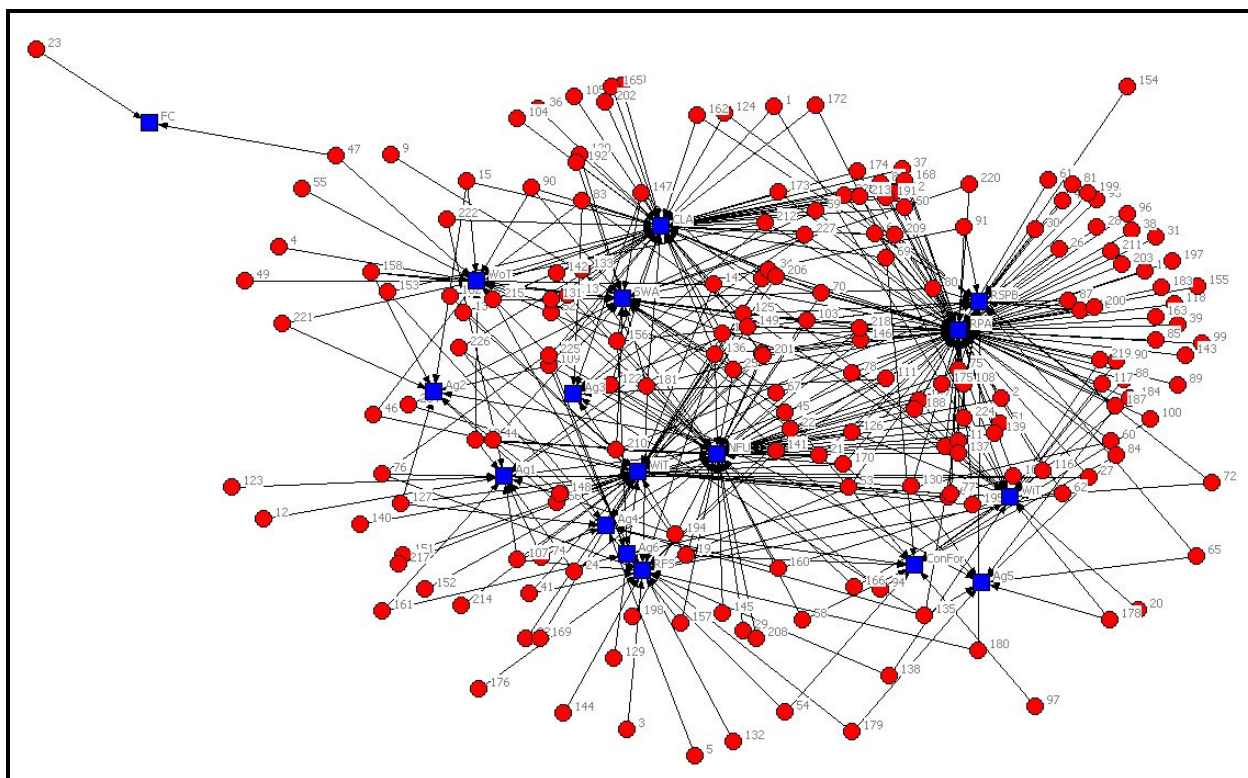


Figure 2 - Diagram Illustrating Modelled Professional Network in Northern Devon NIA

In order to analyse the likely whole network, we used this primary data in combination with data from other sources, as a basis for further projections about the woodland manager social network in the NIA area. Additional data (specific to South-west England) was sourced from unpublished data generated by the Great British Woodland Survey<sup>3</sup> (Sylva Foundation), thesis research by Julie Urquhart (Urquhart 2009) and a redacted extract of the Rural Payment Agency's *Customer and Land Database* ('CLAD'). This enabled us to model the following factors relating to social networks in the area:

- *Organisational memberships = CLA 25% of owners; NFU 25%; RFS 10%; SWA 10%; ConFor 5%; WoT 10%; RSPB 10%*
- *6 agents working in NIA area*
- *Connection to Rural Payment Agency via CLAD (connection at 50% woodland area record coverage)*

From this we can forecast a more complete 'likely' professional network in the NIA, illustrated by Figure 2 (previous page). This figure again shows land-managers' (red) links to the professional contacts (blue). This more analysis drawing on more complete data suggests a significantly larger network and that only a minority (16%,  $n=37$ ) of managers of woodlands >5 ha are unknown within the professional network in that area.

From this network analysis exercise we can conclude that:

