Constraints and opportunities for integrated multifunctional forest management in the Cairngorms region of Scotland

Thesis

CONSTRAINTS AND OPPORTUNITIES FOR INTEGRATED

MULTIFUNCTIONAL FOREST MANAGEMENT IN THE

CAIRNGORMS REGION OF SCOTLAND

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ABSTRACT

Scottish forestry policy promotes integrated multifunctional forestry and continued forest expansion, and the private forestry sector is key to achieving these goals. However, a variety of factors can constrain multifunctional forestry, particularly in upland areas. Management objectives for private forests are also not always widely known and the potential impacts of government policy, and particularly conservation designations, on the delivery of multifunctional forestry have not been explored. Furthermore, the effects of landownership on forest management are unclear. The key aim of this research was to evaluate how forests and woodlands in the Cairngorms are being managed, and to determine the main constraints and opportunities to the further application of a multifunctional approach to forest management in the region at various scales.

The research incorporated GIS analysis, a postal questionnaire survey and semi-structured interviews. A typology was developed which identified three key management themes: sustainable multifunctional management; restricted functionality forestry; and dual function management. Forest owner preferences, economic concerns, government policy and the wider land use context all influence forest management. No consistent relationship was evident between specific types of landownership and forest management functionality. A link was apparent between species and structural diversity and forest multifunctionality. Overall, 'social' objectives were relatively weak, particularly for private forests, while 'environmental' objectives were consistently strong and 'productive/economic' objectives varied in importance.

The themes of constraint and opportunity were: spatial fragmentation and integration; forestry markets; bureaucracy and policy integration; public pressure and public support; and unpredictability and forest resource resilience. Many constraints result from temporal, spatial and organizational scale mis-matches between social and natural systems. The matching up of scales at the management, organizational and market levels and the treatment of forests as

complex social-ecological systems is recommended. Further recommendations include: further land management integration; increased policy regionalization; timber market localization; and enhanced long-term planning.

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1 INTRODUCTION, AIMS AND OBJECTIVES

The primary aim of this research is to evaluate how forests and woodlands in the Cairngorms are being managed, and to determine the key constraints and opportunities to the further application of a multifunctional approach to forest management in the region at various scales. The specific objectives of the research, within this aim, are as follows:

I. To review the concept of multifunctional forest management through literature review, with the aim of defining what a modern interpretation of multifunctional forest management entails in practice.

II. To clarify, through documentation review, the policy and planning context within which forest management has evolved and continues to evolve in the Cairngorms region. This to be carried out from a critical and opportunistic perspective and at multiple scales (regional, national, international, local).

III. To profile the characteristics of the forests and woodland of the Cairngorms region through the use of existing datasets and GIS development. To clarify specifically: key forest and woodland types and the total area of recent planting and forest regeneration; the level of designation; and the (variability in) ownership regimes for this resource.

IV. To evaluate the present and proposed future management of this resource and its wider land-use context, with a view to clarifying different management approaches evident in the region, and the key drivers behind these approaches, in the context of the previously developed definition of multifunctional forest management.

V. To assess the key constraints to, and opportunities for, the further development of a multifunctional approach to forest management in the region at both the landholding and regional scale.

The above objectives will contribute to the making of recommendations for future forest policy and management in the Cairngorms region and a general assessment of the advantages and disadvantages of further regionalization of forestry and land-use policy in Scotland.

The following chapter outlines the research context within which this research is placed and attempts, in particular, to establish a definition and key criteria for a multifunctional approach to forest management. This is followed, in Chapter 3, with an in-depth review of the policy context for forestry in Scotland from the early 1900s to the present day. The study site is then outlined in Chapter 4, which also reviews the regional or 'local' policy and planning context for the Cairngorms region. Chapter 5 outlines the methodology used to carry out the research presented in Chapters 6, 7 and 8. Specifically Chapter 6 presents the results from the GIS analysis and the analysis of responses to a postal questionnaire of landowners, while Chapters 7 and 8 present the findings from semi-structured interviews carried out with forest managers and owners in the Cairngorms region. Chapter 9 presents a discussion of results and includes the overall conclusions of the thesis, as well as outlining a number of key recommendations. Three appendices are also included, as word documents, within the attached CD.

1.1   Justification of the choice of study area

Prior to the advent of sustainable development following the World Commission on Environment and Development in 1987 (see section 2.1.3), nature conservation and human development were often perceived as being almost diametrically opposed distinct processes. However, increasingly these processes are being seen as inextricably interlinked and even

complimentary. The overarching goal of the sustainability agenda is to develop approaches which allow humans to coexist harmoniously with their surrounding environment in sustainable social-ecological systems. A major challenge for any such approach, is the development of policy and management systems which allow the multiple public and private benefits (or functions) of land management to be delivered in an integrated and sustainable way. Increasingly land managers and policy makers around the globe are being asked to develop approaches which can ensure the long term sustainability of ecosystems, while at the same time ensuring that the requirements of the human populations within these systems are adequately met.

A key question then, is how should such multifunctional land management proceed and at what scale(s)? To answer this question the Cairngorms Region has been chosen as a case study area for a variety of reasons. Firstly, the region has a rich mix of different land uses including forestry, sporting land uses, agriculture, recreation, nature and biodiversity conservation, as well as acting as the setting for a number of active rural communities (see sections 4.2.4 and 4.4). Forestry as a single land use in the region delivers on a number of these functions. As evident from section 4.4, timber production is of considerable socio-economic importance within the region. The region also contains the single largest contiguous area of native woodland in the UK, as well as containing a multitude of other nationally and internationally important species and habitats. Large scale productive silviculture is therefore occurring in parallel with the conservation of exceptional woodland and non-woodland ecosystems.

Multifunctional land use is therefore a reality in the Cairngorms. Furthermore, the region has recently been designated as a national park — one of the largest in Europe. The objectives of the park reflect the global sustainability agenda - unlike the objectives of most other national parks, which have been, until recently, very conservation focused - and include the promotion of sustainable resource use and socio-economic development, in parallel with the conservation and enhancement of the regions natural and cultural heritage (see section 4.5.1.5).

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The region also has a range of different landowners engaging in a diverse mix of approaches to forest management. This mix of landownership is at least partially responsible for the region also exhibiting a history of land use conflicts. The Cairngorms Region, with it's diverse mix of land uses and management and policy objectives and high value habitats, therefore represents a prime location for the study of key constraints to, and opportunities for, the further development of sustainable multifunctional land use systems at the European and global levels.

Throughout this thesis, when reference is made to the Cairngorms region, it is specifically the CP area which is being referred to (see Chapter 4). The Cairngorms Partnership (CP) area boundary (see Chapter 4) was used for the purposes of this research, instead of the newer Cairngorms National Park (CNP) boundary, as the views of landowners and forest managers bordering the park were thought to be relevant as a) the park boundary is described in policy documentation as 'porous' implying that policy instruments developed by, or in conjunction with the National Park, could affect landowners in bordering areas; b) there is much debate as to what constitutes 'the Cairngorms' as a region, with debate ongoing as to whether the existing park boundary should be enlarged; and c) the Cairngorms Forest Habitat Network (FHN) and Cairngorms Forest and Woodland Framework (CFWF) are both based on areas more similar to the Partnership boundary than the NP boundary (see section 4.5.1.3).

2 THE RESEARCH CONTEXT: SUSTAINABLE MULTIFUNCTIONAL FOREST MANAGEMENT IN THEORY AND IN PRACTICE

2.1 The evolution of modern multifunctional forest management

2.1.1 The development of sustained yield forest management

The history of human interaction with European forests is long and complex and, throughout history, the availability of wood has been of the utmost importance for the expansion and development of civilisations (Perlin 1991). In early history this requirement for wood often resulted in widespread unregulated exploitation of European forests, often with serious consequences. As early as the 5th Century BC for example, Plato noted the huge damage to the soil resource resulting from deforestation in Attica (Hamilton and Cairns 1961). Early recognition of such losses sometimes resulted in the development of religious taboos, legal penalties or political mechanisms to conserve wood resources (Farrell *et al.* 2000), while the collapse of ancient civilisations such as the Roman Empire led to a re-growth of many European forest areas. However, widespread exploitation continued and extensive conservation measures to stem the felling and associated affects were slow to materialise (Darby 1956).

