

# Understanding Private Land- manager Decision-making

## A Framework for Forestry



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## Executive Summary

1. The vast majority of land, including more than 70% of woodland, in Britain is owned and managed privately. In order to promote activities that help achieve its woodland creation and sustainable forest management objectives the Forestry Commission must engage fully with private land-managers. Traditionally this engagement has been through the provision of grants, advice and regulatory services. However, there is concern that these processes as currently configured are not sufficient to effectively promote desired management practices, and that other influences are having a stronger impact on decisions. Knowledge is therefore required to identify the influences on current land-management decisions so as to facilitate improved engagement with private-sector managers.
2. This report synthesises substantial research relating to private land-management, including previous work by Forest Research. Drawing on both primary and secondary sources, it describes a Framework within which to understand the influences upon land-manager decision-making. Primary research methods included interviews, focus-groups, stakeholder workshops, and survey. Qualitative data have been collected from approximately 100 land-managers in a variety of settings, primarily in relation to biomass energy / woodfuel.
3. The objective is to identify the breadth and complexity of influences on land-management decisions. The Framework describes around 25 categories of influence, which vary in relative importance 'externally' between land-management stakeholders and 'internally' for individual land-managers across parts of their land. It was not within the scope of this report to weigh the relative importance of influences.
4. Economic factors influencing land-management decisions include market security, infrastructure, and scale, along with product price and margin. Economic incentives (grants, tax relief and preferential finance) also exert some influence although not as strongly as market forces. Evidence suggests the key role for incentives is the exploitation of existing opportunities for land-management change, particularly by helping to manage risk.
5. A wide variety of social factors influence land-management decisions. These include concerns over control and bureaucracy resulting from regulation; pressures originating from society such as levels of acceptability, connections to private and professional social networks, and the social norms imparted by land-management cultures; and the personal interests of individual managers in relation to their priorities, attitudes to risk, values and pre-existing objectives.

6. Land-managers make decisions in relation to specific areas of land, between which there is considerable variation in physical and environmental characteristics. Consequently, decision making is deeply affected by factors relating to the land and resource. These factors include the productivity, position, environmental quality and climatic suitability of the land, along with resource availability, assessments of its potential, and the complexity of its potential products.
7. Land-managers are also influenced by operational factors such as the practicalities of work, and the availability of hardware and skilled labour.
8. Whilst some of the influences identified in the Framework are well recognised and acknowledged, others - such as the importance of social networks, personal interests, land-management cultures, and risk - are not and require further research in order to maximise the effectiveness of engagement methods.
9. Decision-making is deeply embedded in social, economic, and environmental contexts. That is, land-managers are already on a particular management 'pathway' or 'trajectory' at the point in time when decisions are made. This can bring considerable resistance to change of land-management behaviour.
10. Land-management behaviour change is most likely to occur at particular times and under certain circumstances, such as ownership change / inheritance, in response to crises or threats (e.g. disease outbreak, flooding, climate-change), or through the spread of innovation. Significant insights would be gained with the application of behaviour and innovation theories to land-management.
11. Risk is a very prominent dimension of land-management decision-making. Significant insights would be gained through the application of risk perception, communication and management theories to land management, and via a systematic consideration of alternative cost-effective methods of risk management used outside of the sector.
12. The framework presented in this report aims to provide a comprehensive set of categories of influence, so that those engaging with land-managers can see a fuller picture of their decision-making. With this broader knowledge these stakeholders will be able to identify new routes and methods of engagement to support sustainable land-management objectives. It will also facilitate better understanding of the limits of some engagement methods.

# 1. Introduction

## Private sector forest management in Britain

The private sector is vital to the delivery of forestry-related products and services. Private ownership accounts for well over half of Britain's woods (FC 2011) with well over 1 million hectares of woodland in personal private ownership in Great Britain, and a further 300,000 hectares in corporate ownership. The Forestry Commission seeks to engage these land-managers in a variety of ways (primarily through grants, regulation systems, and advisory services) to promote multifunctional sustainable forest management and woodland creation that delivers a broad range of public and private products and services. Given that a large proportion of privately owned woodlands are considered un- or under-managed, in many cases the active pursuit of sustainable forest management would constitute a **change** in land-management behaviour. Clearly woodland creation on unforested land (afforestation) also constitutes a change in land-management behaviour. This report considers land-manager decision-making broadly, but emphasises those decisions made relating to changes in management behaviour.

This research builds upon much previous work by Forest Research in this area (e.g. Lawrence et al 2010; Dandy 2011b; Lawrence et al 2011; Ambrose- Oji et al 2011). This work explores the social and governance contexts in which land-management decisions are made. A review of the existing evidence relating to land-owners and forest management (Lawrence et al 2010) identified key knowledge gaps which this Framework addresses through new research and analysis. In particular the need to place land-managers' decisions in a more complete context was identified and this framework provides a means to do that.

### 'Under-management'

The 'under-management' of privately owned woodlands is a central concern within the forestry sector, and is consequently the focus of key policies. For example, the 2007 *Strategy for England's Trees, Woods and Forests* stated that:

To achieve the aims of this Strategy it will be essential to bring much of this under-managed woodland resource back into sustainable long-term management. ... English woodlands that are not currently managed could be a significant source of woodfuel in the future if they were brought back into management (DEFRA 2007: 26 & 33)

The 2007 *Woodfuel Strategy for England* estimated that more than 4 million green tonnes of annual biomass increment goes unutilised (FCE 2007: 11). Targets relating to

remedying the 'under-management' (or 'neglect') of privately-owned woodlands have been a long-standing and consistent element of forestry policy in Britain as well as elsewhere such as the United States. (Nicholls, 1969: 41) noted, for example, that the Forestry Commission's Dedication scheme was introduced in the post-war period 'to assist private woodland owners to achieve a target of 2 million acres of productive woodlands by the end of the century'. The author goes on to note that 'by the end of the century, ... it is hoped that most derelict woodlands, legacies of two wars and of the neglect of past generations, will have been rehabilitated and that private forests will be approaching "normality".' (Nicholls, 1969: 44). In the US, (McComb, 1975) noted the same tendency to equate small-scale private ownership with poor forestry management. Having said this, defining what constitutes 'management', and thus 'under-management', can be heavily contested. Current Forestry Commission definitions focus on the presence or absence of a management plan, grant receipts and felling licence applications. This clearly prescribes a certain form and scale of 'management'. Although the legal threshold for requiring a felling licence is low, many managers of small woods are 'managing' them at a lower scale - perhaps occasionally felling individual trees and using that and other fallen wood for firewood. Furthermore, many stakeholders consider a decision to adopt low- or non-intervention approaches to constitute 'management'.

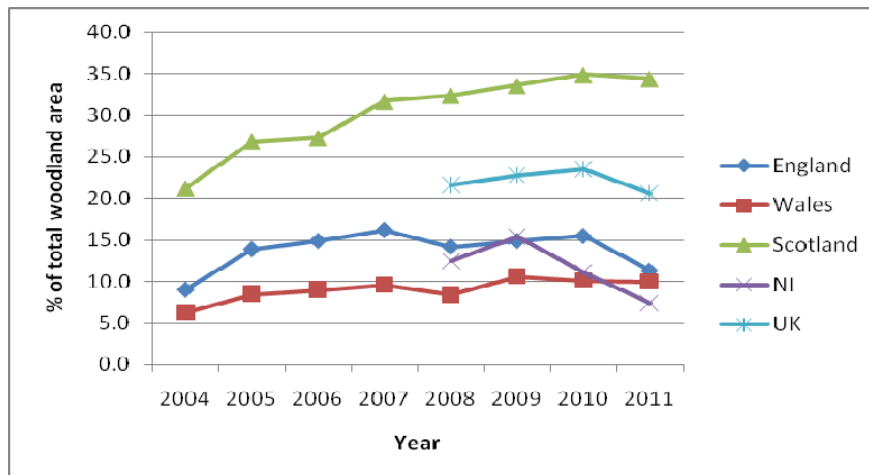
Tracking large-scale changes in land-management behaviour is complex, particularly because of definitional problems as described above, along with significant data inconsistencies and collection difficulties. However, the data on forest management that is available suggests little recent change over time. Forestry Commission (FC) statistics suggest that the proportion of total woodlands in the UK under certified management has increased over the last decade, although the figure has been relatively stable since 2007, at around 45%<sup>1</sup>. However, this masks a substantial difference between public and privately owned woods. Figure 1 shows that, since 2004, only around 10-15% of non-FC woods in England and Northern Ireland, and 5-10% of those in Wales, have been under certified management: and that that figure has remained broadly the same over that time period. In some contrast, Scotland has a significantly higher percentage and has increased from around 20% to near 35%. The most recent statistics (2011) indicate, however, a current year decrease in the proportion of certified management on private land across the UK - including in Scotland. Available figures relating to total land areas in receipt of management grants and total grant amount allocated to management grants illustrate somewhat erratic trends over this time period. They are also difficult to compare and make consistent over time<sup>2</sup>. Annual wood production figures show considerable increases in softwood production. However, hardwood production has remained very stable over the past decade (Figure 2). The private sector accounts for

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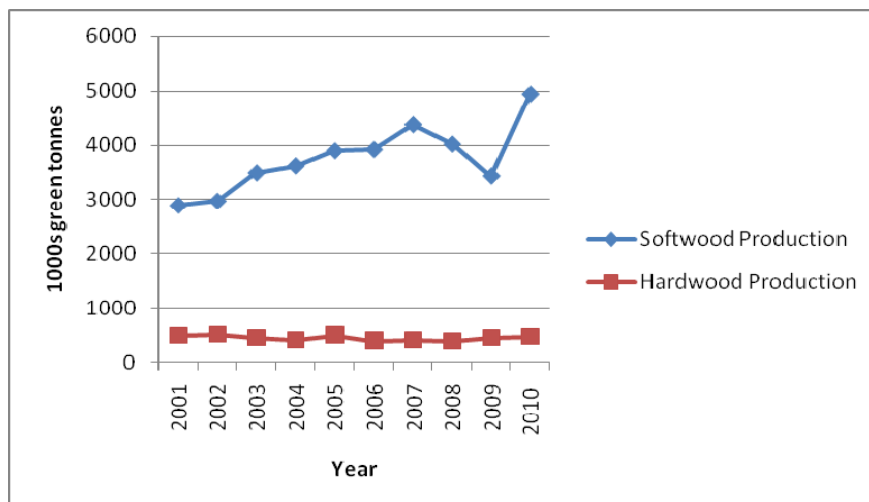
<sup>1</sup> <http://jncc.defra.gov.uk/page-4242>

<sup>2</sup> For example, figures are differently aggregated to GB or UK level, and annual figures vary via excluding or including specific grant schemes. See Forestry Statistics 'Finance & Prices' at <http://www.forestry.gov.uk/forestry/infd-7agdqg>.

the vast majority of broadleaf woodland ownership<sup>3</sup>. Whilst certification may be an imperfect indicator<sup>4</sup>, it could be expected that both the area of woodland under certified management and hardwood production levels would track changes in private woodland management<sup>5</sup>. Neither has shown significant change, other than in Scotland.



**Figure 1. Non-FC Woodland in Certified Management (2004-2011)<sup>6</sup>**



**Figure 2. Wood Production from Non-FC Woodland (2001-2010)<sup>7</sup>**

<sup>3</sup> Only around 8% of the UK's broadleaf woodland is owned by the FC and FS (114,000ha out of 1,355,000ha). See <http://www.forestry.gov.uk/website/forstats2011.nsf/LUContents/061E41873F94CC788025735D0034F33B>

<sup>4</sup> Costs associated with certification may disproportionately affect those managing small areas of woodland.

<sup>5</sup> It should be noted that hardwood production levels are linked to available growing stock which itself to some extent reflects decisions taken generations ago as much as recently.

<sup>6</sup> Source, FC Time series data available at [http://www.forestry.gov.uk/pdf/certified\\_woodland2001-2012.xls/\\$FILE/certified\\_woodland2001-2012.xls](http://www.forestry.gov.uk/pdf/certified_woodland2001-2012.xls/$FILE/certified_woodland2001-2012.xls)

<sup>7</sup> Source <http://www.forestry.gov.uk/website/forstats2011.nsf/LUContents/88BDD8FEA0D881448025734E004F27BB>

## Woodland Creation

In addition to promoting the sustainable management of existing forests, the Forestry Commission is committed to expanding woodland cover (afforestation) in Britain predominantly to increase public benefit from them. Although it has been a long-standing and consistent forest policy goal (Scottish Executive 2006; DEFRA 2007; WAG 2009), afforestation has been a particularly prominent dimension of recent responses to climate change and carbon management. The *Read Report*, for example, very much emphasised the importance of woodland creation and called for a rate of more than 23,000ha per year for the next 40 years (Read et al. 2009) - which would represent a 4% change in total UK land-use.

Forestry Commission statistics reveal a very substantial decrease in the total area of new planting in the UK since the mid-1970s<sup>8</sup>, from a level of consistently more than 20,000ha per year to consistently less than 10,000ha per year in the last five years (FC 2011). The vast majority of this contemporary new woodland creation has occurred on non-FC, therefore largely privately owned, land (see Figures 3 and 4, next page).

Questions have been asked about how the behaviour of private land-managers can be changed towards more widespread adoption of sustainable forest management practices and greater woodland creation. For example, the *Woodfuel Strategy for England* concludes that 'Owners of unmanaged woodland have not responded to traditional levers such as grant aid' (FCE 2007: 7). Whilst strong relationships and understandings exist between Forestry Commission staff and many private land-managers across Britain, the objective of a structured analysis of the influences affecting private land-manager decision-making is to aid understanding of the variety and complexity of issues facing them and identify further opportunities for the Forestry Commission and its staff to engage them effectively.