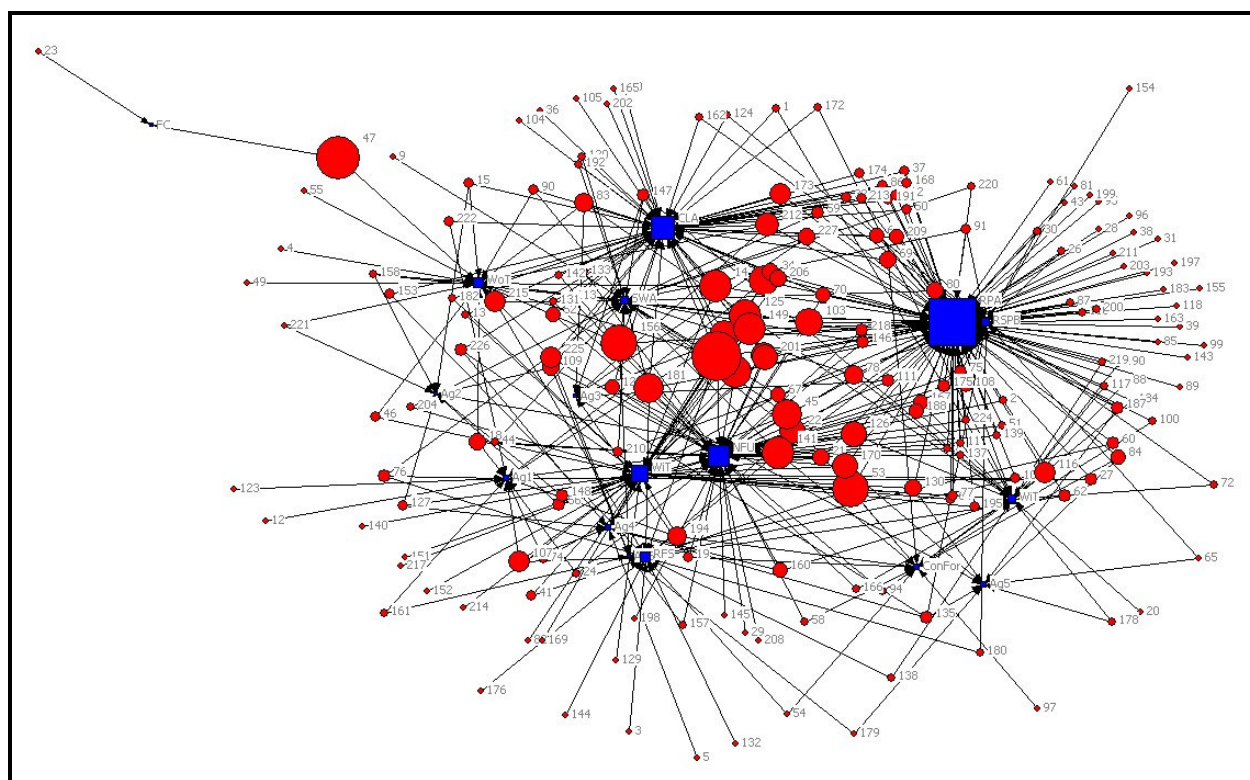
1. Many unengaged owners could be reached through the existing social network.
2. Forestry agents and non-governmental staff can provide considerable local ownership information.
3. The RPA's CLAD database could be a potentially significant route to unengaged owners.

This network analysis, and hence understanding to support engagement with established social networks, could be improved very significantly with further work. Specifically much could be learned from including data relating to the connections between (a) owners categorised as 'engaged' and the professionals in the network, (b) peers (i.e. owners – 'engaged' and 'unengaged'), (c) forestry and land professionals, and by accounting for the ownership of multiple woodlands by one owner (and/or ownership within the same family).

Even within this somewhat data deficient network analysis some owners emerge as more 'central' to networks than others. In redrawing the network, Figure 3 (next page) deliberately over-emphasises the 'betweenness' centrality of woodland owners (relative to the professionals) in this network. This is used as a measure of the importance of individual nodes in a network to the flow of information and clearly shows some owners as more central than others (larger red circles). Further work should focus on this phenomenon and seek to identify the characteristics of these owners as their engagement could result in the efficient dissemination of information within the network.

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<sup>3</sup> With thanks to Alastair Yeomans, Gabriel Hemery, Gill Petrokofsky, and Derek Nicholls.



**Figure 3 - Network Diagram Emphasising the Centrality of Owners Within the Network in the Northern Devon NIA**

## 3. Land-manager Types and Segments

### Existing Typologies and Segmentations

The results of a number of typological and segmentation analyses have been reported in the wider literature on woodland owners (and other land managers). Tables 1 and 2 (next page) offer lists of UK and US studies, along with the names of the types or segments they identify. Viewed as a whole these analyses are rather diverse and offer a complex and mixed picture. Types and segments have a wide range of names, have been constructed from various samples, and have only a little obvious overlap. The majority are based on analyses of owners objectives, commonly established as 'functions' that the owner or manager wants the woodland to provide. This has analytical implications. For example, 'conservation' is most often conceptualised in this way (i.e. as a function) rather than explicitly as an outcome of a set of values (i.e. environmentalism) that the owner or manager might hold. Consequently, in most cases it is not really possible to discern whether 'conservation' is anything more than a simple default response to survey questions about woodland functions (i.e. the woodland exists, and therefore provides a 'conservation' function regardless of whether the owner desires this, let alone actively manages for it).