Early measures which curtailed deforestation included the concept of protection forests. The first of these appeared as early as 1339 in Switzerland, where all cutting was prohibited to prevent avalanches and landslides in certain areas (Farrell *et al.* 2000). Reforestation of felled areas was also practised in the 14th Century in some areas of Germany (Farrell *et al.* 2000). Despite these advances, large-scale exploitation continued, with European mountain forests being clear felled at huge scales as late as the 19th Century, often resulting in devastating erosion (Krauchi *et al.* 2000).

The founding of French, Austrian and German forestry schools in the early 19th Century characterised what is often termed a paradigm shift in forestry, towards management based in science and focused on increasing production (Farrell *et al.* 2000). The founding of these schools led eventually to the establishment of 'sustained yield' forestry, a concept which became the backbone of forest management during the following 200 years (Clawson and Sedjo 1984). Sustained yield management developed from an industrial [revolution] focus on timber production and incorporated balancing timber consumption with timber growth within a given time period (Behan 1990). This approach led to widespread changes in forest composition, with foresters favouring mono-cultural even-aged stands and a plantation approach to reforestation, which often led to reductions in biodiversity and other functions of the forest (Koch and Skovsgaard 1999, Sayer *et al.* 2003). In practice, this approach led to widespread environmental and landscape change across Europe and the USA. In Scotland, for example, the establishment of extensive conifer plantations in upland areas during the 20th Century is often regarded as one of the most significant landscape changes in the country's recent history (Mason *et al.* 1999). Even in the 19th century, the sustained yield concept was not totally new; evidence of similar approaches being practiced during medieval times in the UK has been found (1976). It was however, during the 19th Century that the concept developed into clear methodologies in the form of planting practices and yield models (Wiersum 1995).

The sustained yield approach developed from a view that timber production was the primary function of forests and assumed that the forest and society were relatively static in terms of continued timber supply and demand (Behan 1990). Forests are, however, no longer mainly perceived as a source of timber but as providing an expanding range of functions of equal or greater importance than wood production, including soil and watershed protection, carbon sequestration, nature and biodiversity conservation, food, tourism and recreation resources (Fuhrer 2000, Krauchi *et al.* 2000, Grabherr 2000). This has led to widespread criticism of the

sustained yield concept due to its 'single use' focus on timber production, which has often led to the neglect of non-timber forest values (Behan 1990).

The criticisms of sustained yield practices are particularly relevant to upland forests where the assumptions of the concept rarely hold true, namely; that the whole forest could be managed, that there is a sustained demand for wood and that there is a sufficient workforce (Price 2000). The economic context for mountain forests has also changed, with increasing international competition leading to decreasing profits, related to the handicaps imposed by relief on mountain timber production (Buttoud 2002). Increasing labour costs also necessitate a move away from labour intensive production-oriented forestry and have resulted in a trend towards 'near natural' and extensive (landscape level) forest management (Fuhrer 2000). As a result of these social and economic constraints, upland forests often need to provide a broader range of functions than their lowland equivalents.

2.1.2 The multiple-use approach

In the mid-20th Century, increasing criticism of sustained yield approaches led to the development of the 'multiple-use' approach, where the focus shifted from timber to multiple uses, to provide an optimum mix of human valued products and services (Wiersum 1995). This approach was formalised in the USA with the passing of the 1960 Multiple-Use Sustained Yield Act. Behan (1990) notes that the US forestry industry's early efforts generally involved multiple-use by adjacency, where forests were fragmented spatially to deliver different functions e.g. timber being harvested in one area, recreation being provided in another at so-called 'sustainable' levels. This use 'segregation' approach may have stemmed from the USA having such large-scale forests, with real integration of uses within the same area perhaps not seen as necessary in the early stages of multiple-use forestry.

Multiple-use forestry was officially established in Europe as an American immigrant during a 1987 joint session of the Timber Committee of the Economic Commission for Europe and the European Forestry Commission (Koch and Kennedy 1991). Europe, however, unlike the USA, suffers from a lack of natural resources, necessitating a more integrated approach to multiple-use forestry (Koch and Skovsgaard 1999). The area of biological reserves in many areas of Europe relative to areas of commercial forestry, for example, is too small to sufficiently preserve functions such as biodiversity in a meaningful way. Biological reserves in Scandinavia, for example, account for less than 3% of national forests (Essen *et al.* 1997).

The 'multiple-use by adjacency' approach applied in the USA, appears, therefore, not to have offered a solution to the problem of how to deliver multiple forest functions in a sustainable and integrated manner (Brooks and Grant 1992, Behan 1990), particularly in a European context. As Grumbine (1994) notes, it is "the fundamental goals and driving mechanisms" which are at the heart of the problems of a sustained yield approach. With 'yield' (be it of timber or other forest products) as the main goal, global markets and consumption levels often become the deciding influences in management, with broader environmental considerations often of lower importance. A forest is a complex ecosystem, and functions such as biodiversity conservation and environmental protection are often seen as strongly linked to the forest acting as a whole system (Krauchi *et al.* 2000). Segregating the forest for multiple uses and using the global market as a management guide therefore becomes a fundamentally flawed approach. As Wood (1994) states, "land managers cannot [sustainably] make ecological systems conform to socio-economic issues and demands". This factor, combined with a growing societal recognition of a greater range of forest uses, has led to a widespread shift in approach to the delivery of forestry for multiple functions, with EU and UK forestry policy now increasingly emphasising a 'sustainable forest management' (SFM) approach (See Chapter 3). The scientific literature also reflects this trend (Farrell *et al.* 2000, Varma *et al.* 2000, Kimmins 1999, Koch and Skovsgard 1999, Toman and Ashton 1996).

2.1.3 Sustainable forest management (SFM)

Sustainability is an elusive concept which gained popularity following the 1987 report of the World Commission on Environment and Development (WCED 1987, See Chapter 3). This promoted the concept of 'sustainable development' (SD), as development which meets the needs of the present without compromising the ability of future generations to meet their own needs (Mitchell 2002). SD, in the form promoted by the WCED, depends therefore on the recognition of both human needs and the limitations created by technology and social organisation regarding environmental capacity (Mitchell 2002). Sustained yield has been confused with the more modern concepts of sustainability (Korten 1991) and, indeed, the broad concept of sustainability and the practice of SD have their conceptual roots in sustained yield forestry management (O'Riordan 1993). The modern sustainability ideal has, however, evolved considerably and, in practice, 'sustainable' management is generally perceived as being much broader, incorporating economic, ecological and socio-cultural aspects (FC 2002a).

Following on from the 1992 United Nations Conference on Environment and Development (UNCED) and the development of a global Statement of Forest Principles, the second Ministerial Conference on the Protection of Forests in Europe in 1993 provided the following definition for SFM:

"the stewardship and use of forests and forest lands in a way, and at a rate, that maintains their biodiversity, productivity, regenerative capacity, vitality and their potential to fulfil now and in the future relevant ecological, economic and social functions, at local, national, and global levels, and that does not cause damage to other ecosystems" (MCPFE 2000).

This definition highlights the multifunctional nature of SFM, with a range of functions having to be managed in a sustainable fashion and at varying 'levels' or scales. Chapter 3 outlines how the SFM approach now incorporates a detailed range of specific policies and management criteria and has effectively become the modern basis for European forest management.