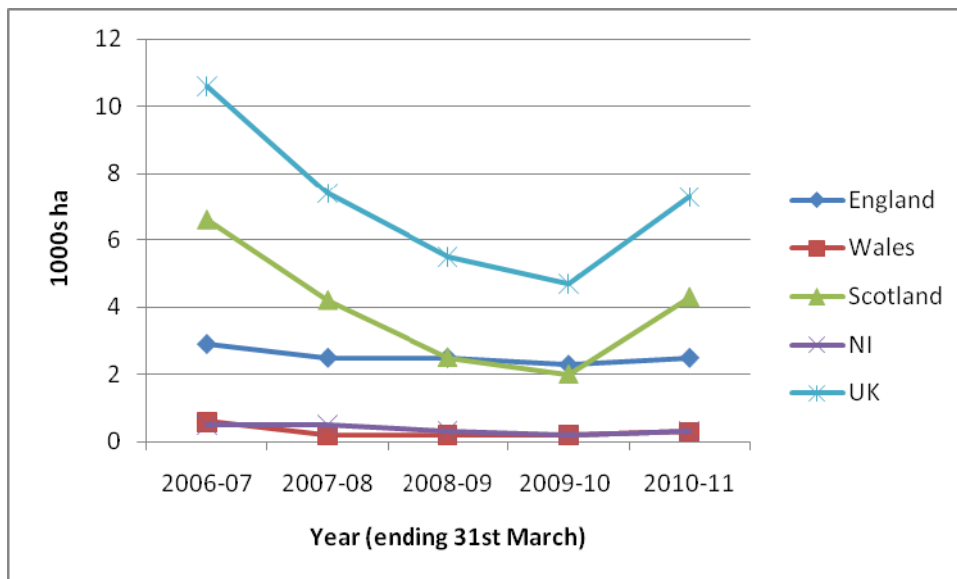
## Woodfuel and the biomass energy sector

In many ways the production of woodfuel for the biomass energy sector is a microcosm of the wider land-management decision-making context in Britain. There is little recent experience of energy related forestry in Britain and thus the widespread production of wood for fuel would represent substantial behaviour change in the sector. Wood biomass for fuel is one of the most important products currently being demanded of Britain's trees, woods and forests: and given their extent, those trees, woods and forests in private ownership clearly have an important role to play in the production of wood

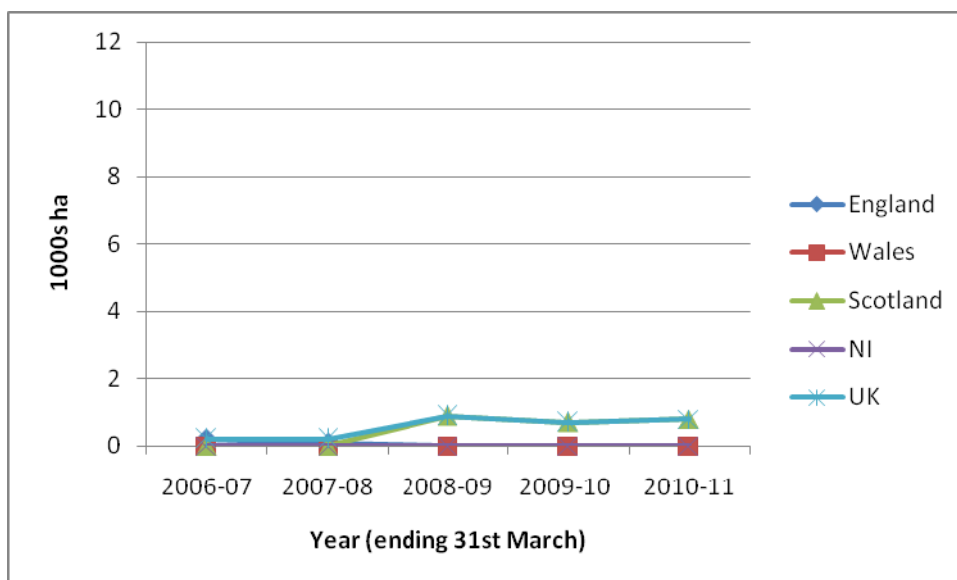
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<sup>8</sup> Figure 1.4 <http://www.forestry.gov.uk/website/forstats2011.nsf/LUContents/4F09640F0B6F8C27802573760033DE64>





**Figure 3. New Planting on Non-FC Land (2006/7-2010/11)**(Source: FC 2011)



**Figure 4. New Planting on FC Land (2006/7-2010/11)**(Source: FC 2011)

biomass. As part of the European Union’s commitments on renewable energy, the UK aims to be meeting 15% of its final energy demand through renewable sources by 2020, and biomass will play a key role as part of the ‘energy mix’. The importance and role of biomass has now been described in a number of policy documents by successive governments including the *UK Biomass Strategy* (DEFRA et al., 2007), *Making Scotland a Leader in Green Energy* (Scottish Government 2008), *UK Low Carbon Transition Plan* (HM-Government, 2009a), *UK Renewable Energy Strategy* (HM-Government, 2009b), *The Coalition: Our Programme for Government* (HM-Government 2010), and the *UK Renewable Energy Roadmap* (DECC 2011). The biomass agenda is clearly framed by the climate change agenda. Woodfuel, along with other biomass, is considered capable of

delivering substantial 'greenhouse-gas' (GHG) emission reductions and provides significant opportunities for carbon sequestration / storage through improved and increased sustainable forest management. Biomass energy is particularly suited to the efficient production of heat (SDCS 2005; Biomass Task Force 2005) which accounts for a significant proportion of the UK's GHG emissions<sup>9</sup>. Further to climate change mitigation and adaptation, the establishment of a strong UK biomass energy sector within a sustainable forest management framework also has the potential to contribute to overall security of energy supply, better waste management, the alleviation of fuel poverty (social justice), economic development (locally and nationally), nature conservation, and the development of sustainable communities.

Biomass can be produced from forestry in a number of ways. Dedicated 'crops' can be grown, usually being harvested on rotations considerably shorter than those used in the production of timber. Short-rotation coppice using poplar or willow species has typical rotations of around 3 years once established, and short-rotation forestry operates on rotations of around 8-12 years. These dedicated SRC or SRF 'crops' are currently a relatively rare land-use in Britain. A more common source of wood biomass is the material 'thinnings' and 'arisings' from silvicultural and arboricultural management of established trees and forests. Such material is generally unsuitable for timber markets but can be chipped and used as a fuel, or for a variety of other purposes such as animal bedding.

Much of the primary research which informs the construction of the framework in the report was conducted in the context of woodfuel and the biomass energy sector. Discussion of the framework (Section 3) is consequently illustrated throughout by extracts of qualitative data from this research.



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<sup>9</sup> For example, domestic heating accounts for 13% of the UK's GHG emissions (HM Government 2009a).

## 2. Scope, Approach and Methods

### Scope - Private land-managers

This report focuses primarily on personal private land-managers: that is, private individuals with the power to make land-management decisions. Substantial areas of land are managed by private corporations or other institutions but this category of manager is not the focus here. Having said this, drawing boundaries around land-management stakeholders is problematic. For example, estate managers and land agents are key land-management individuals but can also have prominent corporate identities. Managers such as this *are* included in the analysis, however it is critical to be aware of the diversity of interests and objectives amongst these groups. For example, clear differences have been identified between 'estate' managers and farmers (e.g. Johnson and Nicholls, 1991).

Although this research centres on forestry and forest management, the focus is on **land-managers**. This is because not only does much of the policy focus and desired behaviour change lie 'beyond the forest', but it is critical to acknowledge the numerous stakeholders who can make land-management decisions. Increasing sustainable forest management (SFM) and the supply of biomass for energy requires not only behaviour change in relation to the management of existing forests and woodlands, but also the creation of woodland on unforested land. These objectives demand engagement with managers of land *per se*, rather than a sole focus on engaging managers of woodlands and forests. Furthermore, often assumptions are made about the centrality of owners in land-management decision-making, predicated mainly on their legal status: their rights and responsibilities. Clearly **owners are key actors**. However, such assumptions can unduly simplify the situation in which not only do tenure conditions and use rights commonly impinge on the decision-making power of owners, but also multiple stakeholders can often exercise power. These stakeholders can include friends, family, tenants, agents, professional advisors, contractors, neighbours, government officials and researchers, amongst others. Often the influence of powerful stakeholders can cross ownership boundaries, rendering these boundaries largely irrelevant. For example, land agents are commonly delegated decision-making responsibilities for woodlands across multiple client ownerships. Significant questions have also been asked about the nature of 'ownership', its history and, consequently, ethical issues around who should make decisions about land and benefit from its ownership (Shoard, 1997 [1987]) (Cahill, 2002).

Whilst use of the term 'land-manager' implies, to some extent, an individual or single decision-maker, the framework described in this report seeks to allow flexibility in who this might be and to recognise the complexity of the decision-making arena in which

they exist. The need for holistic analyses of this type, that take multiple inter-related factors into account, has been recognised for some time (Amacher et al. 2004; Conway et al. 2003).

The behaviour of personal private forest owners, often referred to in the North American literature as 'non-industrial private forest' (NIPF) owners, has been the subject of many studies in rural economics and sociology (Amacher et al., 2003, Amacher et al., 2004). This area of research reaches back at least sixty years to the post-war era in the United States where concerns focused almost exclusively on timber supply (Egan, 1997). The UK Forestry Commission has itself had a long-standing interest in this area of work (e.g. Nicholls, 1969). However, as (Kluender, 2000: 158) noted, whilst questions about the behaviour of forest owners have been asked and answered for a long time, ownership and its context is constantly changing and therefore 'education, outreach, and procurement strategies need to be brought into the 21<sup>st</sup> century to be compatible with landowner's ownership objectives'. In the 1970s researchers began to investigate the diverse goals of these owners, and their characteristics. This constituted, in Andrew Egan's (1997:192-3) words;

an awakening to private landowners as individuals with diverse personalities, backgrounds, and forest stewardship objectives - objectives that may reflect the broad forest resource needs and preferences of society more accurately than the forestry community and government bureaucracies have done.

This resulted in a fundamental shift in how these owners have been conceptualised, with a move during the 1980s away from viewing them as **profit** maximisers to **utility** maximisers (Amacher et al., 2004, Binkley, 1981, Boyd, 1984, Conway et al., 2003). This change enabled researchers to revisit concepts and ways of thinking about forest owner behaviour, such as broadening the notion of 'investment' to include both financial and physical labour elements. (Romm et al., 1987: 199) for example, defined investment as 'any expenditure of time or money' in a wide range of forest management activities, and this continues to inform research (Joshi and Arano, 2009).

The behaviour of this group of owners and managers has been considered more difficult to predict than others (across private, public and third sectors) due to the ways in which they engage with markets and forest economics broadly. Non-timber products and services are generally considered to be a greater priority for personal private owners than others, and the time frames within which they make their decisions are also commonly different. Therefore they do not necessarily respond to economic factors such as price in the same way as industrial owners do (Amacher et al., 2004: 242).

Much of the literature on land-managers and their behaviour seeks to identify observable characteristics (often demographic) associated with particular decisions, actions or

management objectives. Modelling (Arano et al., 2004, Crabtree, 1998, Hugosson and Ingemarson, 2004) and typological (Ingemarson et al., 2006, van Herzele and van Gossum, 2008; McMorran, 2008; Urquhart, 2009) analyses are perhaps the most developed of these approaches. Data are collected relating to, for example, owner or manager age, employment status, education, income, land area managed, location of residence, etc. Whilst these studies are of considerable use they commonly focus (necessarily, see Jackson, 2005) on limited sets of characteristics and variables. Consequently the complexity of behaviour can be missed. This report expands analysis to include less tangible phenomena that are not necessarily easily observable, including, for example, cultural norms, market perceptions and beliefs about industrial capacity.

## Methods

The Framework presented in this report is a synthesis of primary and secondary research conducted as part of a number of projects focused on woodfuel production (wood biomass for energy) and wildlife management. Data collection methods have included semi-structured interviews, focus-groups, stakeholder workshops, and survey. Research participants have included woodland managers, farmers, land agents, forestry and woodfuel business owners, government officials and representatives of various non-governmental organisations. In total woodfuel focussed research has featured detailed data collection from approximately 100 land-managers in a variety of settings and locations. Data have been analysed via various processes and techniques appropriate for the method used. Further details can be found in a number of separate sources in which some aspects of the data have already been reported (Dandy, 2009, Dandy, 2011b, Irvine, 2010; McKay et al., 2011; Robinson, 2011).

## Objectives and Structure

The objective behind adopting a broad framework approach to influences on decision-making is that it facilitates both building a **more comprehensive picture** of land-management encompassing the contexts in which land-managers find themselves and **recognition of the complexity** of decision-making. Instead of attempting to quantify and model certain elements of land-manager behaviour, this report provides a general framework within which to understand it. This analysis should facilitate the identification of new types of intervention and pathways of engagement for those, especially within public bodies such as the FC, seeking to promote sustainable land-management. It will also cast light on the limits of existing engagement. This should assist in the allocation of future resources. A secondary objective is the identification of knowledge gaps where further work is needed gathering existing experience or conducting research.

The next section (3) describes the framework in which influences are divided between four broad general categories. Each sub-section within these describes a set of

influences focusing on (i) the ways in which the factors are thought or perceived to influence decisions, and (ii) the evidence that the factors actually have an effect. Where appropriate primary research data and/or literature is used to illustrate the influences and assess their effect(s). Although the Framework draws on lessons and understandings gained across a number of projects, the primary data used throughout this document are previously unpublished data from interviews and focus-groups conducted with land-managers in relation to woodfuel. The majority of the primary research was conducted in England.

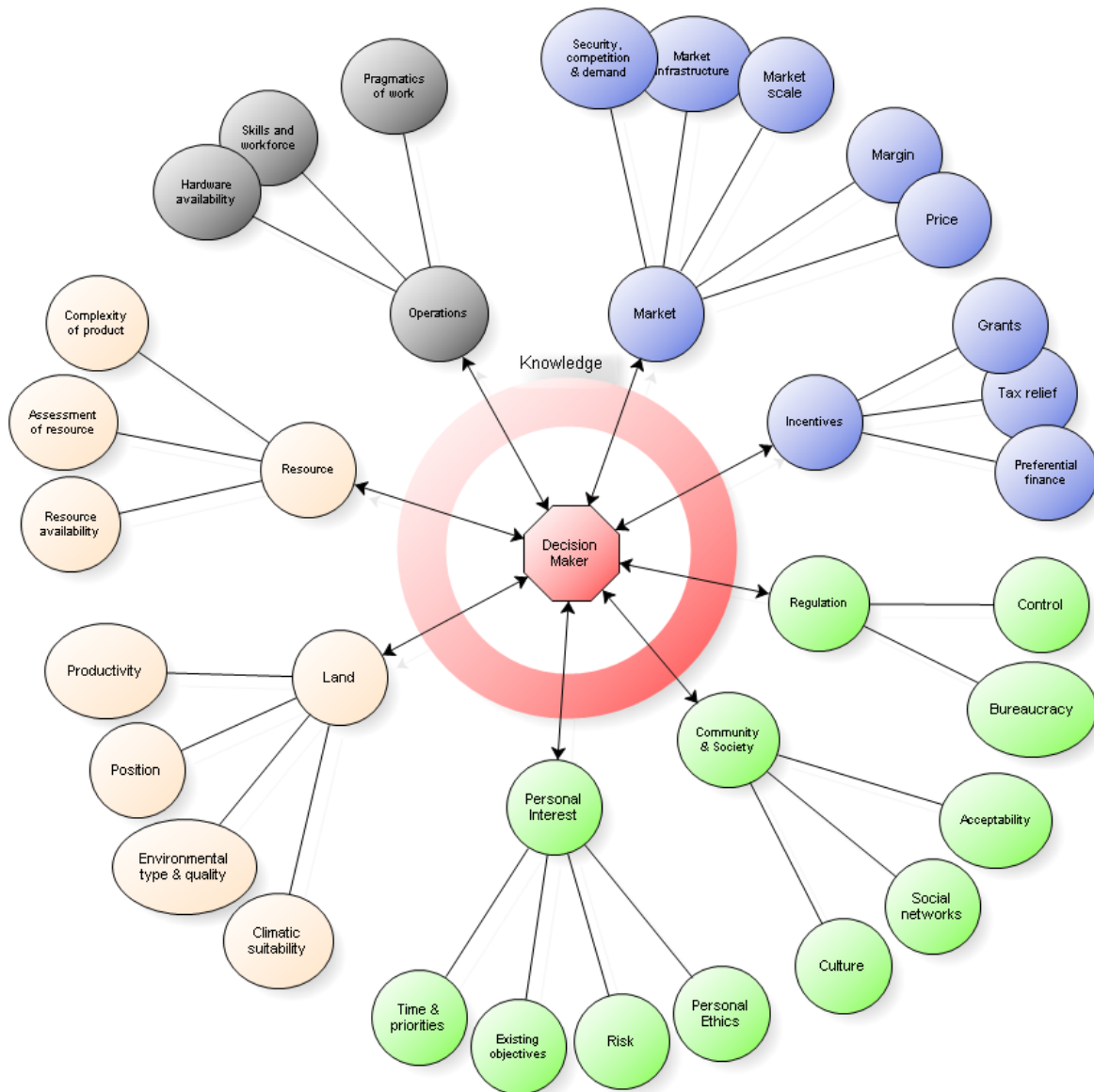
Section 4 highlights some of the key findings of the framework research and places it in a broader context. Links are made between the Framework and some underutilised theoretical work. Finally, the concluding section (5) provides a summary of the work and highlights some of the most important implications for FC practice.