Church & Ravenscroft 2008	McMorran 2008	Urquhart 2008	Urquhart, Courtney & Slee 2010	Urquhart & Courtney 2011	Woodlands.co.uk 2011	URS 2012
Dutyists	Restricted functionality forestry	Custodian	Community woodland owner	Individualists	Family Foresters	Private retreat
Marketters	Dual function forestry (access & conservation)	Hobby conservationists	Farmer woodland owner	Conservationists	Nature lovers	Active Conservationist
Reluctants	Sustainable multifunctional forestry	Self-interested owners	Traditional woodland owner	Private consumers	Bush Crafters	Inactive conservationist
		Multifunctional owners	Resident new woodland owner	Multifunctional owners	Creatives	Multifunctional owners
			Absentee new woodland owner	Investors		Investors
				Amenity owners		Honestly disengaged
						Private consumers

**Table 1 - UK Woodland Manager Typology and Segmentation Summary Table**

Tyson et al 1998	Salmon et al 2006	Butler et al 2007	Surendra et al 2009	Kuipers et al 2013
Intenders	Amenity-focused landowners	Woodland retreat Owners	Amenity focused rural landowner	Consumptive-use forest owners
Nonintenders	Multiple-benefit landowners	Working the land owners	Amenity focused urban landowner	Recreationists
Planners	Passive landowners	Supplemental income owners	Passive rural landowner	Naturalists
Sellers		Ready to sell owners	Passive urban landowner	Multiple objective forest owners

**Table 2 - US Woodland Manager Typology and Segmentation Summary Table**

By and large, values *per se* play only a minor or secondary role in the segmentation and typological analyses available. Social connectivity (i.e. position in social networks or simple links to advisors) are not a feature of these analyses either. Some reflect contrasting ownership structures and a few are linked to likely behaviours. Tyson et al

(1998), for example, segments owners around their likelihood to prepare forest stewardship plans and offers some useful results. In this study owners' intention to plan increased with perceived benefits not only to themselves but also for their community. The stronger an individual's environmental ethic and the greater the perceived level of interaction in the community the more likely they were to perceive community scale benefits (and hence prepare a plan). Just over ¼ of owners (27%) had no intention to plan (mainly due to perceptions that it took too much time and effort to prepare plans), and more than 1/3 (35%) intended to plan but had not done so yet. This indicates a certain amount of latent action amongst forest owners that could be 'released' or enabled.

In addition to these points, some loose patterns can be seen amongst these analyses. For example, multi-functionality (or multiple benefit) is a very common theme. It is unclear, however, what can be learned from this other than the rather obvious statement that a large proportion of woodland managers do *not* have a single or 'most' important function that they seek to gain via their woods. Given this it is clearly important to present messages of multifunctionality when communicating with woodland and forest owners (n.b. grant schemes are often labelled as single issue, e.g. 'woodfuel WIG' or 'woodland bird WIG' etc). There is also a consistent group characterised by a commitment to protect woodlands either because of land management traditions or to family. Social norms would appear to be key influences on these owners. Conservation objectives are very common as are a type or segment focused on recreation ('hobbies' and amenity).

These analyses are limited in some ways. First, it is unclear whether it is possible (or necessary) for an owner or manager to be in two segments: either simultaneously (e.g. through having two or more different woods which they engage with differently) or over time (and how/when they change). Most of these studies have been done at specific locations and those that have drawn from more than one location have (not unsurprisingly) sought to emphasise the identification of cross-cutting types. Consequently, we have no clear knowledge of how different types vary geographically (or indeed *if* they vary). Finally, by focusing on types and segments of 'owners' these analyses can often ignore other key stakeholders in forest management decision-making: such as agents, business actors and family.

## An Outline Social Network-based Land-manager Segmentation

Here we propose an outline segmentation of (primarily private) land-managers who own woodland based on their social connectivity (see Tables 3 and 4, below). We identify two primary factors that, at a general level, are likely to determine the extent, scale and type of social network in which a land-manager may exist. This analysis is based on published literature (discussed above) and a legacy of primary data collection. We go on to provide some descriptions of the characteristics of these segments, including consideration of what social connections they may have (Tables 3 and 4). The aim is to assist in communication, specifically to identify routes (or pathways) to targeted types of land-manager (e.g. those with un-managed woodlands) and suggest the format and

content of that communication. This outline represents of Steps 1 and 2 of a standard three step segmentation method normally consisting of:

1. **Profile** likely groups according to the features most connected with the reason for conducting the segmentation. In our case this is about finding social connections amongst woodland owners and between woodland owners and others as a route to engagement. We also consider how likely they may be to respond to woodland management opportunities through different styles of engagement communication open to partners in the North Devon NIA. The profile uses characteristics and groupings of landowners already suggested by other studies and evidence. Morris (2010) is a good example of a study that predetermines landowner type (namely small woodland owners), and uses propositional profiles to collect data by segment.
2. **Identify the key variables of interest** to the segmentation of profiled owner types. These will be to do with connection and messages of interest and ability to act on those messages. Elaborating the list of variables is an important step and should be based on evidence showing which factors are likely to be most influential.
3. **Run a cluster analysis** using the profiles and segmentation variables, to see what groupings emerge along the Connected/isolated Receptive/non-receptive axes. This should provide additional insights and group together profile types that can be approached using similar engagement methods and messages. This stage should be based on empirical data analysis carried out in step 2.

We were not in a position to complete Step 3 as part of this project. A cluster analysis requires a substantial primary data set relating to the variables and indicators identified during Step 2. We do not currently have this data and did not have the time nor resources to collect it during the project. Subsequent data sets, such as those generated by Defra Woodland Owner Segmentation project (WC0812) or the Sylva Foundation's Great British Woodland Survey may potentially be able to form the basis of such an analysis.