2.1.4   Ecosystem management as a basis for multifunctional SFM

Recognition of the importance of scale in sustainability, the increasing abandonment of sustainable yield approaches, and the recognition that many forest functions are provided by forests acting as systems, have led increasingly in recent years to the promotion of 'ecosystem management' (EM) or the ecosystem approach (EA) as the fundamental basis for multifunctional SFM both in the USA (Grumbine 1994, Wood 1994, Behan 1990, Brooks and Grant 1992) and in Europe (Schlaepfer *et al.* 2002 and 2004, Koch and Skovsgaard 1999, Bengtsson *et al.* 2000, Dekker *et al.* 2007). EM, like sustainability, is a broad concept and not uncontroversial in terms of definition and practice (Slocombe 1998). The EM concept originated in the USA, from the work of the Craighead brothers (Craighead 1979), in relation to grizzly bear (*Ursus arctos*) management at Yellowstone National Park. This work set the defining criterion for EM of 'provision of the primary habitat to support a viable population of the area's largest carnivore', which emphasises the landscape-level scale of the approach and the importance of landscape connectivity. Since 1979 EM has become a major area of research, and a number of key themes of EM or EA are shown in Table 2.1.

Grumbine (1994) goes on to formulate a working definition: *"EM integrates scientific knowledge of ecological relationships within a complex socio-political and values framework toward the general goal of protecting native ecosystem integrity over the long term"*

Table 2-1 The defining themes of ecosystem management. Adapted from Grumbine (1994) and Schlaepfer *et al.* (2004)

1. Hierarchial Context	Management must seek the connections between all levels of biodiversity (genes, species, populations, ecosystems and landscapes) and not focus on any one level – the systems approach.
2. Ecological Boundaries	Management must work across administrative and political boundaries towards defining ecological boundaries e.g minimum area for a viable population – landscape perspective.
3. Ecological Integrity	Maintaining the ecological stability and sustainability of the system by protecting diversity and the patterns and processes that maintain that diversity, including disturbance regimes.
4. Integration of spatial and temporal scales	Management must aim to integrate spatial scales (site, landscape, region) and temporal scales (short-, medium- and long-term).
5. Data Collection monitoring and adaptive management	More research and data collection/monitoring for management feedback. Decisions based on sound science utilising an adaptive management approach.
6. Interagency Co-operation and organisational change	All stakeholders must be represented to resolve conflicting interests. Interagency committees may need to be formed, power relationships may need altering and decentralisation of decision making may be required.
7. Human values and humans as part of nature	People cannot be separated from nature. In this respect EM involves human management. It also involves incorporating human values into EM, which requires management for multiple objectives that consider the ecological and socio-economic requirements of the managed system.
8. Long-term planning and applying the precautionary principle.	Management objectives should be set for the long term, and the precautionary principle applied in decision making.

Since 1979, EM has therefore evolved from a concept focused on the maintenance of ecosystem function, through the provision of habitat for key predators, to a concept which is increasingly socio-political, due to its requirements for boundary transcendence and its associated participation, conflict resolution and human values aspects. A key aspect of this evolution has been the arguments surrounding the relative importance of the intrinsic values of the ecosystems being managed. Kessler *et al.* (1992), for example, argue that EM represents an advanced form of 'sustained yield multiple-use' where ecosystem products and services are still of primary importance but must be seen in a much broader ecological and social context, and advocated management of this complex system as a 'life support system' for humankind. In extreme opposition, Noss (1992) argues that the requirements of non-humans take priority over humans. However, as Grumbine (1994) notes, this view compounds the division between humans and the rest of the biosphere. Conceptually placing humans at the centre of the EM

concept implies management must focus on what is most beneficial to humans in the long term. However, in practice such an approach could result in the continued lack of recognition of system limits (Grumbine 1994, Wood 1994). Each forest function has specific ecosystem-related requirements (Fuhrer 2000) and in taking a long-term sustainability view, it could be said that it is these limits which must govern management goals.

Table 2.2 compares the concept of sustained yield forestry with the newer concepts of SFM and EM/EA. What is evident from this table is the increasing importance, moving from left to right, placed on recognising the limitations of ecological systems on the importance of social values in management, and balancing human consumption with conservation accordingly. The decentralisation of management to support landscape-level approaches to managing ecosystems also appears as increasingly important. It is also apparent from Table 2.2 however, that EM is a vaguer concept than SFM, with less tangible goals and no clear detailed criteria for EM having yet been developed.

Table 2-2 A comparison of sustained yield forestry, SFM and EM approaches (PROFOR 2004)

CRITERIA FOR COMPARISON	SUSTAINED YIELD FORESTRY	SUSTAINABLE FOREST MANAGEMENT	ECOSYSTEM MANAGEMENT/ APPROACHES
Primary Concern....	..is on sustainable commodity production	...is on balancing conservation, production and use of forest goods and services	...is on balancing – and integrating – conservation and use of biological diversity
Tangibility of goals....	...is high – commodities	...is high – products and services	...is low – equity and sustainability
Resource management objectives....	...are based on long-standing technocratic traditions and legal mandates, focused on production	...incorporate broader range of environmental and social objectives	...are a matter of societal choice
Control of resource management decisions.....	...is generally centralised under responsible forest management agency	...is still usually centralised through other management options emerging	...is decentralized to the lowest appropriate level
Hierarchical approach....	...is one of command and control – 'we manage'	...is slightly more open – 'we manage, you participate'	...is replaced by the concept of social learning – 'we are learning together'
Spatial scale is considered....	...at site level only (i.e. management unit)	...primarily at site level, though with some consideration of externalities	...to incorporate the wider landscape – scale linkages (i.e. integrated land management)
Knowledge is based on.....	...scientific and technological knowledge	...expert knowledge, supplemented with broader stakeholders inputs	...a more balanced use of scientific and indigenous local knowledge, innovations and practices
Sectoral approach is....	...narrowly focused	...broadly focused	...cross-sectoral
Assumes....	...predictability and stability	...adaptive management – but with defined limits	...need for resilience, anticipation of change
Associated tools.....	...are those of classic silviculture	...includes codes of forestry practices, criteria and indicators, etc.	...are not yet available. Ecosystem Approaches have no case law and need practical testing.

2.1.5 The importance of social values and social-ecological scale match-ups

Forest policy and management, both in the USA and Europe, have long used indicator-based systems to reduce the outputs of socio-economic and biophysical systems to a set of measurable criteria, often incorporating economics, and particularly cost-benefit analyses, to account for human concerns. Numerous authors argue, however, that employing economic approaches to account for human concerns can lead to poor recognition of the full range of social values and their relative importance in forest management (Slee 2007, O'Brien 2003,

Allen and Gould 1986, Hopwood 1992). Twight and Lyden (1988) and Inglis and Guy (1997) also point out, in relation to US and UK forest management respectively, that key user groups have often not been adequately represented within the decision-making processes in the past. This lack of stakeholder representation and emphasis on economic valuations perhaps reflect both the attitude that 'rationalist' science can account for societal desires and the 'production' oriented goals of an essentially human-centred management approach, which leads to forests being run more like businesses and less like complex social-ecological systems.

The key issue is essentially one of perception; as Stanley (1995) states, "humanity must begin to view itself as part of nature rather than the master of nature". It is this perceived mastery of nature which leads to the favouring of scientific, 'rationalist' management approaches. In this sense, a more biocentric and holistic view of managing ecosystems "changes the problem from one of how to maintain resource outputs, to one of how to limit resource use and population growth" (Stanley 1995). In practice, the move away from a 'rationalist' centralised and scientific management approach, evident within the SFM and EM criteria shown in Tables 2.1 and 2.2, also implies something of a more 'incremental' approach, where societal values are incorporated in management, through public participation. Despite increasing recognition of the importance of social values, the difficulties in measuring these values outside the economic sphere, have, in practice, often led to their exclusion in forest management (Robson *et al.* 2000). However, forest management based in the most vigorous scientific and economic principles and analysis will in the long run be unsustainable if it suffers rejection from society (Marcin 1995).