### 3. Influences on land-manager decision-making

Research suggests a considerable number and breadth of influences on land-manager decision-making, and these are depicted below. The following section provides detail (illustrated in Figure 5 below) relating to each of these and is organised into four sections reflecting broad categories of influence: Economic (blue); Social (green); Physical – Environmental (yellow); Operational (grey).

#### The Framework



**Figure 5 – Framework of Influences on Private Land-manager Decision-making**

This framework places ‘private’ land-management decision makers (such as landowners, farmers, agents, and community representatives) in the midst of a very wide range of influences (arranged around the outside of Figure 5, previous page). It is important to acknowledge that the mix of influences will vary between decisions. Specific influences will be more strong in some instances than in others, and will be relatively more or less strong than other influences. Therefore, any one decision will be an outcome of a particular set of influences. Weighing the relative strength of influences was beyond the scope of this research, and further work is required to investigate whether patterns exist in the occurrence of influences, and their relative strengths, in relation to certain types of decision or land-management problem.

Whilst a ‘decision maker’ is at the centre of this framework it is again important to note that this is not intended to imply that decisions are simply single psychological events undertaken by individuals. Indeed, this framework seeks explicitly to facilitate the inclusion of many other stakeholders within the decision-making process – for example, friends, family and peers within ‘social networks’ and ‘culture’.

## Advice, Land-Manager Knowledge & Decision-Making

‘Knowledge’, or ‘awareness’, is commonly cited as an influence on land-management decisions. For example, it is often stated that a lack of knowledge forms a barrier to making appropriate, ‘informed’, decisions. It is then assumed that this deficiency can be remedied through the provision of information that enables the decision-maker to make the right or best decision. This rational choice theory based ‘knowledge deficit’ model of behaviour and decision-making has, however, been widely rejected (Burgess et al., 1998; Kollmuss and Agyeman, 2002; Darnton, 2008: 10-11) with the identification of the so-called ‘value-action gap’ (Blake, 1999). The primary problems with this model lie in its assumptions of unbridled rationality, ‘perfect knowledge’, and homogenous responses to information.

One assumption made in nearly all empirical work is that markets are “perfect” in terms of the information available to landowners. For example, it is implicitly assumed that landowners have the same information as timber buyers regarding prices for harvesting, and they know with certainty the market desirability of their land. However, new evidence suggests that landowners may not have perfect information. (Amacher et al., 2004: 249)

Further to this, knowledge is frequently conceptualised (and modelled) as a discrete factor and/or in relation to one (or a limited set of) phenomena. For example, in forestry, ‘knowledge of silvicultural practices’ or ‘awareness of incentives’ is often linked to management behaviour.



The primary and secondary research presented in this report indicates land-manager 'knowledge' clearly *is* an important factor in decision-making. However, this 'knowledge' is relational (that is, it can relate to any or all of the various influences identified in the framework), and contextual (for example, knowledge of farming culture will be greater amongst farmers than other land-managers) depending upon the individual land-manager involved. It is therefore not simple to assess or quantify an individual land-manager's 'level of knowledge' relevant to a decision as that individual may possess very good knowledge relating to some influences but very poor knowledge relating to others. Given the variable influence of incentives on land-managers, for example, 'knowledge of grants' will have variable, not fixed, influence across different decision-makers and decisions. The extent to which a land-manager is 'aware' of particular land-management cultures will also be of variable importance. *Vice versa*, an individual's land-management culture will impact on which information is used, which knowledge is held and acknowledged, and which sources and forms of information are trusted.

Within this Framework, therefore, **'knowledge' is conceptualised as a feature of the relationships between individual land-managers and the influencing factors**. It surrounds the land-manager and acts as a filter or lens through which they 'view' or 'receive' the influencing factors.

At its most basic level, advice constitutes one form of knowledge transfer or exchange, and consequently within this Framework, is conceptualised as a feature of the knowledge relationships between land-managers and the influencing factors - not as a discrete factor in itself. Knowledge exchange is a strong dimension of social networks (see Section 3.4). The advice that land-managers receive (or don't receive) has been repeatedly shown to influence their decisions, objectives and outcomes (see Lawrence et al. 2010 for the forestry context). Munn and Rucker (1994) showed that forest owners with access to consultants tend to obtain higher prices for timber harvesting and Greene and Blatner (1986) showed a positive association between 'contact with a forester' and timber management. Hujula et al. (2007) illustrate that the character of the relationship between forest owner and professional advisor can be a crucial factor in decision-making, and that a number of different types of relationship can exist. Having said this, 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 investigated. This study did, however, identify a link between the existence of a formal written management plan and land-managers' harvesting and silvicultural decisions.

## Economic Factors

Economic factors are widely perceived as critical influences on land-management and associated decision-making - including in relation to forestry. For example, in her discussion of plantation forestry geographer Judith Tsouvalis describes 'money' as the

... one element of the formative context of scientific forestry that has perhaps determined its shape more than anything else. ... money played a determining role in the spatial location of plantation forests ... The role of money flows in the formative context of plantation forestry in Scotland cannot be overemphasized. (Tsouvalis, 2000: 71-2)

The strength and pervasiveness of this perception leads some to conclude that economic factors are the primary, or indeed *only*, set of factors which influence land-managers. Central to much of the perceived influence of economic factors are assumed calculations (often informal and / or implicit) of profit and loss made by land-managers. Koontz (2001: 53) notes, for example, that:

Perhaps the most well-developed theory of land use decision making comes from land and agricultural economics, which posits an individual decision maker comparing expected net benefits versus costs in light of risk preferences. ... Economic models to explain parcel sale prices and land use patterns, at the macro level, typically assume owners are motivated primarily by financial returns.

A number of assumptions lie behind this well established view. However, amongst the most important of these is that land-managers will act rationally. In essence, land-management behaviour is characterised as an outcome of the balance between costs and income (contingent on price and level incentive obtained), and the adoption of economically beneficial behaviour is inevitable as it is sensible and rational.

The prevalence of these assumptions may at least in part be due to the fact that much research investigating private land-manager decision-making has focused specifically on decisions relating to economic production, e.g. timber harvesting and agriculture. However, research is increasingly illustrating the boundaries and limitations of the influence of economic factors - especially as motivators of behaviour *change* - and an exclusive analytic focus on economics and money can preclude analysis and understanding of other important, often dominant, influences. Indeed it is widely reported in the forestry literature that financial returns are, for the majority of private forest and woodland owners, of secondary or even tertiary importance behind other primary concerns such as principles of 'stewardship' and amenity provision (Argow, 1996). In his study in Indiana, (Koontz, 2001) recorded that *nonmonetary* benefit was

the motivation behind more than 80% of land-management activities. This led him to conclude that,

government programs that focus on financial returns are not likely to have as much impact as those emphasizing nonmonetary benefits such as aesthetics and recreation opportunities. (Koontz, 2001: 61)

Instead of a view of land-managers as rational profit-maximisers, research suggests that whilst profit maximisation *per se* is not necessarily the main priority, the *balance* between income and expenditure appears vital. British forestry now has a long-standing legacy of perceived low levels of income, as reported in both primary research and the literature. This leads many land-managers to assume that balancing income and expenditure is particularly difficult in forestry, and may continue to be so. Further to this, some research suggests that it is land-managers with multiple objectives which are the most active, and not those motivated purely by economic benefit (Karpinnen, 1998).

In this section we divide analysis of economic factors between the 'market' and 'incentives', although assumptions, especially those associated with margins, are common and important to both areas.

### 3.1 Market

The notion that market characteristics and conditions affect land-manager decision making is probably the most widely held set of assumptions in this area. Common immediate concerns focus on the **price** managers can get for their products, and the consequent profit **margin**. These factors, price and margin, are consistently related to **global markets**. Two other factors are considered to impact significantly on land-manager decisions: long-term **market security** (competition and demand) and **infrastructure**.

#### Price and Margin

The price at which a land-manager is able to sell their products is widely considered to be one of the most significant influences on their decision-making, for example, as one land-manager noted, *'I think it comes down to price. I think that's the single biggest factor.'* In essence, it is assumed that as the price of a product increases, land-managers are increasingly inclined to produce it.

*'What's needed is an increase in prices right across the board, hopefully at the narrow end of the market woodfuel will benefit, in order to encourage woodland owners to get involved, because most of them just shrug their shoulders and say 'what's the point'.'* (Land-manager, SE England)

In the forestry sector, long-standing analyses feature price as a core component of calculations about land value, optimal rotations and harvesting decisions. Recent work, such as Conway et al. (2003), shows harvest price to be correlated positively both to decisions to harvest and, interestingly, to participate in non-timber activities. (Argow, 1996) identifies timber price as one of the three most important 'incentives' that affect forest manager's decisions, along with fair taxes and cost sharing. However, the direct influence of price on land-managers decisions varies. Price acceptability, for example, can vary substantially in relation to a number of factors, such as individual debt payment obligations (Fina et al., 2001) and the accrual of non-monetary benefits.

*'When I go out and work in the woods I'm not paying the subscription to a gym and I'm going to exercise myself so I don't have to cost it in to the product price and that's an important influence for me.'* (Land-manager, SE England)

Price also clearly varies with the complexity of the product supplied - dried, chipped wood can obtain a higher price than freshly cut logs or standing timber, although both utilise the same basic resource - and indeed decisions about the precise nature of the final product can be influenced by price.

*'We just put the work out to tender, so it [the final product] will depend on the successful tenderer and what market he's sourced. We don't specify that this wood must go to an energy end use. In essence its price driven'* (Land-manager, East Midlands)

Price is more meaningfully understood in relation to the land-manager's incurred costs, i.e. as an economic margin. Achieving a balance between income and expenditure appears to be central to many private land-manager's decisions about forestry. Rather than profit maximisation driving decisions as is commonly assumed, it is more frequent that potential economic loss holds managers back from making decisions (Cater 1994).

*'We are not expecting to make a lot of money out of timber. We are hoping to make a little bit, and certainly not make a loss'* (Land-manager, SE England)

That potential losses are a greater influence on behaviour than potential gains is one of the central insights of behavioural economics (as recognised within the MINDSPACE approach, Dolan et al 2010). This distinction is important for two reasons. First it means that even small positive margins may be able to contribute to positive decisions to manage land. Second it shifts the issue and debate away from an exclusive focus on the mechanics of economics and price towards including risk perception. Pervasive perceptions of forestry as 'uneconomic' play a critical role in the creation of perceived risk in the sector.

*'For years and years and years, forestry per se has been uneconomic, with a few notable exceptions. But on the whole uneconomic' (Land-manager, SE England)*

Furthermore, small margins can be viewed as vulnerable, especially to changing conditions. This is commonly made explicit in relation to the impact of administration of margins (see Section 3.3). Similarly the economic gains obtained through accessing grants are often considered so small as to be neutralised by the costs of bureaucracy involved.

### **Market Scale, Infrastructure and Security**

Land-manager's decisions are affected by the various ways in which they perceive and come into contact with wider markets (regional, national and global). These markets set the economic conditions in which all land-managers operate, and the opportunities for their forestry and forest products are assessed relative to opportunities for other products. Markets feature prominently in land-manager's descriptions of decision-making. At a fundamental level, opportunities for one land-manager to supply a product are relative to the wider economy's capacity to supply that same product at a lower cost.

*'One of the problems small woodland owners have is that they can't compete ... they can make charcoal, but they can't sell it for as low a rate as you can buy it from your rainforests and that kind of thing. People would do more, and they would sell more local timber, but you can't sell your labour for 20p an hour. It's just not going to work.'* (Land-manager, SE England)

*'...it's also thinking about the sustainability of the product you have got as well. I mean if you have got say 10 acres of woodland how often is that going to be able to produce wood year on year. What sort of tonnage is he going to get out of that 10 acres of woodland?'*

*'Not enough for a big contractor.'*

*'Absolutely not...'* (Land-managers, SE England)

Therefore, if a land-manager believes they are unable to compete or fit in the market place and will make a loss they are unlikely to choose to produce that particular product. However, land-managers are well aware of the competition not only between different suppliers of the same product, but of the competition between different products within the same sector. For example, the demand for biomass for energy is widely perceived as dependent upon the availability and supply of other forms of energy - especially gas.

When making decisions, particularly about whether to adopt a new land use, managers are concerned about the competitiveness of and demand for a product over time and

hence about the medium and long-term security and viability of its market. Managers are reluctant to invest resources in a sector that may have only limited long-term security. The presence or absence of local markets and infrastructure can be particularly important in relation to land-managers' decisions. These can provide a route through which land-managers can engage a sector, and in areas or regions with a perceived lack of infrastructure land-managers can feel disconnected.

*'There is enormous disconnect. There is not a marketplace so there is no woodland management, and because there is no woodland management there is not a marketplace.'* (Land-manager, SE England)

Examples of these local factors relevant to forestry include saw mills and other forestry business, neighbouring managed economic forests (public or private), and local authorities committed to using renewable energy. A substantial local or regional resource base can also feature strongly in land-manager's descriptions of decision-making as another important element of this infrastructure (Box 1).