## Primary Factors determining land-manager social networks

Table 3 (below) sets out land-manager types by the primary factors identified in this section.

↗ Connections

Dominant Activity → Interactional Drivers

↘ Land

The first factor in this segmentation is the primary or **dominant activity** (land-use) which the manager pursues. Those we're wanting to contact are likely to have one of three activities as their over-riding or dominant pursuit: (i) *food production*, (ii) *estate management*, or (iii) *woodland management*. Farmers and small-holders have food

production as their main activity throughout their land-holding (and this permeates their values). Estate managers can be characterised as having a number, and a mix, of activities and land-uses across their holding – which will almost always include some woodland. These two categories can encompass all private land-managers who own both wooded and un-wooded land, however, many private individuals own *only* woodland. Therefore, woodland dominates the land-holding of woodland managers, and likely constitutes the entire land-holding. These dominant activities are not only descriptive of land-uses, but also to a significant extent constitute the social ‘worlds’ (including cultures and value-structures) in which people find themselves. For example, farmers are likely to attend farming events, talk to other farmers and deal with other farming businesses (e.g. milk processors, pesticide companies, etc). Organisational membership is also likely to be similarly clustered.

Evidence shows that time is a critical limiting factor in decision-making: especially where ‘behaviour’ change is involved. In particular time is needed to consider alternatives to existing practice. Furthermore, evidence shows that knowledge and information are only rarely sought actively. More often knowledge is passed as a by-product of everyday activities. The everyday interactions that land-managers have with others is likely, therefore, to be critical to the knowledge exchange that they participate in, and consequently are the third set of factors on which this segmentation is based. The interactions which may form the basis of communication / knowledge exchange of those we’re wanting to contact will be primarily set by a particular set of dominant **interactional drivers**: (i) *business* objectives and practices, (ii) *place* attachment, (iii) *values*. In each case, one of these is likely to over-ride the others. For example, large-scale farming operations are likely to be tied to particular practices focused on extracting maximum value for money from the land they manage. This would involve detailed cropping and chemical applications, and involve interaction with agribusiness suppliers and other market-place actors. These *business*-focused activities are likely to crowd-out other concerns and over-ride any values or commitment to place of the individual or group concerned. Other actors may be particularly committed to a set of *values* and these over-ride business concerns, and deter or cut across place attachment. Community woodland groups, for example, often seek out ‘like-minded’ groups elsewhere to share knowledge and lessons. In terms of communication, these value-driven long distance relationships may over-ride local connections. Evidence shows that geography and commitment / attachment to *place* can impact significantly on land-managers’ social interactions. For these land-managers, social interaction is likely to be dominated by place and involve neighbours and other community members more than business representatives or ‘like-minded’ others – which are most likely to be non-local.

These factors and sub-categories result in potentially 9 distinct segments of land-owner, although some of these have potentially important sub-divisions within them. **We illustrate 12 owner ‘segments’ in Table 3 below, drawing parallels with segments or types described elsewhere in the literature.** Each of these segments will have identifiable (and usable) social connections, which are described in Table 4, which also provides potential indicators. The analysis contained in these two tables is brought together in Table 5 which characterises land-managers by type and social connectivity.. It is also possible to begin to draw conclusions about the typical land holding and uses of these managers – which will be useful in targeting interventions.

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**Table 3. Land-Manager types by dominant activity and interactional drivers**

Dominant Activity	Interactional Driver	Type	Examples (size of 'segment' as % of total)	General Characteristics	Evidence base (research congruence)
Food Production	Business	1	<b>A. Commercial farming business</b>	Some, but limited emotional / cultural connection to farming Feel marginalised & unsupported Farm often inherited, but indifferent to continued family involvement Often seeking opportunities to diversify Profit-making, debt reduction and financial viability important Environmental protection only a secondary concern	'Modern family business' & Pragmatists (DEFRA 2008) Business / Entrepreneur (Garforth et al. 2006) 'Flexible strategists' & 'Dedicated producers' (ADAS 2005)
			<b>B. Marginal farmer (less than 10%)</b>	Farming valued, but decreasingly so Feeling isolated – farming community & social life broken down; unsupported Wish to 'get out' of farming / retire Farming perceived as a burden on the family Economically dependent on farm (w/ low income levels) Work marginal land (e.g. upland)	'Challenged enterprises' (DEFRA 2008) 'Survivors' (ADAS 2005) 'Independent / small farmers' (Garforth et al 2006)
	Place	2	<b>Family-oriented farmer (20-30%)</b>	Farming valued as a way of life and part of role is to protect this Desire to pass on viable farm to children Farming and family-life closely intertwined Economically dependent on farm, but profit-making not primary driver Environmental protection important	'Family oriented' (Garforth et al. 2006); 'Custodians' (DEFRA 2008); 'Environmentalists / custodians' (ADAS 2005 [Farmers' Voice Survey])
	Values	3	<b>A. Lifestyle farmer (5-20+%)</b>	Farming culture not strong, but some attachment to traditional practices Family important, but not necessarily tied to farming Not economically dependent on farm (often have	'Lifestyle choice' (DEFRA 2008) 'Lifestyler' & 'Enthusiast / Hobbyist' (Garforth et al. 2006)