The importance of the social approach to forestry can be illustrated by a realisation; that the massive functional shift in modern-day forestry is predominantly perceptual. Forest functions to human beings change in a genuinely 'real' sense, for example when the demand for recreational pursuits increases in a forest area (e.g. the explosion of ski resorts in the European Alps in the second part of the 20th Century); however, forestry functions also change in terms

of human perception. In other words, the function was always there but the value which humankind placed on it changes, and this is often being related to increased recognition of the function's value, which can have huge implications (Bengtsson 1994). The widespread recognition of the importance of forest biodiversity, for example, has had major practical implications for forest management (Bengtsson *et al.* 2000). The entire system of forest functions or values – be they ecological, or more socio-economic – is essentially a social construct and dependent on what 'society' deems as important in the long term.

A further, less theoretical, reason which necessitates a more people-oriented management approach is that the transcendence of socio-political boundaries which EM-based approaches dictate requires the incorporation of multiple stakeholders. The development of cross-boundary landscape-level approaches is key to the maintenance of ecosystem and landscape integrity and, as such, the scale at which forest management is applied is likely to affect the overall functionality of the forest resource. Schlaepfer *et al.* (2002) suggest that the smaller the scale of management, the more likely that land-use specialisation will occur, as it becomes increasingly difficult to extract a full range of services from a diminishing area. In practice, however, management efficiency may also be affected by scale, in that efficiency at larger scales may decrease as organisational complexity increases (Born and Sonzogni 1995). There would therefore appear to be an optimal scale (or scales) for the application of a multifunctional approach, dependent on a variety of factors, not least organisational structuring and approaches to stakeholder participation in management.

The unification of the scale of societal use and management of forests with the scale of the ecological processes of these same forests is likely to be a key element of any approach which seeks to incorporate social values in an EM-based multifunctional management approach. At a broad scale, within Europe for example, it is often assumed that forests are becoming increasingly multifunctional and sustainable with a diminishing emphasis on timber production and a shift towards managing more for ecological and social values. This apparent

sustainability may, however, be illusory as the forests of Europe can no longer meet the needs of the European population in terms of timber production (Farrell *et al.* 2000). The sustainability of European society in this light, may therefore be dependent on unsustainable exploitation of timber resources at a global level.

Cumming *et al.* (2006) in this regard, detail how numerous environmental problems are essentially the product of scale (temporal, spatial or organisational) mis-matches between the scale of social organisation responsible for management and the scale of the ecological systems and processes being managed. Social-ecological scale mis-matches of this kind can result from a) social processes including: changes in land tenure and food production; shifts in governance towards nation states; or changing societal values; b) ecological processes such as changes in predator-prey interactions; or c) complex social-ecological processes, such as the human inflicted reductions in great whale populations leading to killer whales turning to keystone species such as otters for food, which has had knock on effects on sea urchin populations (which otters feed on) and algal production, leading to population crashes among various smaller marine mammals. A key example of a scale mis-match affecting forests is that which has resulted from the (global) shift from a dependence on hunting and gathering for food (i.e. a small-scale approach), to an increasing reliance on (large-scale) heavily mechanised and intensive agriculture and the associated changes from small scale to larger-scale land use and tenure. This results in the exploitation of global forest resources at spatial and temporal scales beyond their regenerative capacity. Cumming *et al.* (2006) and Lovell *et al.* (2002) highlight the potential of organisational restructuring, 'bottom-up' management and adaptive and flexible management approaches for minimizing scale mis-matches in social-ecological systems.

2.1.6 The modern concept of sustainable multifunctional forestry defined

The widespread adoption of forest management for multiple functions has led to the development of a range of similar terms such as 'multiple-use' 'multifunctional', 'multi-purpose', or 'multi-resource'. In many respects, these terms are inter-changeable, and any debate as to which is more suitable in a modern context is highly academic and rather circular. The term 'multifunctional' appears most popular in Europe at present (Buttoud 2002, Schlaepfer *et al.* 2002, Gluck 2000, Slee 2007) and hence will be adopted here. In a practical sense it should, however, be recognised that the modern concept of multifunctional forest management as referred to here aims to differ from traditional 'multiple-use' strategies as previously applied in a sustained yield 'segregation'-oriented format and criticised earlier. The key differences are that modern multifunctional management attempts to integrate rather than segregate the delivery of multiple forest functions (and attempts to integrate forest management with surrounding land uses), to manage the forest as an interlinked social-ecological system, while taking account of the limits of this system from both environmental perspectives and social (including economic) values perspectives. Multifunctional forest management is also seen here as implying management which adheres to many of the principles of EM at a broad level, while applying the criteria of an SFM approach in greater detail (in conjunction with the various policies outlined in Chapter 3). Taking these factors into account, the following definition is proposed for sustainable multifunctional forest management:

The sustainable stewardship and use of forests as social-ecological systems, at multiple scales, which provides optimal integrated delivery of the ecological, economic and social functions of the forest, through the integration of scientific knowledge and multi-stakeholder involvement while recognising the functional limitations of the forest as a social-ecological system.

Table 2.3 also proposes a number of key criteria indicative of a sustainable forest management approach, which attempt to encapsulate the theoretical side of the concept as discussed here,

as well as incorporating a number of practical management activities of particular relevance to such an approach, as discussed in the following section.

Table 2-3 Key criteria and management activities relevant to a multifunctional SFM approach

KEY CRITERIA	KEY RELATED MANAGEMENT ACTIVITIES
Social objectives	Potentially including: public recreation and access facilitation; participatory management; consideration of aesthetic landscape impacts. Evidence of management for education and interpretative purposes. Evidence of generation of social capital in local communities from forest management.
Economic objectives	Management focused on generating sustainable economic return. Silvicultural practices geared towards viable future timber production in a significant proportion of the forest area.
Environmental objectives	Management objectives include conservation and enhancement of biodiversity and forest ecological functioning/natural processes. Active management for species and habitats conservation. Use of native tree species across significant areas of the forest. Recognition of the limits of the forest system to provide human-use benefits.
A multi-scale management approach	Consideration given to multiple scales in management including: stand; whole forest; landscape; and regional scales. Recognising the 'bigger picture' key and the impacts of management beyond owners boundaries. Forest owner collaboration to facilitate larger-scale approaches to forest management (with particular emphasis on FHN development)
Long-term spatial planning	Long-term forest plans (25-50 year) in place/being developed incorporating spatial planning elements (detailed forest mapping)
Stakeholder involvement in planning	Local communities and other forest stakeholders involved in management planning process in a transparent manner. Evidence of a matching of scales of management/organisation and of scales of forest processes. Evidence of a decentralization approach to the making of management decisions.
Forest management integrated with other land uses	Consideration of the wider landscape setting for forestry – integration of forestry with other land uses such as agriculture to provide wider range of benefits.
Flexible, resilience building 'whole forest' approach to management	Areas of forest under CCF; Regeneration partially or fully used as a re-stocking/forest expansion mechanism; silvicultural management geared towards the development of high forest species and structural diversity. Adaptive management which incorporates both scientific knowledge (through research) and local knowledge (through participation).
Adherence to SFM policies and codes of practice	Management which follows SFM related regulation, but also engages in a full range of sustainable objectives through utilising support mechanisms available for the delivery of public benefits.

2.2 Key management tools for multifunctional SFM

To assist in understanding the relevant management approaches involved in multifunctional forestry, they are segregated below into three areas: ecological silviculture; landscape planning and decision support systems; and participative approaches. It is important to note, however, that these three 'cornerstones' of practical multifunctional management are inextricably linked, due to the interlinked social-ecological nature of multifunctional forests.

2.2.1 Ecological silviculture/continuous cover forestry

Ecological silviculture or continuous cover forestry (CCF), arose from a need to combat the legacy of sustained yield forestry: the mono-cultural, even-aged coniferous plantation. Mason *et al.* (1999) define CCF as "forest management characterised by the use of natural processes such as natural regeneration, the creation of varied stands with a range of species, working with site limitations, managing the ecosystem rather than the trees, and a presumption against clear felling". CCF is not a new concept, and selection forestry was practised in Germany as early as 1913. However, its use had declined significantly by the 1930s for political reasons (Pommering and Murphy 2004). The resurgence of CCF in Europe is a result of policy shifts in the 1980s and 1990s (see Chapter 3) towards more sustainable forestry. The increased use of CCF is being heavily promoted in UK forest policy (FC 1998, SE 2000a FC 2000).