#### **Box 1. Land Manager Comments on Markets and Management Behaviour.**

*'If there's a decent woodchip market around this will all be fine, it would bring it right the way back into management.'*

*'... it's not just this thing about growing this stuff, there's finding the demand and having that constant demand in there and the full end to end supply chain. To me round here that's what's missing at the moment.'*

*'woodfuel ... is going to make it economic to actually get rid of stuff which has been virtually unsalable for 10 years.'*

## **3.2 Incentives**

Understanding the role that economic incentives (e.g. grants, cost-shares, preferential finance schemes, tax relief, or payment schemes) can play in affecting land-management decisions has been, and is still, one of the most important requirements for public bodies with the power to offer them. Numerous studies have attempted to clarify and isolate their impacts, and test their 'effectiveness' against their objectives (e.g. Brockett and Gebhard 1999; Kluender et al. 1999; Church and Ravenscroft 2008). A variety of incentives are offered across the land-management sector, including forestry,

and represent substantial public investments in the management of private, public and 'third' sector lands. The use of incentives is especially well suited to situations where a land-management activity produces benefits (often public benefits) which have no or low direct market value. Such is the case with many of the cultural and environmental ecosystem services produced by trees, woods and forests. In such situations, public agents seek to facilitate the provision of public benefit(s) through providing incentives. The variety of incentives that are available leads to concerns, amongst both land-managers and public officials, about potential competition and conflict between them. Sometimes complex rules and regulations govern which incentives can be received alongside others, and land-managers often seek advice about which incentives offer the best return.

There are at least three ways in which economic incentives might influence land-manager's decisions and behaviour. These are closely related and sometimes overlapping. The first view sees grants and other incentives as important in crossing economic thresholds. The second view conceptualises financial incentives as 'compensation' for land-managers who have lost income through not practising more profitable land-uses. Thirdly, a view held primarily by land-managers themselves, sees economic incentives as important for managing risk and uncertainty.

Where the objective has been to increase the supply of products, economic incentives have been used to manipulate the market conditions which affect the price at which those products can be sold. This can be achieved in one of two ways. First, 'up-front' grants or cost-share schemes can reduce the costs of production (Kluender et al. 1999: 813), effectively enabling sellers to accept lower prices for a product. In these cases, under normal market conditions the economic costs of an activity outweigh the price received and thus income generated by it, but an incentive can positively rebalance this by off-setting costs. Second, incentives can be used to increase or stimulate demand for a product, with the objective of raising prices obtained for supplying it. In these cases the higher prices should create a market in which existing producers can recover incurred costs, and in which non-producers are encouraged to produce (i.e. change behaviour). In both of these instances, the key process influencing behaviour is that price thresholds (or 'tipping points') are reached where 'uneconomic' activities become 'economic' and behaviour change occurs (products are supplied). This view seems widely held within the professional forestry and timber sector, and is conceived around traditional supply and demand models. Critical reviews of this conceptualisation have, however, deemed it 'very simplistic' (Kluender et al. 1999). One significant problem intrinsic to grant aid structured in this way has been the development of so-called 'grant farming', where, because grant aid forms a regular income stream, it becomes the focus of economic and management activity, rather than a driver of it.

Economic incentives have also been used to compensate land-managers for lost income: that is, income that would have been generated if more a profitable land-use had been followed. This approach has particularly been applied to address over-production problems in agriculture, e.g. CAP 'set-aside' policy. Research in the forestry sector has, however, indicated that some managers are only likely to relinquish control of their land in return for unrealistically high levels of compensation. Stevens et al. (2002: 181) noted, for example, that the compensation level required by private owners to participate in forest management programmes was 'essentially the same as buying the land from the owner'.

A third view of economic incentives, identified repeatedly during the interviews with land-managers conducted for this research, sees them as a way of coping with risk and uncertainty - sometimes through facilitating innovative land-management (Box 2). Incentives do not eliminate risk, but can, for example, help land-managers convince other stakeholders (such as landlords or finance officers / advisors) that risks are manageable.

Economic incentives can take several forms, as noted above, and each of these may engage with and influence various stakeholders in different ways. However, knowledge of this is weak. It is very difficult to unpick the various effects of economic incentives *per se* let alone the effects of the different *types* of incentive. This is due to a number of factors including the general complexity of decision-making (i.e. the number and variety of influences), the fact that incentive packages never occur as discrete phenomena (they are always accompanied by administration and communication as a minimum, and more often than not, by active promotion and advice giving), and the tendency within the literature to aggregate knowledge about their effectiveness to a generic level (especially in conclusions, see for example Klosowski et al., 2001). At the core of this tendency to aggregate conclusions is the assumption that all incentives are commensurate with each other; an assumption which itself flows from the conceptualisation of decision-makers primarily (often exclusively) as economically motivated individuals to whom one pound always equates to another pound. This ignores the possibility that different land-managers might engage with different incentives in different ways - perhaps because of, for example, the associated conditions and/or existing relationships with, or experiences of, the incentive-giver.



### Box 2. Land Manager Comments on Incentives and Risk Management.

*'Like anything there was a risk, there's risk in converting to biomass, there's risk in producing it and that financial element helped to reduce the risk of some of the work we're doing.'*

*'The number of people that are moving into anaerobic digestion in the space of the last 6, 8, 10 months is unbelievable and ... its the financial support, the long-term financial support mechanism [RHI] that's championed that change. ... bigger arable farmers, probably a bit more financially savvy and secure, are looking at it as a way of smoothing out the ups and downs of cereal production. ... a really big outfit ... are putting in three large anaerobic digesters that will take maize and they're going to put maize into their rotation to help them manage black-grass [*Alopecurus myosuroides*]. So instead of continuous wheats with the odd oil seed rape, the idea is to use maize as a break crop and give them a really clean seed bed. ... The RHI makes a business case.'*

A few studies have attempted to assess the *form* of incentive preferred by land-managers. These have rarely provided clear-cut conclusions, however, there is some evidence to support aggregating incentives together for analysis. For example, in their study of forest owners in Massachusetts, Stevens et al (2002: 182) found that forest owners 'expressed no preference for cost-sharing (i.e. partial reimbursement) over tax benefits or direct payment' as a way to gain reward for participating in a forestry stewardship programme. Rather, it was the *level* of economic incentive that influenced decisions to participate although 'the probability of participation was **not** overly sensitive to changes in level of economic incentive' (Stevens et al. 2002: 180, emphasis added).

A recent review focused on the UK (Lawrence et al 2010) concluded that, overall, evidence indicates that incentives have specific but limited impacts of land-management decisions. This conclusion is reinforced by the wider literature. For example, (Klosowski et al., 2001: 37) concludes that 'the probability that landowners would actually adopt programs of the type examined in this study is very small, even when sizable incentives are offered.'. (English, 1997: 5) state that their modelling suggests 'that attitudes, experience and knowledge of forestry programmes may outweigh monetary incentives (50, 65 and 75% cost-share) in the [forest management programme] participation decision.'. Over a long period, evidence has repeatedly shown that economic incentives alone are unlikely to **change** land-manager behaviour (e.g. Neumann et al 2007; Kluender et al. 1999; Amacher et al., 2004) and do not often lead to **additionality** of

production (also see discussion of grants below). In their 1975 overview of government interventions in private forestry in the United States, (Skok and Gregersen, 1975:204) concluded:

There is particularly little scholarly evidence to back up the assumption that direct public subsidy programs can effectively and efficiently induce increased or *additional* wood production from such lands. The key word is "additional." The fundamental rule for evaluating benefits from any program or project is to look at the situation with and without the program or project. Only the difference between the two can legitimately be considered benefits attributable to the program. That is, we need to know the extent to which individuals would have carried out the practice without the subsidy. (emphasis in original)

Kluender et al. (1999) more recently conclude:

it is obvious that incentive users would probably engage in tree growing and commercial forestry, whether incentives were present or not. ... [Therefore] The subsidization of a few individuals who will invest in forestry regardless of assistance constitutes a reward for doing what would have been done anyway (Kluender et al. 1999: 813 & 817).

Much of this research has, however, interrogated the relationship between land-managers, incentives and timber production. Recent work in the UK has expanded this to consider the facilitation of public access through incentivisation (Church and Ravenscroft, 2008; Bateman et al., 1996), but reaching broadly similar conclusions. Research has also illustrated that some land-management stakeholders, such as land agents, have a strong vested interest in mobilising grants and other incentives as they can form a significant proportion of their income.

## **Grants**

Grants are the most commonly used form of economic incentive in the land-management sector in Europe, and represent very substantial investments of public funds. The use, format and amount of grants are strongly regulated (increasingly so in recent years), and they most regularly take the form of partial re-imburements for capital costs incurred - such as for equipment, installation of hardware, or tree-planting. The level of re-imburement is most frequently around 30-40%, although variation with geography and priority is substantial and some grants can be for as much as 80% of costs. Grants appear to be viewed in the same way as other economic incentives (discussed above), that is as useful for crossing economic thresholds, forming compensation, and addressing risk. In the UK, forestry grants were introduced in 1921

to assist the replanting of woodlands after their depletion through World War 1<sup>10</sup>. Since this time they have been focused primarily on 'productive' forestry (i.e. woodlands suitable for timber production) although this was expanded to encourage public access and recreation in the early 1970s, under the third phase of the 'Dedication' scheme (Tsouvalis, 2000: 72-3), and secure other public benefits such as nature conservation. Low 'uptake' of grants has been a consistent concern in the forestry sector (Johnson and Nicholls, 1991; Kluender et al. 1999).

The difficulties of isolating the impacts (and 'effectiveness') of incentives have been noted above and clearly the same problems relate to grants. However these questions are still often asked, particularly in grant scheme evaluations. Lawrence et al 2010 reviewed relevant research in the UK and concluded that, although the evidence is limited it suggests that grants do not have substantial direct impacts in terms of *changes* to land-manager attitudes or behaviours (see Bliss and Martin, 1990; Burton and Wilson, 2000), nor generating *additional* production (see Bliss and Martin, 1990; Church and Ravenscroft, 2008; Johnson and Nicholls, 1991; Watkins, 1984). Cater 1994 offers a number of cogent conclusions from their study of grants, which are a useful summary of the research more widely. She notes that whilst grants are regarded as valuable by some for helping cover costs, they are often viewed as restrictive, bureaucratic, overly complex and too small to have a significant impact. However, this author also notes the wider 'effects' of grant schemes which highlights various aspects of their added value.

Grants are often the key to raising owner awareness, a trigger encouraging owners - through publicity - to seek further information and undertake management. They may be of secondary importance to the owner's motivation but they encourage the owner to think about action and contact a woodland adviser or grant-giving body. ... Grants, however, can affect the owner's attitude and activity both on conceptual and practical levels. With a grant incentive, owners can be encouraged to expand or adjust their plans to include appropriate management. Grants ... are an enabling mechanism which can facilitate activity under the right circumstances. (Cater, 1994: 132 & 133)

Lawrence et al. (2010: 44-47) identify four key dimensions to how grants are perceived by land-managers (i.e. actual and potential applicants). These were (i) bureaucracy and administration, (ii) economic adequacy, (iii) control and property rights, and (iv) restrictiveness and flexibility. These categories echo those identified by (Johnson and Nicholls, 1991: 52) nearly 20 years earlier.

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<sup>10</sup> At a rate of '£2 per acre for conifers and £4 per acre for hardwoods.' (Nicholls 1969: 41)

## Taxation

Tax concessions and relief, is another form of incentive that has been widely applied to land-management, and forestry in particular, with significant impacts. In his early survey of private forestry, (Nicholls, 1969: 53) noted that 'tax concessions applicable to forestry undoubtedly comprise one of the greatest incentives for the pursuit of a positive forest policy.' and, more recently, Tsouvalis (2000:75) asserted that tax concessions 'constituted the primary moving force in Scottish afforestation' in the Twentieth century. Tax relief can facilitate the early amortisation of costs incurred undertaking land-management. In some circumstances it can also provide a route through which to avoid tax payment. Historically the UK tax system relating to forestry and woodlands was widely exploited by the forestry sector with the result that considerable areas, particularly in the Scottish uplands, were afforested (see Tsouvalis 2000: 75-77; Shoard 1997 [1987]: 165-169, Tompkins 1989). However, it is important to note that these tax concessions drove afforestation by *particular* types of people on *particular* types of land: that is, investors who had made money (by whatever means) who wished to reduce the tax burden on that money (Shoard, 1997 [1987]: 168). These investors (often corporations) were not necessarily existing land-managers, nor did they necessarily have any interest in land or forestry *per se*. Rather the new forests were simply 'living tax sinks' (Tsouvalis, 2000: 77). Consequently, the lessons about the relationship between incentives and afforestation drawn from studies of this period cannot be transferred across to land-manager decision-making in a straight-forward manner.

Having noted the above, some studies have concluded that tax incentives have, similarly to grants, been too small to affect behaviour and that they do not create additional forestry investments (Brockett and Gebhard, 1999; Amacher et al., 2004).

## Social Factors

### 3.3 Regulation

Regulation, that is the formal aspects of governance, establishes many of the 'rules' which set the boundaries of land-manager's decision-making, and is a key area of interest for the forestry sector (e.g. FRTF 2011) and others. They influence land-managers primarily by constraining the range of options from which they get to choose. There is considerable regulation of land-use, which creates wide-ranging and sometimes complex 'rules'. Areas of regulation which the literature and primary research show have an affect on land-manager decisions include forestry, planning, agriculture, heritage and nature conservation, environmental pollution, health and safety, competition, and conditions attached to grants and other financial incentives. Land tenure, specifically the

distribution of rights to use or benefit from the various elements of land, is another strong 'regulatory' influence on management decisions.

Land-managers are perpetually engaged with regulation, and often expend considerable time and effort negotiating a route through it. Once an individual has become familiar with the suite of regulation pertaining to their particular land-management activities and circumstances, this engagement becomes more efficient and easy. Knowledge increases of the particular practices which are acceptable, application forms become recognisable, and contacts are established with (usually local) regulatory officials from whom advice can be sought. This familiarity is one of the strongest factors driving land-manager engagement with professional advisors and agents. Purchasing advice and support from these is, in essence, an efficient way of gaining familiarity with the regulatory system.

A critical factor here is that the regulatory system can have a particularly strong impact upon decisions to **change** land-management. Ongoing regulatory commitments or structures may be a constraint on options for change, and increased engagement with regulation may lead to subsequent loss of control over decisions. Furthermore, where a land-manager has established a good level of familiarity with a particular suite of regulation, changing land use can often hold the fear of having to learn and negotiate a new suite - with the associated need to expend time and effort. In some ways therefore, the influence of the regulatory system can be to reinforce decisions **not** to change. These issues can be summarised in terms of 'control' and 'bureaucracy'.