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				other incomes) Above average grant uptake	
			<b>B. Community food group (e.g. 'Incredible Edible')</b>	Community / co-management important (Localism & social capital building) Local economic development important Environmental protection important (Sustainability)	
<b>Estate Management</b>	Business	4	<b>Estate manager or owner</b>	Land-management culture and tradition strong (long term view taken) Estate often inherited and managed for long- term family ownership Have mixed land-use and objectives (commonly including forestry) Business focused & economically secure	Nicholls and Young (2005)
	Place	5	<b>No example</b>	n/a	
	Values	6	<b>Estate Trust (e.g. Dartington Hall Estate, Devon)</b>	Land-management culture weak Value-driven land-management (e.g. education; arts; environment) Commonly trust ownership – family ties weak Economically secure – not tied to land- management	
<b>Woodland Management</b>	Business	7	<b>A. Forestry business, agent or contractor</b>	Strong forestry culture Limited land ownership – mixed with work on others' land Economic dependence on forestry (& economic security dependent on scale)	Evidence of messages pertinent to business-led woodland managers (Ambrose-Oji et al 2012)
			<b>B. Absentee owner</b>	Weak forestry culture Not economically dependent on forestry	EVIDENCE FROM THE US Kendra and Hull, 2005
	Place	8	<b>Resident woodlander Community Woodland Groups</b>	Weak forestry culture Generally smaller land holding Engaged in local social networks Regularly does woodland work themselves Personal wellbeing and environmental protection	'Resident new woodland owner' (Urquhart, Courtney and Slee 2010) Community place (Lawrence and Ambrose-Oji 2011)

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				important Not economically dependent on woodland	
			<b>A. Woodland NGO</b>	Weak forestry culture Value-driven land-management (e.g. environment) Not economically dependent on woodland	
	Values	9	<b>B. Lifestyle / family woodlander Community Woodland Group</b>	Some commitment to traditional woodland management practices Wellbeing and environment important Some ties to family and community (e.g. for use for family or community bonding / social capital) Not economically dependent on woodland	'Family Forester' (Woodlands.co.uk 2011) 'Custodian' (Urquhart 2008) Lifetsyle alternatives, Community focused resource (Lawrence and Ambrose-Oji, 2011) Wood lotting (LUC, 2007) Value focused social enterprises run by CWGs Stewart, 2011  EVIDENCE FROM THE US Woodland retreat, Working the land family owners (Butler et al 2007) Thoreau, Muir and Jane Doe (Finey and Kittredge, 2006) Amenity family owners (Hujala et al 2009), Young families (Kendra and Hull, 2005), Conservationists and recreationists (Kuipers et al, 2013) 'Amenity focused' and 'passive family' owners (Salmon et al 2006, Surendra 2009)

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**Table 4. Descriptions and potential indicators of connection and engagement**

Connections			
This set of factors relates to the type of connections and social networks land managers have. The key features around the strength of connections with different kinds of people and associations operating at different scale levels are important with regard to the <b>degree of connectedness or isolation</b> experienced by the different profiled types, and are <b>important when considering which channels of connection</b> , which social networks, might exist for engaging landowners and propagating woodland management messages. What kind of bonds exist between people? Are they outward or inward facing to the individual's social unit? Are they strong or weak in character?			
Factor		Description	Potential Indicators
Ties	Internal	Strength of linkages within the decision-making unit (e.g. family members; business partners; group members).	Formalised family ownership Registered micro- or small businesses Group with established governance structure
	Peer	Strength of linkages to others of own type and category, including associations thereof (e.g. other food producers, woodlanders or estate managers;).	Association membership (e.g. farmer clubs; NFU; CLA) and degree of participation Attendance at local events
	External	Strength of linkages to other types, associated actors, local community & other sectors (e.g. agents, media / press, government, consultants, market actors, businesses in other sectors)	Business / market activities Media prominence
	Number	Overall number of social ties	Aggregation of indicators above
Scale		Geographical level of dominant or main ties. Different forms of social networking and social connection will operate at different levels. This suggests routes (and formats) in which to channel key messages and engagement efforts.	Local / community Sub-national / Regional National
Trusted associations		Which organisations does the profile type already connect with? Where does trusted advice which is most likely to be acted on come from? This could suggest key	Membership of associations and organisations