Prevailing silvicultural practices in even-aged conifer plantation forests in Scotland and the UK generally, incorporate patch clear felling (coupe size 5-20ha), artificial regeneration through planting, comparatively short 45-70yr rotations and limited thinning due to windthrow risk (Mason 2003). This approach is particularly common in upland plantations, and the negative visual and ecological impacts of clear-felling in such areas are key reasons for the increasing promotion of CCF. There are currently some 1.5Mha of even aged mono-cultural conifer high forest in the UK, with 500-750 kha having been designated as sufficiently

windfirm to be managed under a CCF approach (Miller 1985). However, less than 20Kha were being managed in this manner in 2001 (Malcolm et al. 2001).

There are three basic CCF scenarios: (1) establishment on bare land; (2) transformation of even-aged plantations; and (3) maintenance of existing CCF systems (Pommering and Murphy 2004). The majority of interest currently lies in the transformation of coniferous plantations (Schutz 2001) and to a lesser extent in native woodlands restoration (Mason et al. 1999, Thompson et al. 2003). Silvicultural systems involved in the transformation process vary in relation to environmental factors, from thinning to produce irregular shelterwood systems, through group to single stem selection (Malcolm et al. 2001). Natural regeneration is a key component of CCF, although planting in the early stages may be necessary, particularly if new species are required (Malcolm et al. 2001).

Successful regeneration depends on multiple factors including seed quantity and quality, vegetation structure, vegetation type and browsing pressure (Thompson 2004). The manipulation of a stand's microclimate through thinning regimes and the creation of canopy gaps can assist in supplying these factors and thus encourage regeneration (Malcolm et al. 2001). In areas such as Scotland, where species present are relatively shade-intolerant and light levels are low, gaps need to be relatively large (0.1-0.2 hectares) to ensure adequate light for successful regeneration (Malcolm et al. 2001). Gap creation and the thinning processes involved in CCF open the forest, which can limit its application in windy sites (Mason 2003), particularly on soil with shallow rooting qualities (Quine et al. 1995). However, modifications to current thinning approaches, incorporating earlier first thinnings and much larger intervals between further thinning in the first 60 years of growth (from the traditional 5yr to 15-20yr intervals), could ensure a more stable root structure and increase the wind resistance of trees in windy sites (Cameron 2002). In selecting a particular silvicultural approach (within CCF) for any given site, attention to the multiple scales (from stand to ecosystem) of the forest system is therefore necessary. The impacts of browsing deer, for example, can be strongly influenced

by silvicultural system choice (Reimoser and Gossow 1996), while Capercaillie (*Tetrao urogallus*) are also likely to be more successful in shelterwood systems, as opposed to single tree felling approaches (Storch 2003). The establishment of forest margins as transitional zones can also significantly increase overall forest wind resistance (Gardiner 2000).

CCF relates strongly to multifunctional forestry. In economic terms, CCF has been recognised as potentially favourable in terms of reducing tending costs in the long term (Benecke 1996). The increased structural and species diversity of CCF forests has also been recognised as increasing their overall resilience through developing increased resistance to costly disease and pest outbreaks (Nyland 2003). Current UK timber certification measures relating to CCF management (see FC 2000) also suggest that economic returns could potentially increase further. The broader picture, however, must take into account the difficulty in measuring social and ecological benefits in economic terms. The social benefits of CCF, for example, include the reduction of unsightly clearfelling and decreased disturbance to recreational facilities e.g. footpaths, with potential increases in scenic and wilderness values. The emphasis on continuous cover and the enhancement of structural and species diversity also imply significant benefits in terms of biodiversity conservation as well as for the protection of soil and water resources.

2.2.2 Forest landscape planning and decision support systems

To assist in the development of multifunctional forestry approaches, particularly at larger scales, various spatial planning and decision support tools are increasingly being used in forest management, and the direct practice of EM is now often referred to as landscape ecological or socio-ecological planning (Leitao and Ahern 2001, Kangas and Store 2002). In practice, ecological or socio-ecological spatial planning approaches are usually based in the maintenance of landscape ecological integrity and the cessation of habitat fragmentation in conjunction with the delivery of multiple forest functions. The development of forest habitat networks

(FHNs) in particular (see Section 4.5.1.3), is being increasingly promoted as key to the implementation of CCF at the landscape or ecosystem scale (see Peterken *et al.* 1995 for Scottish example).

Geographical Information Systems (GIS), in particular, are increasingly being utilised as a basis for long-term, large-scale forest management planning (see Kangas and Store 2002, Kangas *et al.* 2000, Varma *et al.* 2000). Schlaepfer *et al.* (2002), for example, in determining management options for provision of habitat for a viable wolf (*Canis lupus*) population, utilised a regression model within a GIS to predict the probability of the presence of wolves across a landscape, with the model incorporating a range of known forest variables. The focus was on one species, however the approach inherently leads to increased ecosystem integrity and forest multifunctionality overall, through the development of an ecological network. The incorporation of variables such as high-use recreation areas within the model meant that social functions could also be catered for by minimising human-wolf interactions through appropriate planning.

Independent simulation models (often using a GIS as a base) are also now being used to predict the effects of various environmental factors on long-term forest growth and stability (Dunham *et al.* 2000). These models are increasingly being developed more to support EM-type approaches, such as CCF. Interactions between different potential CCF thinning regimes and a site's windthrow risk can, for example, be examined using GALES (Dunham *et al.* 2000), a simulation model which can be used in conjunction with Detailed Aspect Method of Scoring (DAMS Quine 2000), a scoring system for the prediction of wind climate at different sites in the UK. The natural regeneration potential of a site can also be simulated for different tree species, based on the input of various site-specific environmental variables, using the Ecological Site Classification system (ESC) (Pyatt *et al.* 2001) Results from different simulation approaches can also be combined to predict which silvicultural strategies suit specific sites. The recently developed GIS-based programme Biological and Environmental

Evaluation Tools for Landscape Ecology (BEETLE), developed in Scotland to assist FHN development, also utilises environmental data to predict the effects of changing habitat balances between woodland and open ground on a number of key species (Humphrey *et al.* 2004).

GIS and modelling of forest systems provide ways of analysing the effects of different management scenarios over time, at different scales, while taking complex environmental variables into account. Through providing managers with a range of potential future management scenarios, such approaches allow for a more optimal approach to forest management, with managers capable of selecting the 'best' future option for their forest resource. However, regardless of the tools used, centralised or 'expert'-based decision making must also account for social forest values to ensure long-term sustainability. This factor, combined with the criticisms of economic assessments of social values, has led to the increased promotion in policy (United Nations 1992a, Anon 2000, EC 1998) of more direct systems of social value communication.

2.2.3 Public participation in forest management and policy development

Public participation is being increasingly promoted as a means by which social values can be incorporated into the decision-making processes in environmental management (see section 3.2.3.2 for relevant Scottish policy). However, the term participation is ill defined and may often be more related to non-committal consultation of the public rather than genuine empowerment of society (Buttoud 2002). The participatory process therefore requires clarification. Stakeholder or public 'participation' can occur at different levels, from simple consultation to genuinely empowering participation with different user groups represented throughout the management process, right up to full community control, which often involves local community ownership (FC 2001b).

As Rowe and Frewer (2005) explain, three main types of public engagement exist: public communication; public consultation; and public participation (see Figure 2.4). Public communication consists of direct (one-way) transfer of information to the general public from the sponsors of the project. Public consultation involves the project sponsors actually attempting to access the opinions of the public on their project, so the main flow of information is from the public to the sponsor. Public participation, on the other hand, should (at least in theory) involve a two-way flow of information between the sponsor of the project and the public, as well as allowing the public to influence decisions being made by the project sponsors.