## Control

Existing obligations and/or constraints flowing from regulation can have a substantial impact upon the control that managers have over their land, and are therefore amongst the most significant factors affecting their decisions. There are numerous examples of this. One particularly prevalent set of obligations relates to designated areas and other contractual agreements relating to nature conservation. For example, in describing why new tree planting had not gone ahead on their land, one manager noted that the

*'Land was tied up in countryside stewardship scheme ... we had obligations to the countryside stewardship scheme, we signed a legally binding agreement, that's where our hands were tied.'* (Land-manager, West Midlands)

Regulation designating landscapes, parks, and gardens as of aesthetic and/or historical value also limits the control that managers have over decisions about land. Examples of this include constraints on the land uses possible within historic parklands (such as those managed by the National Trust) and listed landscapes; as one land-manager noted during a focus-group:

*'One of the difficulties I have is because it's a Grade II\* listed landscape. ... I may want to extract all of these sycamores out of there, but then I have a tree preservation officer who comes along and says "no you can't do that because this is part of the ancient landscape".'* (Land-manager, SE England)

Much of this regulation constitutes part of the planning process which, by controlling development more generally, can also have a range of indirect impacts on land-management. For example, concerns over landscape aesthetics has led National Park Authorities to block development of renewable energy facilities such as biomass installations. This can have the effect of frustrating the evolution of local biomass markets and infrastructures which would likely drive land use change.

Existing tenure arrangements, including the relationships between various rights holders, are another important factor limiting the control of individual land-management decision-makers. A considerable (although diminishing) proportion of land in Britain is farmed by tenant farmers, and, although farm tenancy conditions such as lease duration are changing over time, in these situations *changes in land-management* can be complex, often requiring the agreement of more than one stakeholder: tenant and owner. Further to this, the utilisation of existing resources can be prevented by tenure arrangements. For example, a tenant farmer may not be able to conduct management to generate woodfuel from woodland on their farm, even if they use it for livestock grazing or shelter, because the timber rights are retained by the landowner. *Vice-versa*, landowners are often limited in the control they have to change land use on 'their' land, such as woodland creation, where a tenant does not want it to occur.

An especially prominent issue for land-managers is the perceived loss of control likely to follow from land use changes which entail increased or different regulation. In our primary research, this was particularly commonly expressed as a key issue in relation to forestry, woodland creation, and receipt of forestry grants: due to two main regulatory factors. The first of these is the felling licence regime which comes into effect as forests grow and mature - specifically when trees reach certain sizes. Once certain size thresholds are reached permission is required, in the form of a licence from the Forestry Commission, to carry out any work to the trees. Restocking, that is replanting of felled trees, is usually a condition of granting a licence, tying the land to forestry as a land use in a cycle of fell and restock and preventing a return to agriculture or other subsequent change. The loss of control over their land resulting from this perceived 'one-way track' towards forestry can be a major barrier to land-managers deciding to adopt forestry. When forestry is an unfamiliar land use to the manager, this loss of control can be compounded by perceptions of risk, and an inability to respond to it.

A second regulatory factor commonly associated with a loss of control is the common requirement woodlands in receipt of grant monies to be open for public access. Many

studies in the UK and beyond identify this as an important issue (Sime et al. 1993; Urquhart, 2006; Church and Ravenscroft, 2008; Potter-Witter, 2005).

In a few instances a third regulatory factor was associated with a perceived loss of control over management decisions - the registration of land with government agencies. In order to apply for grant monies, the ownership and location of land must be declared and registered (in the UK this registration is with the Rural Land Registry, administered by the Rural Payments Agency). For those land-managers who are particularly concerned about governmental bureaucracy this in itself can be seen as a barrier to engagement.

It is important to note, however, that this perceived loss of control is not always a barrier to land use change as some land-managers are happy to accept it if it fits with their future objectives or they consider the new land use to be the best option. For example, the following two land-managers were well-aware of the issue but were still prepared to adopt forestry as a land use.

*'We had to acknowledge that it would remain in woodland, for ever, but we were basically at the time prepared to give it up as agricultural land.'* (Land-manager, East of England)

*'We knew that it would probably not come back out of being woodland ... but we accepted that for that piece of ground it was as good a use as anything.'* (Land-manager, West Midlands)

Literature confirms this widely held concern regarding loss of control (Brunson et al. 1996) - particularly as a barrier to engagement with government agencies and programmes. For example, (Dedrick et al., 2000) reported loss of control as the most frequent reason given for not enrolling in the Forest Bank™ programme in Virginia, (Stevens et al., 2002) illustrated that losing control of timber rights dramatically reduced landowner's enrolment in a government management programme, and in the UK (Sime et al. 1993) reported that landowners perceived that accepting grant money and allowing public access would result in a loss of control of their woods and were thus dissuaded from doing so. Unease about loss of control has been linked to property rights and concerns about privacy (Urquhart, 2006; Rickenbach et al. 1998). Creighton and Baumgartner (2005) found that loss of management control was an important concern that family forest owners had in relation to regulations.

## **Bureaucracy**

Land-manager's perceptions of regulatory bureaucracy can deter them from making decisions to adopt land uses which they feel either will bring them into contact with more

or different regulation, or which they believe to be in some way vulnerable to regulation. Perhaps the clearest example of this is the widespread perception of grant schemes as bureaucratic (see Lawrence et al., 2010 : 44). As one land-manager noted succinctly during a focus-group discussion *'my experience of grants is that the hassle of getting them, particularly on a small scale, just doesn't make it worthwhile'*. This reference to scale reveals a widely perceived 'economy of scale' relating to engagement with grant administration processes and systems, that is a trade-off between the resources needed to engage with administration and the income generated by this. Land-managers who are familiar with the grant regulations and application processes, and whom have areas of land large enough to generate significant income (grant incomes are most often set by land area) are able to engage effectively with grant processes. Owners of smaller land areas, such as small woods, who are not familiar with application processes, are often not able to dedicate enough resources (time, effort, and/or money) to access grants. As one land-manager summarised:

*'My difficulty is finding what's available, what's available for what. The inability for me to see the type of templates that people have used before in writing business plans or proposals and things like that. ... I'm starting off, it's difficult for me to, first of all know what's available ... and [justify] the amount of time I'm investing into just looking for grants. ... it would be easier if there was some way of getting access to this information, some kind of support system ... without having to pay.'* (Land-manager, SE England)

The tendency to transform the bureaucracy associated with regulation into an economic cost extends beyond grant processes. This cost is commonly set against the limited and/or fixed income that it is possible to generate from the land, and thus clearly related to economic margins. For example:

*'... in simple terms that's cost, because that's your time, or somebody's time, to sort that regulation and bureaucracy out. Time costs. All the time these barriers are stacking up against an 'immoveable' - which is the market value of your firewood - and as your costs increase, be that regulation or whatever else, then that's offsetting what you were hoping to get as a return.'* (Land-manager, SE England)

*'If you have got a marginal business, we are talking about low priced products, any increased regulation can actually knock it out ... More health and safety makes it more difficult to get people to work in the woods, it's more expensive and very quickly ... your margin's gone.'* (Land-manager, SE England)

However, in their comparison of Massachusetts and Connecticut, Kittredge et al. (1999) found no evidence to support this traditional forestry sector assumption, and concluded



that regulation does not adversely affect price or profit for private land-managers. Further to this, Johnson et al. (1997) found the potential legislation was not a factor in forest owner decisions to harvest or not.

### 3.4 Community and Society

Land-managers live and work within wider communities and societies which impact upon their decision-making in a variety of ways. They are members of a variety of professional and personal groups and networks including professional bodies and unions, charitable organisations, local community groups, friends, and families. The plethora of formal and informal relationships affects their decisions in three primary ways. First, the values of individual land-managers are often strongly affected by prevailing land-management 'cultures'. Second, both the general social context and their specific social ties act to constrain the decisions of land-managers by setting boundaries around what is perceived as acceptable action by society beyond their particular profession. Third, their social networks can be significant sources of ideas and innovations, and advice.

#### **Culture**

Individuals make their decisions within the context of over-arching 'cultures' of land-management. In this sense, 'culture' refers to those values, traditions and practices commonly shared by practitioners (and other stakeholders such as families, see social networks below) within particular sub-categories of land-management, such as farming and forestry. Farming and agrarian culture has been the subject of considerable study with farmers often emphasising, for example, the importance of productivity (see also Section 3.6), tidiness, food, and annual crop cycles. Dunn et al. (2000: 22) conclude that:

'There can be no doubt that the values, norms and beliefs associated with farming differentiate farm life from other lifestyles. They also provide the tools with which farmers make, or do not make, choices about adoption of farm practices.'

Numerous examples of this occurred during primary research, such as farmers stating "We have a pressure to farm, if you like. To produce food." and "We're farmers. We produce food - poultry, arable, fruit!". Emery (2010) adds 'hard work' and 'improvement', amongst other things, to the list of values within farming culture.

Certain values are also prevalent amongst woodland owners and foresters. Recently, a pro-management ethos has begun to emerge and be recognised, as one land-manager concisely summarised.

*'There's a lot of pressure not to just leave your wood unmanaged isn't there, at least in the sort of circles that we are all moving in. ... I feel it. You're constantly reading articles about management.'* (Land-manager, SE England)

Traditions are particularly deep-seated aspects of culture. They reinforce and perpetuate beliefs about what is 'best practice', having developed over many years of experience and often having been passed between generations. Inter-generational influences are strong in farming culture and families with parents and children sometimes being referred to as 'ghost generations'. Farmers inherit from parents and are generally committed to pass on to children and so to an extent their influences are drawn from one 'ghost generation' in the past and another in the future - but not from the present. Many studies illustrate impact of culture on land-management choices and decisions (e.g. Vanclay 1992) but, in general, it is apparent that land-managers are more likely to adopt land-uses and make decisions which 'fit' within the culture of their peers, family and friends.

### **Acceptability**

Profoundly linked to aspects of culture, land-managers' decisions are constrained by social boundaries around what are perceived as acceptable actions and these are set, to a large extent, by society and specific social ties. Some of the clearest examples of this can be seen in wildlife management with broadly held social norms ruling out, for example, the use of indiscriminate and unnecessarily cruel methods by the vast majority of land-managers. Boundaries of acceptability in relation to land-management focus on changes to landscapes, the location of infrastructure, use of appropriate crop and tree species and, especially, the felling of trees (particularly when they are large or old). Opposition to tree-felling is widely perceived by land-managers to be widespread, severe, and usually linked to a lack of knowledge of the needs of woodland management, as these extracts illustrate.

*'It's unbelievable how ignorant a lot of people are because as soon as you say you're going to start chopping down trees and burning the woods, at [place name] they would put their hands up in horror and say 'how can you cut down the forest.'* (Land-manager, SE England)

*'If we started cutting down all of our woodlands surely the general public is then going to jump up and down and say, you know, "how dare you".'* (Land-manager, SE England)

*'If we went in and we said we were going to cut down that wood, the uproar that you would get from the local inhabitants, where so-and-so has walked his dog for*

*50 years and picked mushrooms and there has been this fungus growing on that tree and this and that, would go through the roof!* (Land-manager, SE England)

*'The more of us that manage them [woodlands] the more it becomes normal, and it will become less evil to cut down a tree ... the more of us who do manage, the better it will be.'* (Land-manager, SE England)

These extracts are all drawn from primary research conducted in the South-east of England and it is important to consider the geographical distribution of this perspective. It is difficult to ascertain exactly how widely held views opposing tree-felling are, however the 2009 Public Opinion of Forestry<sup>11</sup> survey reports that only one-sixth of respondents (17%) agreed with the statement "*Trees should not be felled in any circumstances, even if they are replaced*". This was substantially fewer than the same survey recorded in 2007 in which about one-quarter of respondents (26%) agreed with the statement. There may be some spatial variation in these views, as these surveys show differences between 'rural' and 'urban' respondents, with greater agreement exhibited by respondents located in 'urban'. Although methodological problems limit the ability to draw particularly meaningful conclusions from this<sup>12</sup>, qualitative evidence from primary research to some extent corroborates this dichotomy. For example,

*'When I'm working in [name, rural] wood or somewhere I get more compliments than criticism ... from all the walkers who come every day, they love it ... "lovely to see the woods worked". All positive. To be honest most of them were even complimenting us on how many squirrels we had managed to kill as well ... The other part, when we start a chainsaw up anywhere around [place name, urban] to do a contract or anything else it's just endless, you just get endless, mindless criticism on email.'* (Land-manager, SE England)

Land-managers are also aware of the potential for opposition to changes to the landscape. This may be relevant to decisions about species use (e.g. fast-growing / tall; 'exotic' or unusual appearance) or positioning of new infrastructure (e.g. biomass boiler chimney; wind turbine; access roads). Biomass production has the potential to impact on landscapes in a number of ways - from affecting individual micro-landscapes / woodland 'places' through changed silvicultural practices to whole landscapes by establishment of medium and large-scale energy forest 'plantations' using species such as eucalyptus (see Dandy, 2010).

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<sup>11</sup> <http://www.forestry.gov.uk/forestry/INFD-5ZYL9W>

<sup>12</sup> It is, for example, impossible to know from these surveys the sorts of trees respondents are conceptualising when answering the question. Respondents in 'urban' locations may focus on individual street or park trees of high value in their local neighbourhood which they may legitimately consider irreplaceable, rather than a tree in a plantation forest. Furthermore, a respondent in an 'urban' location may well have strong connections to 'rural' places, and *vice-versa* for respondents in 'rural' locations.

Land-management decisions are not only *constrained* by the boundaries of acceptability but can also be *promoted* by them. For example, one land-manager noted that as fossil fuel use has become less acceptable to society, demands for alternative energy sources have increased. This lends legitimacy to land-management for biomass production.

## Social Networks

Land-managers are often 'members' of a large number and diversity of social networks, both formal (e.g. membership of organisations) and informal (e.g. friends and families). These social networks, and their constituent relationships, can have a profound effect on decision-making in particular through being routes via which ideas, innovations and culture reach land-managers. Our research repeatedly highlights the importance of externally generated ideas and cultural norms for land-management change. Networks are also routes through which managers can access knowledge and advice with which to assess various options and activities. Informal professional relationships, generated by repeated working together and/or locality, can have a particularly important impact on land-management decisions (Hujala et al. 2007). For example, the following are typical examples of responses when asked where ideas for woodland creation originated,

*'We we're approached by the FC [Forestry Commission] who have an office, a research centre, in the village ... they rang us and said we're looking to run a trial have you got a suitable site?' (Land-manager, West Midlands)*

*'... it came to us from Head Office, an email from [name]. He has contacts in the Forestry Commission, and somebody had said is this something [the organisation] would be interested in?' (Land-manager, East of England)*

Another land-manager highlighted the role of professional membership organisations when he noted the genesis of woodland creation ideas on his farm, stating 'I *read about it somewhere. Most likely through the CLA [Country Landowners and Business Association]*'. Professional land management agents and businesses can also be a source of ideas.