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	delivery routes.	
<b>Media</b>	Although evidence is poor, it is suggested that different media formats are likely to be used and trusted by different groups. This could therefore have a direct impact on the delivery approach if found to be an important clustering variable.	Media format used, e.g: Print <ul style="list-style-type: none"> <li>• Newspapers / magazines</li> <li>• Leaflets; newsletters</li> </ul> Internet Field visits and demonstrations Social media and discussion fora
<b>Receptivity / Valence</b>	The potential 'availability' of the owner to engagement and the set of messages most likely to make a connection to them.	
<p style="text-align: center;"><b>Land</b></p> <p>This set of factors relates to the character of the land and woodland holdings the different profiled types have. It relates to the generic features of the woodland held, and the main woodland management objectives current and future. All of these factors will influence land owner decision making, and the overall <b>receptivity</b> they will have to <b>accepting and acting on</b> different woodland management messages. The overall features of the group by "interaction drivers" will also influence the capacity to act on woodland messages, for example, "survivor" farmers or marginal farmers operating within very tight financial limits, may be receptive to woodland management messages but may not have the capital reserves required to put anything into action, or where they have an 'intention' to get out of farming they may have lost interest in changing current management practice.</p>		
<b>Factor</b>	<b>Description</b>	<b>Potential Indicators</b>
<b>Woodland type</b>	Affect what products and financial returns are a realistic proposition, or provide a basis for action. Marginal locations include slopes and poor access, prime locations are easily accessed	Spatial data Mainly broadleaved, or conifer, or mixed. Marginal locations, or prime locations
<b>Main 'use' woodland</b>	The (likely, main) objectives associated with woodland by the group. Indicates owners potentially of key interest to forestry outreach, i.e. those already partially engaged in woodland management or those using woodland for any specific purpose. This may also provide an indication of complimentary or conflicting woodland management systems and/or messages.	Shelter Wildlife Landscape Wellbeing Woodfuel (own use) Shooting Timber

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<b>Prominence of woodland in land holding</b>	The prominence of woodland within an owner's overall holding (and within their broader suite of activities) impacts upon their level of interest in it and availability of time to invest in its management.	Ratio of woodland to non-woodland within overall land holding Total woodland area within overall holding
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Indicators are provided to underpin quantitative segmentation analysis and to prompt discussion. All factors could be surveyed to ascertain, but we also need to consider how to identify at least some of the members of each group without having to conduct further research.

# Network and Segmentation Analysis

**Table 5. Land- Manager types by connection and engagement**

		Food production					Estate Management			Woodland Management				
		1A	1B	2	3A	3B	4	5	6	7A	7B	8	9A	9B
		Commercial farming business	Marginal farmer	Family-oriented farmer	Lifestyle farmer	Community food group	Estate manager or owner	NONE	Estate Trust	Forestry business	Absentee owner	Resident woodlander	Woodland NGO	Lifestyle / Community woodlander
Connections	Ties	Internal	Medium	Weak	Strong	Medium	Strong		Medium	Strong	Unknown	Unknown	Medium	Medium / strong
		Peer	Medium	Weak	Strong	Weak	Weak	Strong		Weak	Medium	Weak	Medium	Weak
		External	Medium	Medium	Weak	Strong	Strong	Medium		Medium	Weak	Medium	Medium	Strong
		Number	Few	Few	Few	Many	Few	Medium		Medium	Few	Few	Few	Few
	Scale		Local & Regional	Local	Primarily local	Primarily non-local	Primarily local	Local & Regional		Primarily non-local	Non-local	Non-local	Local	Local & National
	Receptivity / Valence		Open to change Messages : Agriculture Diversification	Open to change Messages : Agriculture Change	Unlikely to seek change Messages : Agriculture (shelter)	Unlikely to seek change Messages : Wellbeing Environment and wildlife	Unlikely to seek change Messages : Localism Community Environment	Unknown Messages: Tradition & Custodianship (land) Shooting Wildlife		Open to change Messages : Goal specific (e.g. education ;	Unlikely to seek change Messages : Timber	Unlikely to seek change Messages : Unknown	Unlikely to seek change Messages : Tradition & Custodian ship	Unlikely to seek change Messages : Wellbeing Community

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				Wildlife	Custodian ship?				innovatio n; arts)			(woods) Communi ty Wildlife		Wildlife
	<b>Trusted associati ons</b>	NFU CLA Market organisati ons and businesse s	Local farming clubs	NFU Local farming clubs and orgs (e.g. Young Farmers )	Unknown	Environme ntal organisatio ns Local Authorities	CLA ICF IEEMA RFS Political parties		Market organisati ons and businesse s	ConFo r ICF RFS Market organi sation s and busine sses	Agents	SWA WoT	Other NGOs Local Authorit ies	WoT SWA RFS
	<b>Media</b>	Print trade media Radio Via market	Print trade media Radio Via market	Print trade media Local print media Radio Social media?	Print media (trade and general) Via organsiat ions Social media? Events?	Internet Social media	Print media		Unknown	Print media (e.g. Charte red Forest er F&T News) Events	Unkno wn	Local print & TV media	Corpora te commu nication s	Internet Social media
<b>Land</b>	<b>Woodlan d type</b>	Often broadleaf & fragment ed	Often broadleaf & fragment ed	Often broadle af & fragment ed	Often broadleaf & fragment ed	Very limited woodland	Mixed. Often includes conifer production forest		Mixed	Conife r	Unkno wn	Broadleaf	Broadle af native	Mixed, often broadle af
	<b>Main 'use' woodlan d</b>	None  Shelter Wildlife Landscap	None  Shelter Wildlife Landscap	None  Shelter Wildlife Landscap	None  Wildlife Woodfuel (own use)	None  Unlikely to own / manage	Shooting Timber Landscape Wildlife		Wellbeing Education Recreatio n Social	Timber  Likely some prime	None  Wildlif e	Recreatio n Wellbeing Woodfuel (own use)	Environ mental protecti on / wildlife	Wellbein g Social capital- building

# Network and Segmentation Analysis

		e	e	pe Wellbein g Woodfu el (own use)  Some margina l woodlan d	Some marginal woodland	woodland	Likely some prime woodland		capital- building	woodl and			Likely some prime woodlan d	Recreati on  Some margina l woodlan d
	<b>Prominen ce of woodlan d in land holding</b>	Low	Low	Low	Low	Very low	Medium		Medium	Very high	Mediu m / low	High	Very high	High

This grid seeks to illuminate clusters of similarity (i.e. provide groupings suited to specific engagement approaches) and provide the basis for discussion around where to concentrate efforts with 'unengaged' community or perhaps how better to tailor specific messages to parts of the engaged community.