Flow of information

Public communication:

Sponsor   ⟶   Public representatives

(one way)

Public consultation:

Sponsor   ⟵   Public representatives

(one way)

Public participation:

Sponsor   ⟷   Public representatives

(two way)
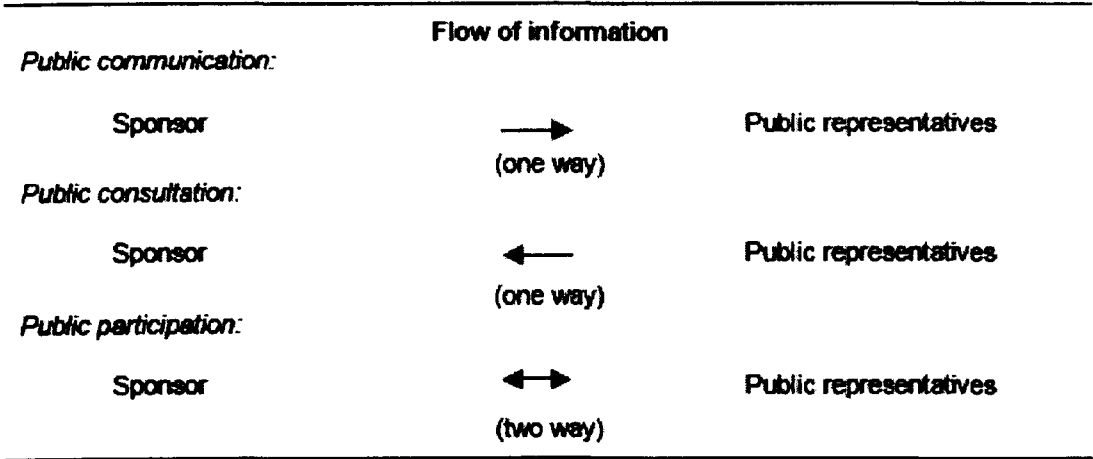
Figure 2-1 The main forms of public engagement (Rowe and Frewer 2005)

Arnsteins Laddder, shown in Figure 2.5, (based on the work of Sherry Arnstein – see Arnstein (1969)), illustrates the various levels of participation which can occur in practice, with the level of public or community empowerment increasing as you move up the ladder. It is clear that it is only in the top three rungs of the ladder (partnership, delegated power and citizen control) that participation is actually engendering any real empowerment. The unfortunate reality, however, is that much of what is currently termed participation, occurs at a level below these top three rungs.

Ladder diagram labels (top to bottom):
Citizen Participation — 8 Citizen control, 7 Delegated power, 6 Partnership
Token Participation — 5 Placation, 4 Consultation, 3 Informing
Non-participation — 2 Therapy, 1 Manipulation
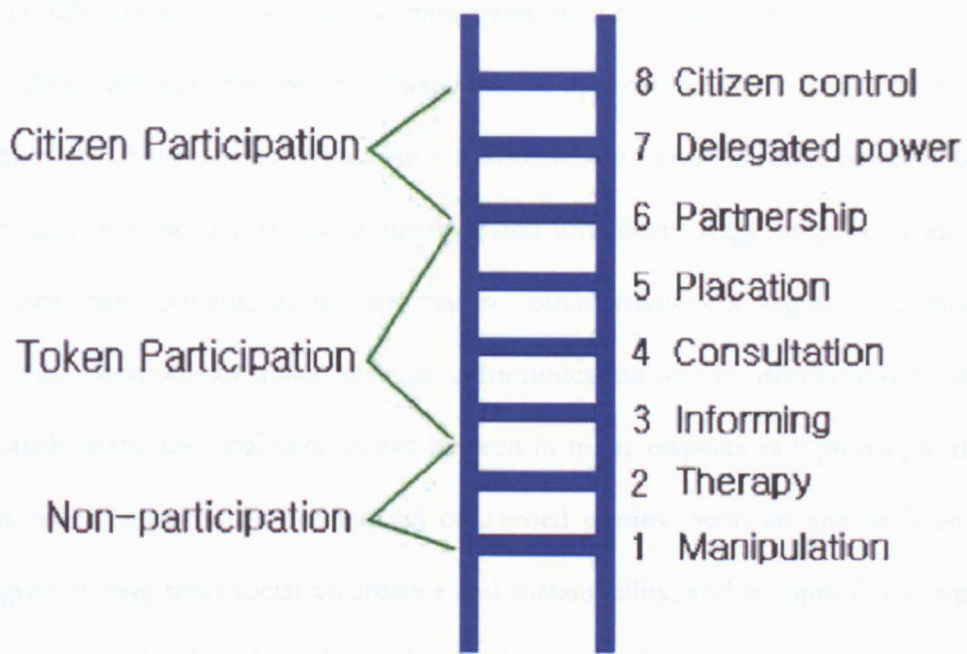
Figure 2-2 Arnsteins ladder of participation (in Hyung Shik 2005)

Genuinely empowering participation, where management decisions reflect societal values, may therefore actually require considerably more devolution in terms of decision making than is often realised. The FC has, for example, received criticism in the past for not encouraging community woodland ownership and strong local participation in state forestry management in Scotland (Inglis and Guy 1997, Inglis and Beck 1996). In this regard, land tenure and organisational structure become major issues in forest management. The influence of tenure on the level of participation in management may necessitate change in ownership, organisational re-structuring and changes in legal and policy frameworks. Gluck (2000), for example, argues that common property regimes may be more suited to the concept of multifunctionality than private or state-owned forests.

Localised decision making and smaller-scale community ownership systems may offer potential for alleviating organisational dominance in forest management and policy processes. However, the reality of land ownership situations dictates that practical multifunctional management (in public or private forests), be it concerned with policy formulation or direct management, must often take a combined approach where public participation can be

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incorporated into decision making and administrated by a centralised state body. Buttoud and Yunusova (2002) advocate the use of a 'mixed model' approach to forest policy development, which applies the theory of communicative action, where continual confrontation between interest groups, in various formats, is incorporated into every stage of policy formulation. Multifunctional management, by its very nature, often involves a degree of compromise; however, when decisions are made through communication and confrontations between all relevant stakeholders, the final choices can be seen in many respects as 'optimal', in that it is the best possible compromise between all concerned parties. Such an approach ensures a greater degree of long-term social acceptance and sustainability, and is applicable at the forest site or landholding level and at the wider landscape level, with stronger communication between the stakeholders leading to more optimal approaches both within forest management and in relation to wider landscape management.

Buttoud and Yunusova (2002) recognise, however, that the participatory process can often be manipulated by the more powerful actors involved, necessitating a clear structuring of the process. Representative participatory management may also not necessarily represent the views of society at large in a democratic way. Robson *et al.* (2000), in this regard, promote the use of public surveys to empower the 'unspoken' members of society. Myers and Thompson (2003), for example, incorporated both a qualitative and quantitative approach in a public survey of a rural Scottish community. This strengthened the validity of the results through comparisons across methodologies and allowed for the collection of large amounts of information. Survey techniques can also be applied at any scale (Robson *et al.* 2000); in this respect, they could help overcome issues of organisational complexity involved with multifunctional management and stakeholder participation at very large spatial scales i.e. at the landscape or regional level (Born and Sonzogni 1995). The information gathered can also be utilised by forest managers in setting objectives and in identifying key conflict areas. The survey approach, in these respects, offers a clear alternative to traditional economic approaches for assessment of social values.