Investigation of the impact of social networks on land management has strongly featured in the literature (see for example, Schraml, 2003; Rickenbach, 2009). Praestholm et al. (2006), for example, suggests that one explanation for low awareness of agri-environmental incentive schemes amongst certain sections of the farming community may be because of their lack of membership of traditional information networks. Personal social networks can also be an important source of innovation for land-managers, especially families. A substantial literature exists around the impact of families on farming decision-making in the UK (Gasson et al., 1988; Potter and Lobley, 1992; Potter and Lobley, 1996a; Potter and Lobley, 1996b; Munton and Marsden, 1991;

Whatmore, 1991) and US (e.g. Salamon, 1992; Salamon et al. 1997). This literature strongly highlights that farming decisions are made in the 'context of family relations' (see also Koontz, 2001). Cater highlights how important family interest can be in relation to forms of land-management which are not primary areas of interest for the primary decision-maker.

Of the farm woodlands, it is important that within the household it is often another member of the family - a wife or son - who triggers an interest in woodland management rather than the full-time farmer. (Cater, 1994: 131)

Having said this, other literature posits that strong inter-generational familial connections can act as a barrier to innovation. Neumann et al (2007) and Raedeke et al (2003) looked at the relationship between farming and forestry and both found that planting trees on farmland was strongly resisted by those farmers with a commitment to family. They conclude that these land-managers see planting trees 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).

Social networks are also an important route for land-managers to gather knowledge and access advice about various land-management options. Many engage with research and educational organisations in order to generate scientific information about current or potential future management. For example,

*'From [name] University, we have students looking at the biodiversity grassland associations .... they are producing some very useful information, picking up species we didn't even know were there!' (Land-manager, East Midlands)*

*'We're currently working with [institute name] ... we're doing trials to see if a change in the management of the hedge could actually produce more biomass.'* (Land-manager, East of England)

As Praestholm et al. (2006) suggests, a lack of good social networks or relationships can, in contrast, form a barrier to decision-making because of the lack of ideas, knowledge and/or advice. This is considered especially the case where land-managers cannot draw on professional networks to access understanding of the market. For example, when asked why he didn't work with other woodland owners, one land manager identified a lack of local social networks.

*'I don't know my neighbours, I see them, wave at them now and again but we don't know each other because we are spread out by fields, you know we are separated. The reality of rural life today is that there is no such thing as a rural community anymore.'* (Land-manager, SE England)

Rickenbach et al. (2006) illustrate the importance of social networks (organisation membership specifically) for forest management and cross-boundary (landscape scale) co-operation.

### 3.5 Personal Interests & Values

Land-managers' established personal and professional interests are perhaps the strongest influence upon their decisions, and they can manifest themselves in a number of ways. First, land-managers have a set of existing objectives which they are trying to achieve through their land-use. Decisions about adopting land-uses which contribute to achieving these objectives are both more likely and easier for the manager (due to familiarity with risks and less associated complexity). Second, existing interests set the priorities for land-managers and the time and resources allocated to considering other things. Third, land-managers are more likely to be familiar with the risks involved in land-uses relating to their existing interests. And finally, land-managers are likely to have some personal level of interest in certain land uses, developed over time and perhaps reinforced by training and education, which enables them to develop personal (i.e. non-professional) connections to the land around them. Although these connections are often to well-established primary land-uses, occasionally they can be with less prominent land-uses and in this way can sometimes provide opportunities for land-use change.

#### **Existing objectives**

That existing objectives impact upon decision-making is perhaps one of the easiest and most obvious conclusions to draw from an analysis of land-managers; yet it's importance is often underestimated. Land-manager's explanations of how they made a decision very often feature prominent descriptions of their existing objectives, in some detail. In our biomass research, the vast majority of land-managers who decided to join a 'producer group', install a boiler, apply for a grant, or engage in an energy crop growth trial had an existing interest in biomass or renewable energy prior to taking the action. The general point here is that managers are unlikely to decide to adopt specific land-uses or management practices which do not contribute to the achievement of their existing objectives. However, it is crucial to move beyond this general point and recognise the importance of the content (details) of a land-manager's objectives and the ways in which this relates to specific land-uses. A common focus of the literature is analysis of 'economic' and 'non-economic' objectives, and their relationships to land-use and management decisions. For example, are land-managers who want to 'make money' from their land more likely to harvest crops or timber? However, conceptualising land-managers at that general level misses the importance to the land-manager of the ways in which the money is made: that is a more specific preference linked to their objectives.

Furthermore, land-managers often have multiple objectives which they attach to various parcels of their land.

Linkages between land-managers' existing objectives and their management decisions have been a consistent and prominent dimension of the literature. (Kluender, 2000), for example, note the fundamental point that land-uses are most likely to be adopted if they can deliver on existing objectives. Survey research repeatedly shows that managers usually have multiple objectives, even if one emerges as perhaps the primary motivation amongst these. Existing objectives can have very specific and strong impacts on land-management choices. (Conway et al, 2003) for example, links harvest decisions to interest in deer hunting, and Kluender et al. (1999: 818) state:

for many individuals the ends of forest management are aesthetic experiences, pristine air and water, and a Camelot where insistent telephones are controlled. For them, pressure to harvest trees is anathema. For these individuals, cost-share and tax incentives will never provide a lever long enough to pry loose standing timber.

It is important to note, however, that apparently contrasting management objectives are not necessarily mutually exclusive. Kluender et al. (1999) again note that even those land-managers most focused on making money from their forests were still interested in conserving their resources through sound forest management. Stevens et al. (2002: 171) note that existing objectives influence decisions to engage with public incentives and programmes.

... for many landowners, particularly in southern New England, timber harvest is not a desirable management objective. Yet, most management programs require at least some timber harvest.

A knowledge of the content of land-managers' objectives facilitates innovation in relation to finding synergies between them and future land-management options, and understanding how best to communicate these.

## **Time and Priorities**

A land-manager's established interests also affect their decision-making through setting their priorities and consequently the amount of time and resources they can invest in exploring other land-uses. When a land-manager has little or no time to investigate or consider the pros or cons of a particular land-use, particularly how it may help them achieve their objectives, its costs and risks, they are unlikely to adopt it. Furthermore, when a particular land-use is a low priority a land-manager may lack basic related knowledge about the land or resource they manage, such as the extent or type of resource they have.

*'I think it comes down to one thing that a landowner will have a huge amount of things on their plate ... just they don't have the entrepreneurial energy for doing anything with the woodland. ... 'No one knows how much woodland they've got, and the reason they don't know how much woodland they've got is because this is right the way down the list of priorities.'* (Land-manager, SE England)

## **Risk**

Risk has been discussed throughout the preceding sections of this report (see for example Box 2) and it enters the decision-making of land-managers in a number of ways, particularly when deciding on new management. In general land-managers seek to minimise risk in their decisions about land-use, although it is not an absolute barrier. Risk is intrinsic when investing financial resources in new equipment or practices, in being open to criticism from others for conducting unacceptable or different practices, and when selecting appropriate species which may be vulnerable to local environmental conditions. The established interests of a land-manager can impact upon how they view risk generally and in relation to specific land-uses. Land-use that is familiar to an individual may hold less of a perceived risk than something new and unfamiliar.

*'...it's an industry, at my end, that's quite slow to change and they're not particularly quick to grasp innovation. The more they see it and the more they get exposed to it, the more confident they feel.'* (Land-manager, East of England)

Otherwise, a land-manager may draw on the known established interests of their personal or professional network contacts to help them understand the risks involved in adapting certain land-uses. In our primary research, managers identified the problem of getting out of their 'comfort zone'; that is the areas of business and land-management that they know about. Innovative business arrangements, such as selling heat, are particularly vulnerable to this. Attitudes to and perceptions of risk vary between individuals and this may be a significant factor in individual decision-making.

## **Personal Ethics**

In addition to the constraints on decision-making put in place by 'community and society', individual land-managers also have sets of personal values and ethics which affect their decisions. These can relate to environmental concerns, appropriate treatment of land and animals, just relationships between people - and can be very closely related to the cultural norms and values in which the land-manager finds themselves (see Section 3.4)



*'The one thing that we have all got in common as we are gathered here is that we care about woodland and, you know, it's on our radar. It's part of all of the influence of our personal values and beliefs.'* (Land-manager, SE England)

Lighthall (1995) links farmers' adoption of low-chemical cultivation techniques with their levels of environmental consciousness. Emery (2010) describes the importance of core personal values relating to, for example, 'hard work' and 'improvement' for farmers. Salamon et al. (1997) argue that personal attitudes about the relationship between humans and land are key to farming decisions. However, the precise relationship between personal values and land-management decisions is dynamic and variable. Some analysis of land-managers' values suggests no correlation between them and long term management objectives (Karpinnen, 1998).

## Physical - Environmental Factors

### 3.6 Land

Land-managers often possess considerable knowledge about the land that they manage, what it is capable of, where it is and what affects it. These factors have a very significant impact on the decisions made about what use particular parcels are put to. A number of land characteristics are important to managers but concerns about productivity, location, climate and environmental quality seem especially important.

One of the variables most commonly linked with land-management decisions is land area (or 'size'). Such attempted correlations are based on economic rationale relating to economies of scale and market infrastructure. Conway et al. (2003) for example, links timber harvest likelihood to 'tract size'.

landowners with larger tracts were more likely to harvest. In highly parcelized areas, access to any given forest stand is reduced, and harvesting may require additional costly contracts between the logger and other adjoining landowners. Moreover, the benefits to the logger, with fixed costs, to harvesting smaller areas may also reduce the likelihood of a landowner finding a bidder for the forest stand. (Conway et al, 2003: 197)

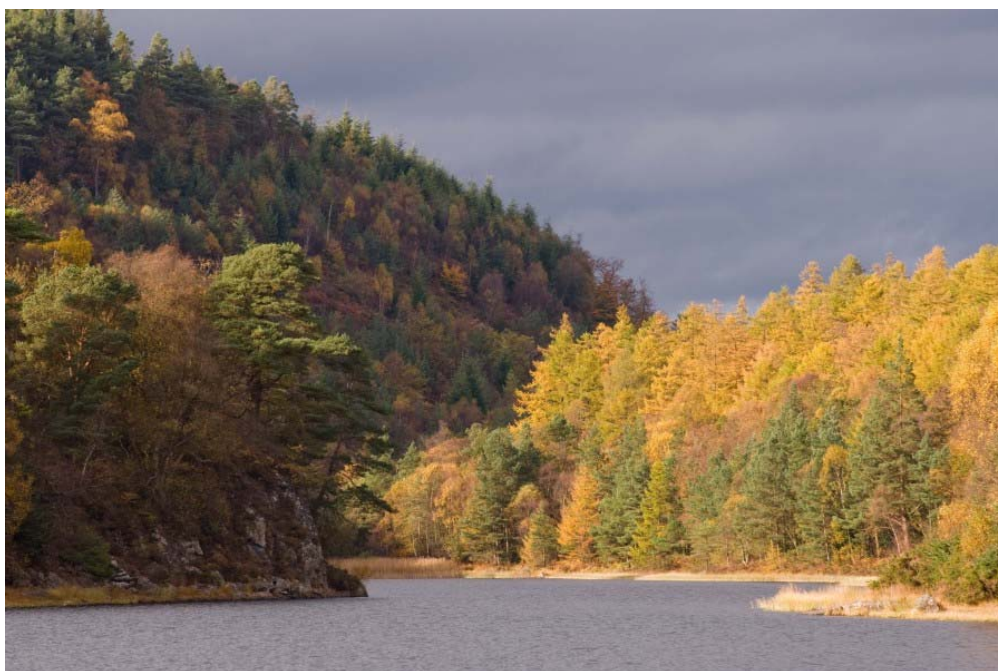
Other timber focused studies to make this link include Greene and Blatner (1986) ('woodland size') and Joshi and Arano (2009) ('ownership size'). Our primary research echoes this and we report this both in Section 3.1 above ('Market Scale, Infrastructure and Security') in relation to economics and in Section 3.7 below ('Resource Availability') in relation to perceived resource yields.

## Productivity

Land-managers are acutely aware of the productive capacity of land, and ‘productivity’ and ‘condition’ are very prominent and explicit elements of their decisions about particular parcels of land. Productivity is most frequently communicated in economic terms (see Box 3:1), but there is clearly a more fundamental commitment to production per se which is part of a wider land-management culture (see Section 3.4 and Box 3: 2). This is particularly well illustrated by one land-manager who made explicit reference to the fact that productivity and economic gain were not necessarily the same thing (Box 3, 3). Having said this, it is apparent that other stakeholders which affect the decisions of land-managers can have contrasting definitions of productivity (Box 3: 4 & 5), some of which clearly relate to environmental quality (see below).

Notions of the productivity of specific parcels of land clearly feature in land-managers’ explanations of land-use change relating to forestry. This was particularly in terms of allocating areas perceived as unproductive (Box 3: 6 & 7), although vice versa other land-managers indicated that a reluctance to allocate land they deemed productive as a reason for not changing to forestry.

The importance of productivity to land-managers, and its relationship to cultures of land-management, is echoed in findings from the forest management literature. For example, Rodriguez-Vicente and Marey-Perez (2009: 489) identify ‘the particular characteristic of “a moral responsibility” of looking after the land or using it for productive purposes’ as an important part of NIPF owners’ responses to timber markets, and Kluender and Walkingstick (2000: 157) state ‘Many landowners not primarily concerned with producing timber are concerned about sustaining forest health and productivity of their forest land for other important forest outputs’.