# Network and Segmentation Analysis

## Sorting Types into Land-manager Segments

In light of the detail and differences illustrated in the tables above, it is perhaps useful to begin to sort the identified owner types into broad groups relative to their connectedness and social 'valence'. This sorting is useful only in so much as it may assist in targeting communication effort. It does not remove the need to focus down on specific sorts and arrangements of connections relevant to each type. Sorting at only a very general level four potential groups (or segments) emerge (see figures 4 and 5):

**On-board:** a number of manager types appear well connected and receptive to forestry messages and communications. These types, likely including estate managers, forestry businesses, agents and other professionals, and possibly woodland focused NGOs, are likely to be easy to reach and receptive to standard messages – i.e. relatively easy to communicate with. It is notable that these are, however, perhaps the land managers which the FC expends most effort and time communicating with.

**Ready for (some) change:** some manager types may be seeking change or awaiting opportunities to change but are not connected to woodland actors or messages. These represent a significant latent group. Both marginal (isolated) farmers and commercial farming enterprises may fall within this segment. Although the social networks and interactions of both of these are driven by food production and business-focused concerns and cultures (and therefore may share receptivity to certain messages and common engagement routes), some distinctive approaches would need to be taken. Marginal farmers may be more likely to be attracted to messages of wholesale change (often sale of business or land) as a route out of farming. More commercially focused managers are likely to be attracted to messages of diversification, income generation and long term economic security/stability. Woodfuel messages seem particularly relevant here, as does activity to engage with land agents (rather than forestry agents) and other agricultural advisors.

**Tied:** A number of manager types seem well connected to social networks but not necessarily easy to reach and relatively strongly tied to other (non-forestry) social networks so as to make them unreceptive to forestry messages. Eliciting change from these types could be very difficult. Family-oriented farmers fit here given their strong ties to families and friends (which are relatively closed 'institutions', i.e. with few access points) and strong commitments to food production cultures. Community woodland groups may also fall within this segment, although their limited connectivity - especially to the forest sector and messages - is noted. Eliciting change from the manager types in this segment is likely to require highly targeted efforts featuring precise messages (such as long term agricultural sustainability for family farmers). It will also need the use of less familiar engagement techniques – such as peer-to-peer learning methods.

**Hard to reach:** some managers are not only likely to be unreceptive to messages of change but also have very limited connections via which to be reached. Absentee owners are likely to be within this segment (although it is difficult to generalise usefully about the receptivity of this group which is likely to be quite diverse internally), possibly along with some community woodland groups and some land management or estate trusts that act as arms length from their land. The suggestion is that agents and contractors may be best placed to be in contact with managers in this segment, although these links are likely to be relatively weak.