2.2.4 Integration of silvicultural, spatial planning and participative approaches to practical multifunctional SFM

In practice, multifunctional forest management often involves the integration of the silvicultural, landscape planning and participative approaches outlined here. Managing for CCF at large scales, for example, often involves the use of landscape planning and simulation tools, and computer-based approaches to forest management can also incorporate social elements, through recognising social forest values such as public recreation in forest planning (see Kangas and Store 2002). The Long Term Forest Plan (LTFP) system introduced by Forestry Commission Scotland (FCS) for private forests also exemplifies a more holistic approach, through its use of GIS mapping, stakeholder participation and encouragement of CCF (FC 2001c, Scottish Government 2007, See Section 3.3.4). GIS techniques have also been applied in a participatory format as Public Participation GIS (PPGIS). Jordan and Shrestha (2000) for example, applied a PPGIS approach to a community forest in Nepal, where the community assisted throughout the GIS planning process, from assisting in forest mapping to providing information on land ownership, through focus groups and interviews. The GIS was then developed in a user-friendly format to assist the community in managing its own forests.

Sheppard (2000, 2003, 2005) also outlines how computer visualisation programs, which are used to develop simulated future forest landscapes, can be used in conjunction with public participation to assist in public understanding of the potential aesthetic impacts of different management alternatives. Kimmins (1999) however, points out that what is visually preferable may not necessarily equate to what is ecologically sustainable. Bell (2003) also describes an integrated management approach as applied in a forest management study in Strathdon in the Cairngorms. In this approach, workshops consisting of local residents assisted in 'zoning' the local forest area in terms of their own perceptions, to both gather local information and determine socially-dominant landscape perceptions in the area.

2.3 <u>Summary</u>

Forest landscapes evolve and change largely as a result of interactions between their social and environmental elements. These elements are not separate entities, however, but rather interlocked components of complex systems. The effective delivery of multifunctional forestry requires that managers and policy makers recognise that forests exist as complex social-ecological systems which have specific functional limits. The concept of multifunctional forestry has evolved in conjunction with other related concepts – particularly EM and SFM. The review of these concepts has led to the development of a definition and criteria for the concept of multifunctional forest management in a modern context. A number of key criteria for the effective implementation of a multifunctional approach have been outlined, with a multi-scale 'systems' approach; multi-stakeholder participation; ecological silviculture (or CCF) approaches; and long-term spatial planning all seen as key.

3 THE POLICY AND PLANNING CONTEXT FOR THE FORESTS AND WOODLANDS OF THE CAIRNGORMS REGION

3.1 The International and European Policy context

3.1.1 The international policy context

Policy developments for forested lands have only begun to be developed at an international level relatively recently and can be linked with global concern over apparent widespread deforestation and associated issues, such as global warming. These concerns coincided with the arrival on the international scene of the concept of sustainability, which was to become the basis of international forestry policy dialogue. Following the 1987 World Commission on Environment and Development the concept of 'sustainable development' (SD) began to be promoted as the means by which humankind can begin to live in harmony with the rest of the Biosphere (Mitchell 2002).

The concept of SD became more formalised in 1992, at the UNCED in Rio de Janeiro, which led to the adoption of Agenda 21, a global programme of action for SD, which included the Statement of Forest Principles. These principles represented the first truly international forest management initiative and constituted an *"authoritative statement of principles for a global consensus on the management, conservation and sustainable development of all types of forests"* (United Nations 1992a). The importance of forest multifunctionality, participatory management, and integrated land-use policy were all highlighted within these principles. The principles remain a guiding statement as opposed to the legally binding conventions for biodiversity, climate change and desertification, all of which impact upon forestry, but also have much broader remits.

The Convention on Biological Diversity (CBD), agreed in Rio in 1992, has particularly strong implications for forestry. The convention identified 'biological diversity' as;

"the variability among living things from all sources including, inter alia, terrestrial, marine and other aquatic ecosystems and the ecological complexes of which they are part; this includes diversity within species, between species and of ecosystems" (United Nations 1992b)

This definition implicitly includes human diversity and thereby recognises the cultural, educational, recreational and aesthetic, as well as the biological facets of biodiversity (Miller 1996). The signatory countries were required to identify the components of biodiversity requiring conservation, to monitor these and to develop national strategies to ensure the conservation and sustainable use of these resources. The 1992 UNCED was followed by over fifteen years of intergovernmental global forest policy dialogue (currently within the UN Forum on Forests (UNFF)), resulting in over 130 Proposals for Action on Forests (PFAs) (FPP 2004). The UNFF has, however, come under criticism in recent years, with non-governmental organisations (NGOs) and Indigenous Peoples Organisations (IPOs) disappointed by its inability to tackle issues central to indigenous peoples, local communities and genuine sustainable forest management (Caruso and Krul 2004). The fundamental criticism of the UNFF is related to its lack of recognition of both the concerns of civil society and the reality of what constitutes genuinely participatory processes (FERN 2004).

The concept of National Forest Plans (NFPs), which resulted from international forest policy dialogue, constitutes the primary means of implementation of the Forest Principles. NFPs are developed by national government, following generic guidelines, which promote a dynamic, participatory and inter-sectoral approach to NFPs (Pulzl and Rametsteiner, 2002). The adaptability of the NFP over time and the recognition of requirements for *sectoral governmental change* for successful NFP implementation are seen as key (Pulzl and Rametsteiner 2002). FERN (Forests and the European Union Resource Network) (2004) point out that the

participatory processes involved in NFP preparation are often not sufficiently inclusive to genuinely reflect the concerns of all relevant stakeholders. At the international level public participation in environmental management was addressed as early as 1972, at the UN Conference on the Human Environment in Stockholm, however, it only become a major international policy issue in 1992 at Rio. The ideas of participatory decision making were then formalised in the EU, by the 1998 Aarhus Convention. This states that real 'participation' must involve the public being informed of key decisions early enough to ensure all possible lines of public action and that due account is taken of participatory opinion in decisions (Ebbesson 1997). Applestrand (2002) praises the convention as a progressive move, but points out that it does not provide a step-by-step formula for carrying out participation, merely a framework to support it.

3.1.2 The European Policy context

The forestry principles developed at Rio in 1992 were brought forward through various regional processes across the globe, such as the African Timber Organisation Initiative (ATO) and in Europe, the Ministerial Conferences on the Protection of Forests in Europe (MCPFE), involving 40 European countries. The second European conference, in Helsinki in 1993, resulted in the development of guidelines for sustainable management of European forests, with sustainable forest management being defined as:

"the stewardship and use of forests and forest lands in a way, and at a rate, that maintains their biodiversity, productivity, regenerative capacity, vitality and their potential to fulfil now and in the future relevant ecological, economic and social functions, at local, national, and global levels, and that does not cause damage to other ecosystems " (Anon 2000).

This definition again highlights the importance of the multiple functions of European forests, and promotes management based on maintenance of a forest's vitality and biodiversity, which

provides benefits at a range of scales. The ministerial conferences have made considerable progress in terms of pan-European commitments to sustainable forest management (Mayer 2000). The World Wide Fund for Nature (WWF) note however, that the sustainable management approach of the MCPFE and the WCED conferences has led to increasing neglect of the idea of key protection areas for priority habitats and species conservation (WWF 2004). The dominance of the 'management' approach is perhaps inevitable; however, the associated lack of emphasis on protected areas is perhaps a matter for concern.

The multi-purpose nature of forestry across Europe is well illustrated by the number of EU policies which incorporate measures relevant to this land use. These include the Common Agricultural Policy (CAP), environmental, energy, research, industry and rural development policies (Miller 1996). The 1998 EU forestry strategy focused on the development of multifunctional forests throughout the EU, as well as supporting the increased use of forestry to aid rural development. The strategy also stressed the importance of environmentally sound forest practice and the protection of forest habitats (EC 1998).

There is a range of European policies which affect forestry and a full review is beyond the scope of this chapter. Three key areas are particularly relevant however: the CAP and particularly its new Rural Development Regulation (RDR) - EU Regulation 1698/2005 (EU 2005); the Wildlife and Habitats Directive (Directive 92/43 EEC) (EC 1992); and Directive 85/337/CEC (EC 1985) on Environmental Impact Assessment (EIA) legislation for forestry. This latter directive resulted in the requirement of EIAs for certain forestry developments: a regulatory issue which is discussed later in a Scottish context.