### Box 3. Comments on Productivity and Land Management Decisions

1. *'why would anyone want their wood to be productive? well because they're going to get a return from that. I don't understand why else...'*
2. *'it's not as though I want to grow firewood or I want to grow fence posts or I want to grow anything else it's the woodland actually being productive.'*
3. *'That land is producing nothing ... I'm getting paid [countryside stewardship] ... for that land to sit there not producing anything.'*
4. *'I'd seen it as a bit of unproductive land ..... it wasn't achieving anything, but they saw it very differently ... they took the view that management had created valuable habitat for ground-nesting birds'*
5. *'the landlord particularly likes shooting partridge and anything he feels will diminish the capacity for the land to hold English grey partridge is not deemed as a good thing ... my landlord certainly accused me of devaluing his land by putting trees on it.'*
6. *'they rang us and said we're looking to run a trial, have you got a suitable site? I immediately thought "there's a bit of land that's doing nothing".'*
7. *'when we were approached by the Forestry Commission we identified a couple of fields that weren't doing anything, and we thought that it was a wonderful opportunity to have a new harvestable tree crop planted.'*

### Position

The position (location and juxtaposition) of specific parcels of land is a key factor influencing a land-manager's decision about what use it is put to. Some aspects of this are institutionalised / formalised in official guidance and policy (e.g. grants). To a certain extent the position of a land parcel has economic implications through the effect on accessibility. Examples of this include blocks of woodland located away from roads or other woodlands which can have increased costs of biomass extraction. However, there are also social dimensions to this. Land-managers can be hesitant to allocate land close to neighbours or otherwise visible for new, different or visually striking crops or land-

uses. Such practices are more commonly located on land either screened visually, or remote from neighbours and or other stakeholders (such as walkers). In giving reasons for choosing particular sites for forestry trials, two land-managers stated:

*'In a way it was an ideal site as no-one was affected by it.'* (Land-manager, East of England)

*'Currently it is openly visible to a relatively small number of people.'* (Land-manager, SW England)

Land-managers may also be prevented from adopting certain land-uses on a particular parcel of land because of its location. In particular, planning regulations, such as those relating to listed landscapes, parks and gardens, constrains the adoption of land-uses out of character with a particular area.

### **Climatic suitability**

Climatic suitability is becoming an increasingly important consideration for land-managers, in two principal ways, both closely linked to perceptions of risk. First, land-managers can be sceptical of the suitability of the UK's climate for growing 'exotic' crops (such as *Miscanthus* or *Eucalyptus*) and/or adopting new cropping processes (such as specific rotations). For example:

*'It was just whether it was worth taking the risk with Eucalyptus. The unknown issue was climatic. Will it actually survive?'* (Land-manager, East Midlands)

Second, increasing awareness and understanding of climate change and its potential impacts on the UK's climate and weather is leading land managers to question the viability of some established land-uses and species/ crop selections, and rethink how Britain's land can / should meet future challenges in the event of changes in supply from elsewhere in the world.

### **Environmental quality and type**

The perceived value of land to the environment is another factor which influences land-managers decisions. Most frequently this is referred to in terms of 'nature conservation' or 'biodiversity' and is primarily seen as a restriction on land-use options and decisions. That is, where the environmental quality of an area of land is high, fewer options are available and *vice versa*.

*'... in terms of nature conservation it was not really an issue as it was reclaimed land that had been intensively grazed so the nature conservation value of the site, biodiversity, was small, low.'* (Land-manager, East Midlands)

Although this factor is perhaps only rarely considered more significant than land productivity or position, in general managers seek to avoid reducing environmental quality and pressure to recognise it as a factor can often also come from other stakeholders (see Box 3, 4). The Environmental quality of land may not always be apparent or recognised and it seems that some traditional practices (sometimes reinforced by regulation) such as grass cutting and scrub clearance act to limit its perception.

*'The single payment rules said you had to cut your scrub after 5 years, but after 3 or 4 years we thought, "oh my god there's butterflies everywhere, birds everywhere!" ... when it started reverting we realised there was quite a lot of biodiversity happening ... so what was quite interesting for us was seeing that process'.* (Land-manager, SE England)

Literature also supports the inclusion of environmental quality as an influence on land-management decisions, although how it affects different managers seems contested and unclear. Uliczka (2003), for example found that forest companies paid particular attention to environmental issues, more so than NIPF managers, perhaps because of Forestry Stewardship Council requirements, whilst Eckerberg (1988) suggested that these companies pay least regard to these issues because of the levels of mechanisation.

## 3.7 Resource

### Resource availability

A number of factors relating to the availability of the resource under their control influence the decisions made by land-managers. Where a land-manager considers there to be little or no resource available, decisions to engage in management are deterred. In particular, the resource that is available from a particular parcel of land is thought to be affected by factors such as land area, scale, physical accessibility (e.g. slope, soil), position in relation to other land-uses (i.e. fragmentation) and its composition (e.g. species, age, and quality).

In the private sector, land-management units are often small. The perception that an individual manager's unit (parcel of land) is too small to yield a resource of any significant amount is one of the most commonly expressed barriers both to management and wider engagement with the sector.

*'as a private person ... I feel that I would never as a small landowner engage with a big company ... because I would be at the wrong scale.'* (Land-manager, SE England)

A closely related influence is the location of the land in the landscape. Where land-managers see their land as part of an interconnected wider landscape in which certain land-uses are prominent they appear more likely to adopt those practices. However, relatively few land-managers see this landscape scale view, and to do so requires certain knowledge, dealing with complexities, and having linkages to other stakeholders. The more prominent viewpoint is of a fragmented landscape (especially in relation to woodlands) and limited linkages to other woodland stakeholders. This deters management activity.

*'We do have a forest resource, but we have a lot of fragmented isolated farm woodlands so you don't get the economies of scale that you would do if you were in an even-age plantation, harvesting an even aged crop ... we've got a lot of uneven-aged mixed woodland. So it is just complicated!'* (Land-manager, SE England)

## **Complexity of product**

The complexity of the products of woodland management influences the decisions of land-managers in a number of ways - and is closely linked to assessments of the resource. Products are numerous, not discrete, inter-related with other land-management products, and often in need of contextualisation (e.g. placing wood within a sustainable forest management context in order to understand it as a renewable source of energy). Stem wood ('saw logs' and 'roundwood'), branch wood, roots, bark, and brash ('lop and top') can each be processed in different ways (or left unprocessed) for different uses and markets. Each different product and end use can have different and complex intended outcomes, such as in terms of carbon management or greenhouse gas emissions (Mortimer et al., 2011). Products from a single act of woodland management can include high-quality timber, firewood logs, fencing posts, woodchip (for fuel or other use such as animal bedding) and brash bales (for fuel). Consequently none of these products is discrete from the others, and cannot form an individual basis for management objectives (although some may be a dominant priority). Knowledge is necessarily required of various markets here. Furthermore, as market prices vary, the proportions of the resource which are best allocated to the different markets also varies. For example, as the price for firewood increases and competes with timber price, more product that might have previously gone to a timber market can be allocated to firewood. Not only is this relatively complex and dynamic, but it also challenges some deep-seated cultural dimensions of the forestry profession - such as that wood of a

certain quality *should* be used for timber (see Section 3.4). Product value also varies considerably with the amount of processing it undergoes. Standing wood, wood at roadside, chipped wood, and dried wood or chip can each attract different prices. Land-managers are faced with decisions about how much processing to undertake.

Land-managers are, therefore, faced with considerable complexity in relation to wood products. Decisions are consequently influenced by differing levels of knowledge relating to the various products and being able to see clear markets. Conceptualising a certain product demands that the land-manager has a particular set of knowledge and can require them to act, think and plan in a certain way. This requires an investment of resources - time and effort - which some are not willing or able to make.

*'There are so many different products that you can get from the woodland. The woodchip is an element of that ... people can't be bothered to look at the different markets.'* (Land-manager, SE England)

Land-management products are also complicated by their inter-relations and, often, the need to place them in a certain context in order for them to become viable products. Biomass production for energy again provides clear examples of how this happens. Biomass energy products and use must compete economically and culturally with other forms of energy provision - both renewable and fossil fuel alternatives. Further to this, using land for biomass must compete in the same ways with using land for the production of other goods and services - most obviously food. Biomass also needs to be placed within a sustainable management context in order to be understood as renewable.

*'[the] 'fuel to radiator journey'. So we want people to be able to see the trees growing, to see timber drying, to see chipped wood, to see wood burning, to see hot radiators, and to have that whole journey on one rotation.'* (Land-manager, Northern England)

This adds another layer of complexity to the decision-making process - which many other forms of renewable energy do not have to deal with. Whilst awareness of this may be good amongst land-managers themselves (although not necessarily all), they can be concerned about the lack of awareness amongst the public and potential renewable energy users. These factors introduce uncertainty into the decision-making process - in relation to market security and longevity of demand, along with minimising loss / maximising gain.

## Assessment of resource

The ways in which a land-manager assesses the quality and quantity of their resource, and the processes used to do this, can have a significant impact on their decisions. Linked closely to the complexity of woodland products (see above) is the capacity of managers to be able to assess the resource they have. Individual managers may draw on various and multiple sources of knowledge and/or skills - either their own or those of others. The choices made about the way in which they carry out their resource assessments can lead to a variety of outcomes which influence decisions differently.

A lack of familiarity with the land (through ownership change, absenteeism, or being low priority) can make appropriate resource assessment difficult. In relation to forestry in particular, changes in the structure and character of a wood (e.g. through long term lack of management) can lead to unfamiliarity.

## Operational Factors

### 3.8 Operations

A number of operational factors influence land-management decisions, such as those relating to the practicalities of conducting land-management and, crucially, using land-management products. Furthermore, the availability and capacity of the labour (skills and workforce) and hardware needed to do the work are key concerns. Where a particular practice is thought to be difficult or awkward to implement managers seem disinclined to choose it. Furthermore managers are deterred from choosing land-uses that result in products that users may consider unpopular, difficult or awkward. This is closely linked to concerns about market scale and security (see Section 3.1). Our research suggests this is especially the case in relation to woodfuel use, which land-managers perceive to be significantly less practical than gas for the majority of heat users.

### Practicalities of work

A very wide range of practical issues relating to work are raised by land-managers when considering their decisions.

*'...there's a number of barriers ... there's imaginary barriers that people have. "I don't want to do this". "This is too hard". "It's too much hassle". "There's too much work in this".'* (Land-manager, SE England)

These focus around worker health and safety, site access, transportation and/or storage of product, and processing. There is significant variation both in how these issues are



perceived by individual land-managers and how they relate to different land-use products and scale of production. For example, whilst health and safety is frequently cited as a significant practical barrier to employing people to work on the land, some land-managers view it positively.

*'... you do have to address health & safety at every stage ... you teach them how to hold an edge tool, you also teach them how not to get RSI, how to stand well when they're processing the wood. So health & safety goes right the way through everything ... it's all about good practice and enjoying your job. If you look after health & safety, you don't feel crocked in the evening when you've finished a day's work. It makes sense, you don't have to rush people to hospital. It makes perfect sense, it's not an onerous thing at all.'* (Land-manager, SE England)

The practical difficulties associated with processing and transporting products are particularly evident in relation to forestry - although clearly they are important for other land-uses also. Woodfuel production and sustainable forest management appear to be associated with numerous issues.

*'You've got to come and pick it up from the woodland, take it to the chipper, you've got to chip it, you've then got to store it as you can't always chip at the time, you've then got to unload it from the store, put it back into a trailer and take it ... If it was just a question of wood chipping from the wood straight to the place it would be brilliant, but it's not. Its storage, keeping stuff dry and a lot of bulk transport. It's an expensive business.'* (Land-manager, SE England)

In addition to these 'on-the-ground' problems, land-managers perceive practical difficulties associated with the use of products which can deter them from pursuing particular land-uses. Again, woodfuel production illustrates this well.

*'You're still going to have all these little people in the little houses who at the moment they've got a very easy way of getting their heat and all they do is done by direct debit for them once a month and they don't have to worry about it. It switches on - you don't have to do any work. They don't have to clean something out. I speak to my mum and ... I tell her that we've got one of these log burning stoves in the house and her immediate reaction is "Oh am I going to have to deal with that? It's all messy". ... she wants to be able to switch that switch and forget about it she wants the easiest route. You need the easiest route for people ... everybody in that chain needs it to be as easy as possible.'* (Land-manager, SE England)

Further concerns relating to the reliability of biomass boilers and their flexibility in terms of feedstock are particularly widespread. In general, land-managers appear to avoid

land-uses that they consider will raise significant or numerous practical barriers for them or for users of the products.

### **Skills, Workforce and Hardware**

Land-managers also consider labour availability and capacity, along with hardware needs, when making decisions. As in relation to practicalities above, these considerations also encompass the end-user or land-use products and the availability of a skilled and well-equipped workforce to service their needs. Concerns about labour are again wide ranging but commonly relate to low numbers of appropriately trained people, perceived laziness, or ineffective working models.

*'You have got a blockage which is the number of people that can work in the wood'* (Land-manager, SE England)

*'We do not have manual workers in this country ... Because people don't want to do it ... You cannot get one person to get up at 5 o'clock in the morning to go and work. No one wants to do it!'* (Land-manager, SE England)

*'I had a couple of hedges laid on my farm by a community, they laid about 2 metres in 7 days, it's a wonderful thing, I'm sure it did great things for the kids, but it didn't do anything for my hedges.'* (Land-manager, SE England)

*'Individual householders are not going to put in a [woodchip] system that is going to run their central heating because of the manpower that is needed to do it.'* (Land-manager, SE England)

Issues of scale and time often arise within land-manager discussions of labour needs. Some managers see a more immediate need for economically focused contractors with an appropriate scale of equipment, whilst others see labour issues within a longer timeframe (see Box 4).

Concerns about hardware are various but relate primarily to cost-effectiveness, availability, suitability and desirability of different types of machinery for working on specific sites, and site accessibility. In the forestry sector, there is a very widespread perception that woodlands of a small size are not appropriate for the hardware most usually used in standard forestry operations (e.g. harvester and forwarder). Instead there is a focus on hand-held and tractor-mounted machinery as appropriate, but the quality of this technology (and associated techniques) is seen as poor and driven by *ad-hoc* adaptation of existing hardware. Development of technology relevant to this scale is felt to be under-supported. These concerns appear to frequently act as a barrier to pro-management activities. It has been noted above (Section 3.8, 'Practicalities of work')

that land-managers are also conscious of hardware related problems for users of land-management products.

#### **Box. 4 Conversation between land-managers about skills needs**

'I think there are jobs even it's building a brash fence against deer. There are plenty of jobs in and around. I personally cut all my core wood up ... and pick it up and put it on a trailer and move it that way, I don't have the machinery. That works because it's physical, it's ok for me but I could also get other people to do it, I couldn't pay them but I could get them to do it for development.'

'I wonder if this hinges on what you mean by jobs, if the idea is to create a local woodland contractor base, maybe half a dozen young people with chainsaw certificates and a forwarder then you need to make it economic. But if you're relying on social rehabilitation type scheme with voluntary work, I think that's a completely different project.'

'But that's where the scheme leads to, so that they do have jobs in their local area, that's the whole idea – that you start them off with the germ of the idea that they are able to contribute to their own community.'



## 4. Discussion

This framework identifies approximately 25 different influences (see p. 15), or more precisely categories of influence, upon land-manager decision making. Some of these, such as incentives, the 'market', and resource characteristics, are familiar and have received considerable study and other thought. Others, such as land-management cultures, social networks, risk, and personal interest, are less obvious and little recognised and thus require further analysis. No attempt is made here to weigh the relative importance of the influences. This was not within the scope of the research and, more importantly, relative importance will vary considerably both between land-managers and 'internally' for each manager in relation to different parts of their land. Future work exploring this variation would be valuable. A decision-making model could, for example, be built around these categories of influence.