# Network and Segmentation Analysis

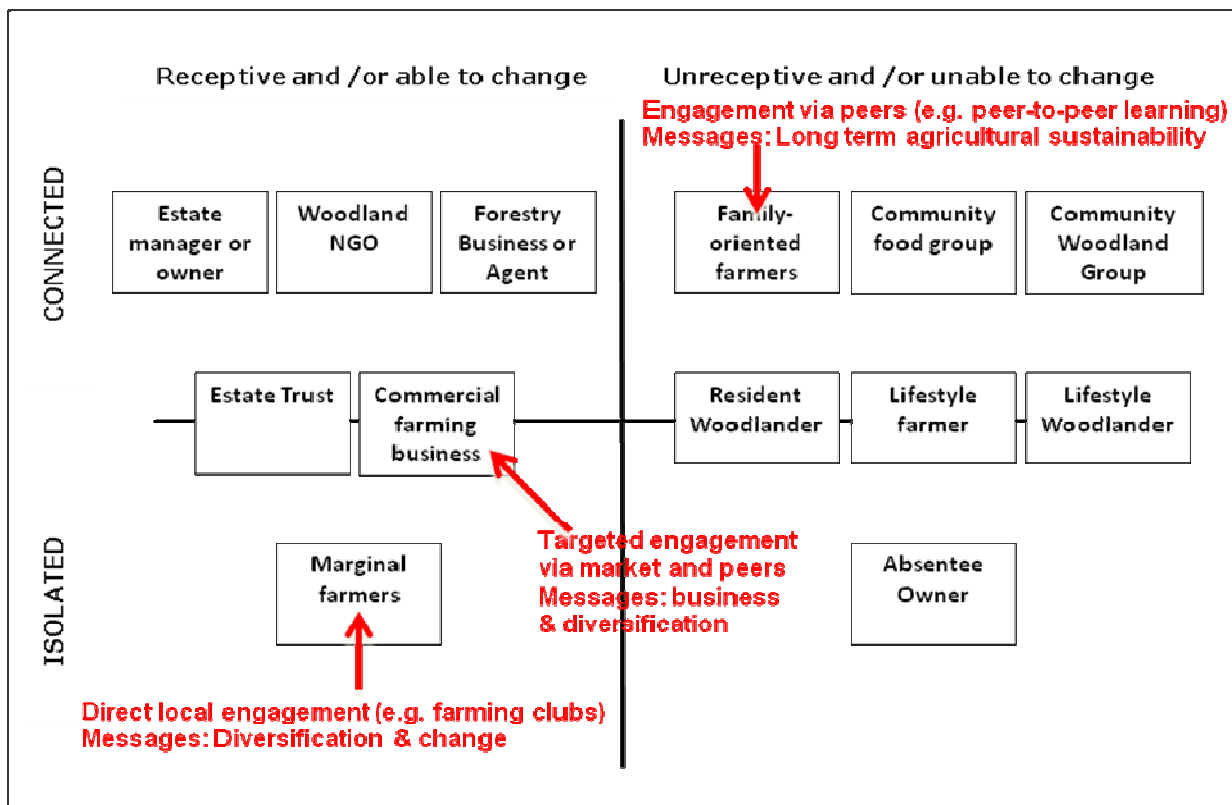


Figure 4: Woodland Owner 'Sorting Hat'

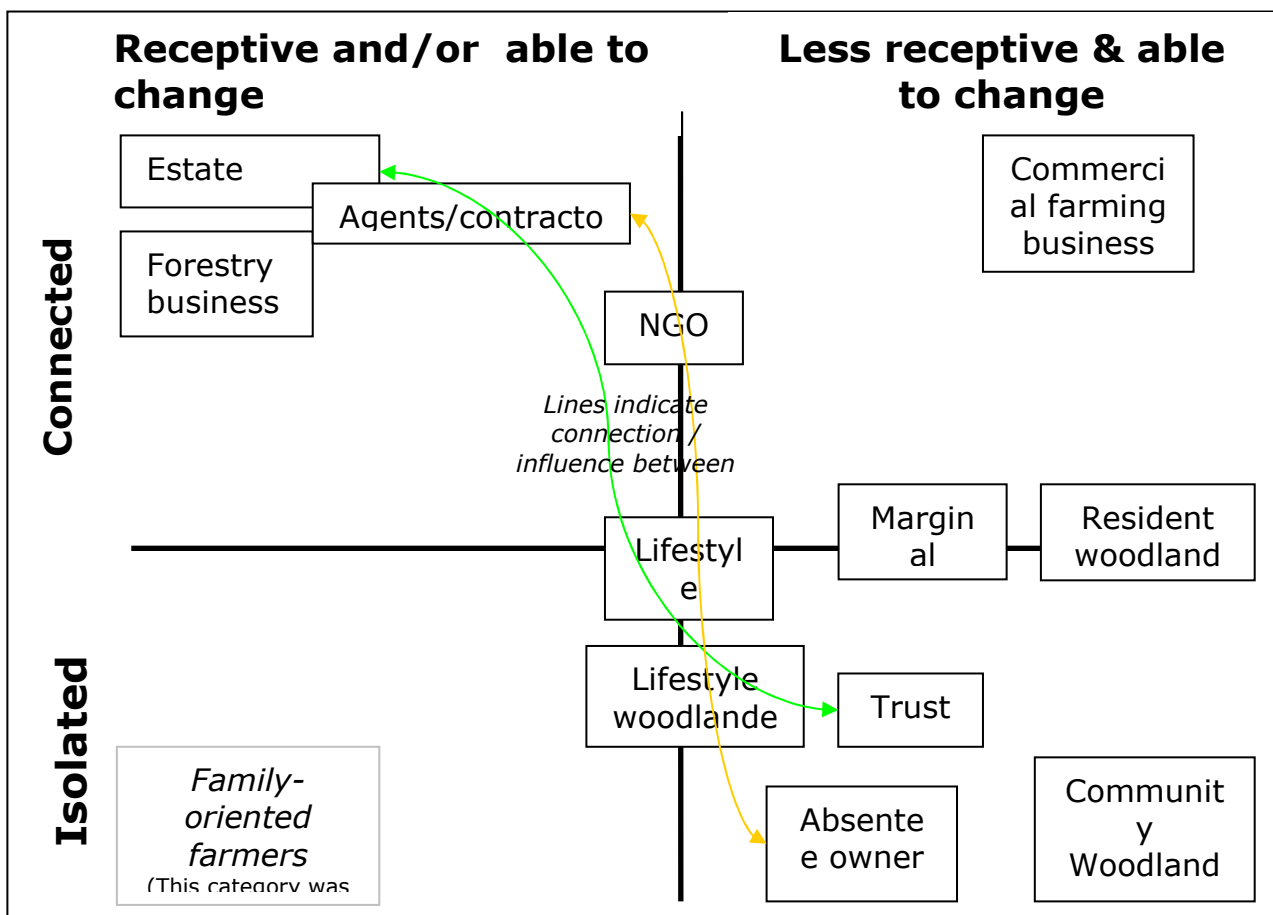


Figure 5: 'Sorting Hat' amended by Woodland Officers at Coed Y Myndd,

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