Land-managers' decisions are influenced by a wide range and high number of factors, which are often inter-related and can vary substantially over time and space. Decisions are made from within existing economic, environmental and social contexts. Individual land-managers and other stakeholders make decisions based on their knowledge, experience and understanding of these various contexts not only across a landscape at the single point in time of the decision, but also looking forwards and backwards in time. The existing objectives to which land-managers are committed have a very strong impact on how (and if) they view other options. Land-managers are not, therefore, 'blank canvasses' waiting passively to receive information to show them the 'best' way forward. They can more appropriately be considered as on land-management trajectories (as outlined in relation to family farms in the agricultural sector by Potter and Lobley (1996a)). These trajectories can give considerable momentum for continued land-management and thus generate much resistance to change.

Having said this, under certain conditions and at certain times land-managers may be less immersed in particular contexts, and therefore more open to influence than others. Potter and Lobley (1996a), for example, identify the importance of inheritance and succession as processes during which change is most likely to occur. Understanding these conditions, these opportunities for change, is critical to stimulating certain land-management decision-making. In addition to the work on agricultural management, the substantial literature on behaviour and behaviour change holds many insights into these opportunities (see Thompson et al. 2011). This analysis is, however, very substantially focused on individual lifestyles (such as changing health, consumption, energy-use or travel behaviours) and considerable work is required to translate it into the land-management field.

Valuable insights could be brought to land-management from several theories and models such as the theory of planned behaviour, health belief model, elaboration likelihood model, and diffusion of innovations model. The health belief model (HBM) is a long standing model seeking to explain health related behaviour focused on individual's perceived threat (susceptibility and seriousness), benefits, and barriers, along with cues to action and their self-efficacy (Hochbaum, 1958; Becker, 1974; Janz and Becker, 1984; Sharma and Romas, 2012). Nisbet and Gick (2008:297) summarise this model;

in order for behaviour to change, people must feel personally vulnerable to a health threat, view the possible consequences as severe, and see that taking action is likely to either prevent or reduce the risk at an acceptable cost with few barriers. In addition, a person must feel competent (have self-efficacy) to execute and maintain the new behaviour. Some trigger, either internal ... or external ..., is required to ensure actual behaviour ensues.

In a land-management context, it might therefore be theorised that behaviour may change in response to threats to existing practices, outcomes or objectives - threats such as climate change, flooding, energy shortage/insecurity, or pest/disease outbreak. If a land-manager perceived that a current practice or their livelihood was vulnerable to such a threat and it was likely to prevent them achieving their objective, the provision of practical and affordable alternative options (such as revised species/crop choice, new energy sources, or innovative pest control) may well trigger change. Competent implementation would still be required either by the manager themselves or an available workforce in order for change to actually occur. The HBM highlights the potential for problems or crises to become significant positive opportunities for change. However, it largely ignores the wider environmental, social and economic contexts in which decision makers exist. It does not, for example, encompass the influence of social norms.

In contrast, communication and social networks are central to the diffusion of innovations model (Rogers 2003). This theory of social change emphasises innovation itself rather than individual behaviour. In order to spread (i.e. become adopted as behaviour) an innovation must offer (i) 'relative advantage' over prior ideas, (ii) be compatible with existing values and practices, (iii) be simple to use/adopt, (iv) be testable (at a small 'trial' scale), and (v) have observable results and outcomes. This model identifies risk avoidance and trust as important dimensions of innovation adoption and thus places peer to peer communication at its core. Consequently the peer (social) networks are emphasised as critical routes of change. There are very strong echoes in this model of elements of the framework described in this report. Synergies with existing objectives, practicalities of implementation and use, the importance of social networks, and role of risk perception and management have all been identified as critical influences on land-management decisions. This model therefore has strong potential in helping to understand these decisions and promote behaviours. It indicates, for example, that

considerable benefits may be gained through putting effort into supporting biomass energy networks in order to spread positive experience and knowledge amongst land-managers around innovative short-rotation forestry practices.

Reaching a holistic understanding of land-management decisions presents a significant challenge. Research more easily (and more commonly) focuses on a small number of observable factors and indicators and seeks to establish co-variance between these and land-use or management outcomes. Such analysis, however, ignores the difficulty of isolating the impact(s) of individual factors on decision outcomes, that is, differentiating between them within the complex social context. As a result, explanations and understanding of decision is partial. For example, studies that establish the correlation of a land-management incentive and land-use outcome rarely differentiate between the incentive (financial income) and other factors which are intrinsic to the delivery of the incentive in the 'real' social world. These factors commonly include contact with professional land-management stakeholders (such as foresters or FC Woodland Officers), knowledge exchange, or greater engagement with land-management networks. Indeed, there is evidence that applications for incentives can be a pretext through which land-managers seek to obtain advice, contact or knowledge. The framework constructed here facilitates recognition of these other factors and therefore enables understanding to move beyond the assumed impact of individual factors such as incentives.

The framework aims to provide a comprehensive set of categories of influence, so that those engaging with land-managers can see a fuller picture of their decision-making. With this broader knowledge these stakeholders will be able to identify new routes and methods of engagement to support sustainable land-management objectives. It will also facilitate better understanding of the limits of some engagement methods.

Taking a broad view of land-management decision making illustrates that economic incentives are just one amongst many influences. Evidence strongly indicates that incentives can be used to effectively exploit existing opportunities for land-management change by facilitating land-manager's achievement of pre-existing objectives, but rarely create new opportunities for change by creating new objectives. Land-managers appear to view incentives as part of their risk management strategies. Different forms of incentive (tax relief; grants; loans) reach and influence different stakeholders in distinct ways. For example, tax relief can be attractive to investors, who may or may not already be land-managers. Experience in UK forestry illustrates this as much of the afforestation associated with tax relief in the Twentieth century was achieved (often via third-party forestry business) by investors with no or limited direct interest in land-management. Such stakeholders make decisions in social and economic contexts that can be very different from others, including those with experience of land-management. Consequently, caution should be taken when transferring the impact of incentives such as tax relief between different types of land-management stakeholder.

Incentives and markets are inter-related in complex ways. Incentives can be used in attempts to support fledgling industry sectors, as they are being used for example to stimulate the woodfuel market (Dandy, 2011a). Such 'seed' funding allows demand-side stakeholders to manage the risk intrinsic to engagement in emergent sectors. Having said this incentives are a weak influence relative to the development of secure, long-term markets themselves. Governance, such as 'state aid' regulation, places various boundaries around the extent to which incentives can be used to alter market conditions. Significant administration is required to address this and ensure duplication of funding support does not occur. This bureaucracy, such as the rules requiring the registration of land) can impact on land-management decisions.

Risk is a prominent and often explicit dimension of land-management decision making. It is identified as a discrete influence within this framework in that to a certain extent the influence of risk is contingent on an individual land-manager's personal perception of and attitude towards it. However, risk permeates through a variety of influences. As already noted, incentives can help manage risk. Private and professional social networks can act as routes via which managers can access trusted advice needed to manage risk. Land-managers may be more or less familiar with particular management practices, also affecting their attitude to its level of risk. Despite this prevalence, little work has been done drawing on the very substantial literature and theory relating to risk management, perception and communication to analyse and explain land-management decisions. Furthermore, there would appear to be considerable value in systematically considering financial risk management strategies from other fields which may provide cost effective alternatives to grants (see for example, Green Investment Bank Commission, 2010).

Managers at all scales see their land as a diverse landscape and decisions are taken in reference to specific parcels or patches of land. This is critical, if seemingly obvious, dimension of understanding land-manager decision making as it brings an under recognised suite of influencing factors into focus, accounts for heterogeneous landscapes, opens up opportunities for engagement, and calls into question those typographical approaches that classify land-managers into single categories according to management objectives. Land varies in many ways even at small scales within individual woodlands. Slope, aspect, soil, species, position, accessibility, environmental interest, and heritage are some of the dimensions along which land-managers perceive variance. As a consequence of this, decisions can be significantly different from one land area to another, that is, they can exhibit substantial 'internal' heterogeneity. An immediate problem can be seen therefore with approaches to research and practice which conceptualise and/or classify individual land-managers into a single management category such as (in forestry terms) 'timber productionist', 'amenity owner' or 'multi-functional'. A single managing stakeholder could easily exhibit all of these objectives somewhere in their management 'landscape'. If engagement followed such an approach,

opportunities may be missed to reach managers who may be seeking to adopt certain activities on small proportions of their land not directly linked to their primary management objectives and, therefore, associated classifications. A more useful approach to typological analysis would be focused on the *relationship* between land-managers and specific parcels of land. Such an approach would be complex but could be supported by the use of substantial existing spatial data and would facilitate a strongly targeted approach to land-management engagement.

A number of data deficiencies limit understanding of land-management decision-making, especially in relation to those who do not engage with public bodies. Evidence shows that engagement, such as through grants, can often focus consistently on land-managers which have been engaged with public agencies for some time. Engagement in this sense becomes in essence consistent *re-engagement*. Making contact with those managers outside of this process is hindered significantly by a lack of information as to who are they are. Registration of land-ownership has recently been made compulsory upon changes in ownership and in order to receive grant aid. Many land-owners and managers actively avoid identification, and yet more land is controlled by 'absent', that is non-local and often inactive, managers. This issue is long-standing and attempts have been made to investigate it (e.g. Yeomans et al. 2008). However, the focus has been directly on the *identification of owners*, which demands certain types of information typically including personal data, which many individuals are reluctant to divulge. A route around this problem would be to establish a systematic methods for *engaging land-managers* which could exploit alternative pathways to those with control over land (such as social and professional networks) and avoid an over-dependence on personal data. Such a method would facilitate targeted approaches to distinct land-management stakeholders.

If such a method were spatially referenced it would also provide valuable insight into the extent of engagement with land-managers. The fact that different managers control different total areas of land means that knowing how many managers have been engaged is of only limited value. More valuable is knowledge of the total area managed by them and, particularly in terms of ecosystem service delivery, where within the wider landscape this management occurs. It may be that in some locations engaging only a few land-managers would constitute engaging in the management of a large proportion of the local landscape area. This applies equally to an understanding of how land-management objectives are distributed across a landscape. For example Koontz (2001: 61) notes that 'activities on larger parcels are associated more with financial returns', and that whilst nonmonetary benefits are cited most *frequently* as motivation for management activity, in fact 'the parcel acreage held by owners citing this reason [financial returns] is considerably greater (about three times as large)' (Koontz, 2001: 61).



## 5. Conclusion

In order to achieve its objectives the Forestry Commission need to generate woodland creation and sustainable forest management behaviour amongst private sector land-managers, who control the vast majority of land in Britain. To do this effectively it is necessary to know what factors influence decisions to adopt certain management practices or land-use. This knowledge will assist in the allocation of increasingly scarce resources to address specific barriers to, and exploit opportunities for, change. The Framework described in this report provides a broad picture of the influences on land-manager decision-making. This can be used to help understand barriers and opportunities in specific situations. It draws extensively on both published literature and primary research relating to biomass energy (woodfuel) and wildlife management. Twenty-seven inter-related categories of influence are encompassed within the Framework, which in itself highlights the complexity of decisions made by land-managers. There are divided between four higher level categories of economic, social, physical-environmental, and operational influences.

Economic influences centre on the market and incentives. Product price and the achievable margin are strong influences on decisions for many land-managers. Price and margin do not only affect profit-orientated managers, but influence any decision which is likely to result in a cost for the land-manager. Managers strongly seek to avoid losses - even if they are not motivated by economic gain *per se*. Market scale, infrastructure and security also influence decisions. Margins are affected by having to operate in globalised markets and the presence or absence of local infrastructure can affect managers' perceptions of industry capacity and connectedness to the wider sector. The impact of incentives has received much attention and has traditionally been assumed as a significant influence. Evidence suggests that they have specific impacts, rather than a broad homogenous effect. Land-managers appear to use them to manage risk and they seem particularly useful for exploiting existing opportunities for change rather than generating change. Dimensions of risk perception and management permeate the influence of economic factors, as indeed they do other categories.

Social influences on land-management decisions are particularly numerous and focus around regulation, community and social ties, and land-managers personal interests and values. Concerns over the processes involved in and outcomes of regulation can strongly influence land-managers, especially those who value privacy and freedom to control their land. Personal factors, such as the manager's existing objectives, attitudes to and perception of risk, and own values also exert influence. 'Internal' factors such as these tend to be particularly robust and resistant to change. In many instances basic lack of time to consider lower priorities is the main barrier to making decisions. Social ties, both personal and professional, clearly have a profound effect on decision-making. Land-

management culture and the boundaries of wider 'public' acceptability set the parameters within which decisions are made, and social networks from families to membership organisations are critical routes through which knowledge, obligations, trust and experience flow. Very little is understood about the impact of social networks on the land-management sector, nor about their structure and function.

One of the most important aspects of the Framework is the recognition of the many physical-environmental factors that influence land-management decisions. Whilst managers may have over-arching objectives they make decisions in reference to individual parcels or areas of land at relatively fine-scales. As land characteristics vary, so do decisions. This set of influences brings an extra dimension to understanding behaviour in this context, relative to understanding, for example, health behaviours which perhaps depend less on relationships between the decision-maker and external biophysical factors. Considerations about the productivity, position, environmental quality, and climatic suitability of land all influence decisions. Further to this, the characteristics of the resource - that is the products of the land - also have an impact. These include the perceived availability of the resource and assessment of what type and quality of products is likely to flow from particular land areas and land-management practices. A major barrier to decisions can be the perceived complexity of the products and potential products available from a particular parcel of land.

Finally a more focused set of influences centre on the operational aspects of land-management - industry capacity in terms of skills, labour and hardware availability and the practicalities of work. It is important to note that land-managers are not only influenced by perceptions of these factors are they are, but also looking forward in time. Future potential limitations on industry capacity are particular barriers to decisions to adopt certain practices.

Decisions about land-management are made by managers who are, to a greater or lesser extent, embedded in social, economic, and environmental contexts. Opportunities for management change are most likely to occur when significant changes occur in these contexts - such as ownership change, crisis or serious threats to the realisation of existing objectives, or the spread of innovation.

Changing land-management behaviour requires:

- recognising and seeking synergies with pre-existing objectives and cultures,
- a focus on exploiting key opportunities for change,
- understanding and engaging strongly with existing social networks,
- fostering innovation and effectively promoting its diffusion,
- undertaking considerable knowledge-exchange, particularly via channels characterised by high levels of trust such as interpersonal communications, and,
- sharing the burden of risk through appropriate risk management strategies.

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