The CAP has financially supported the planting of trees on farms since 1992, where this planting contributes to local environmental quality (United Nations 1992c), and also influences forestry indirectly through its broader effects on land use and availability. The RDR, a more recent instrument of the CAP, is of particular importance, as the Land Use

Policy Group (LUPG 2002) state: "the forestry related measures of the RDR have emerged as the de facto framework and the principal delivery mechanism for an EU forest policy". The RDR provides the basis for financial support for afforestation of agricultural land, the improvement of the quality of Europe's forest stands and forestry industry, and the maintenance and protection of biodiversity, through support of the social and environmental contributions of the private forestry sector (LUPG 2002). The CAP has recently undergone reform and the consequences of this reform, as well as the associated CAP implementation measures for Scotland, are discussed in Section 3.2.5.1. The Habitats Directive directly affects forests, through the requirement that national governments create a range of protected areas under the Natura 2000 protected sites network. These sites are generally designated due to the presence of rare species or habitats - including a range of forest habitat types such as Caledonian pine forest and a range of Oak woodland habitats (EC 1992). The EU provides support for management and conservation of these designated areas.

3.2 **The national policy context**

International forest policy developments have been relatively recent, and it is national policy developments which have been the key influence on the development of Britain's forests over the last 100 years. This has been largely in the hands of the Forestry Commission (FC) and, as such, the development of this organisation over time is charted here, along with the development of national policy generally. The broad changes in the national (Scottish and UK) forest resource are outlined as they occurred in conjunction with policy shifts, and the drivers of policy changes are also discussed, as they illustrate the importance of trends in societal thinking in the policy process.

3.2.1 A century of policy manoeuvres in the British forestry sector 1885-1985

3.2.1.1 Wartime forest policy - timber policy

The British forest resource of the early 1900s had been depleted by centuries of deforestation and accounted for just 5% of the total British land area or just over 1 million hectares (Aldhous 1997). The poor state of this resource, in terms of overall area and timber potential, was recognised at a governmental level as early as 1885 when a Commons Select Committee suggested the government should take a more active role in national forestry matters (UK Government 1887). The government's response involved the commissioning of a review of afforestation requirements in Britain and Ireland, published in 1886. This report's conclusions were that there was an over-reliance on imported forest materials in the UK, that there was a surplus of unproductive land not required for agriculture, and that further afforestation would result in increased employment opportunities (Schlich 1886).

The British government was slow to respond to the Schlich report, although a number of Royal Commissions on Forestry followed, and a more detailed report on the potential for afforestation in Britain was published in 1909 (Miller 1996). This report estimated that 9 million acres of land in Britain and Ireland could be afforested, without disrupting agricultural production, at a rate of 150,000 acres annually, and recommended the appointment of a commission to begin this task (Miller 1996). A number of forestry demonstration areas and Schools of Forestry were set up following this report; however, a commission was not established and afforestation did not begin in any real sense (Miller 1996), despite the fact that Great Britain was the largest importer of timber in the world at the time (Shaw 1956).

The First World War (1914-1918) hugely affected timber demand in Britain, and combined with the associated decline in available overseas timber, resulted in a change in the government's view on forest policy. The area of forest in the UK prior to the onset of WWI

has been estimated at 1,214,000 hectares (including Northern Ireland), of which some 96.3% was privately owned (Shaw 1956). As the war progressed, Britain's forests were hugely depleted, with almost the entire mature coniferous timber resource felled and the bulk of the best ash and oak used up during this period (Shaw 1956). The private sector supplied most of this demand, which accounted for the highest quality timber and the clearfelling of over 180,000 hectares (Healey 1969). The result of these events were the first significant moves in terms of national forest policy, with the establishment, in 1916, of the Forestry Sub-Committee of the Ministry of Reconstruction or the 'Acland Committee', whose primary objective was:

"to consider and report upon the best means of conserving and developing the woodland and forestry resource of the UK having regard to the experience gained during the war" (UK Government 1917).

The recommendations of the Acland Committee centred around the establishment of a timber reserve, sufficient to safeguard the supply of timber within Britain in the case of future global conflict. They included:

- The afforestation of 737,500ha, using coniferous species, two thirds of which should be planted by 1957, and the planting of a further 416,666ha of broadleaved species.

- The establishment of a Forest Authority with funds and powers to acquire and plant land and to make grants to the private sector for replanting or afforestation (UK Government 1917).

As Mather (2004) points out, these recommendations represented the 'moment of transition' for Scottish forestry, resulting in Britain's first Forestry Act and the establishment of the FC. By 1939, 261,000 ha of plantable land had been acquired by the FC and 150,000 ha planted (Healey 1969). The new plantations were, however, too immature to sufficiently supply the timber demands of WWII. This resulted once again in the private sector supplying much of the demand for timber during the war (Miller 1996). To control and regulate the supply of

timber from private forests, the FC introduced felling licences during this period, with foresters having to apply for a licence to fell any significant volume of timber (FC 1943) (see Section 3.3.1.1).

The huge demand for timber during WWII prompted another review of national forest policy, resulting in the FC report *Post-War Forest Policy* (FC 1943). This recommended further expansion of the afforestation proposed in the Acland Report, including the planting on bare land of 1.2 million ha of forests and the rehabilitation of existing forests to provide a further 800,000 ha, to provide a total of 2 million ha by 2005 (FC 1943). In 1955, Duncan Sandys, the then Minister of Defence, announced that future UK defence policies would be based on a nuclear deterrent, implying that any future wars would be very short, which automatically removed the military strategic objective, which had hitherto been the basis of national forestry policy (Miller 1996). The removal of the threat of long-term war did not, however, remove Britain's dependence on overseas timber. As a result, the Zuckerman Committee proposed the replacement of the military objective for continued expansion with an economic objective in 1957 (Miller 1996): the logic being that Britain needed to secure its national timber supplies, in light of the growing demand for timber globally and the associated rise in timber costs (Grayson 1993). Planting therefore carried on as before, and forestry remained focused on timber production, with the primary aim being the creation of an economically strategic timber reserve.

During the first half of the 20th Century forest establishment was mainly by the FC on acquired land, with the FC owning a rapidly expanding 500,000ha of forested land by 1960, in contrast to some 1 million ha of forests in private ownership at this time (Grayson 1993). The requirements for rapid expansion and high productivity led to a large-scale, monocultural approach to forestry development, with large, straight-edged plantations, often of exotic conifers, being the norm. Wartime fellings had impacted most heavily in Scotland, and it was here that much of the FC's planting was concentrated during this period (Mather 2004). Since

the 1930s, the perceived landscape impacts of these plantations have become increasingly controversial, although less so in Scotland than England, until relatively recently (Warren 2002a). The drive for productivity in agriculture following the world wars was also to influence forestry, with plantations being increasingly moved to upland areas to free up land for agriculture. This led to forestry often being established on poorer quality land, where productivity tended to be lower and visual impacts higher (Mather 1993, 2004).

3.2.1.2 Beyond timber – moving towards policy for the multi-benefit forest

The revised Forestry Act of 1967 charged the FC with:

> *"the general duty of promoting the development of afforestation and the production and supply of timber and other forest products in Great Britain"* and
>
> *"promoting the establishment of and maintenance in Great Britain of adequate reserves of growing trees"* (UK Government 1967)

The wording 'other forest products' of the act appears to have remained relatively unclear and the primary aim of forestry at this time remained one of timber production, following a sustained yield approach, but with increasing consideration for the recreational and aesthetic values of forestry (Miller 1996). This was further evidenced by the FC's policy review of 1963, which stated that more emphasis should be placed on the provision of public access and recreation, as well as considering the landscape and aesthetic impacts of forest plantations (FC 1963). The passing of the 1967 (Scotland) and 1968 (England and Wales) Countryside Acts also charged the FC with providing countryside recreational facilities and the conservation of the natural beauty and amenity of the countryside (UK Government 1968).

The early recognition of the value of non-timber forest functions by the FC was therefore tentative, and was further inhibited by the publication of the 1972 Interdepartmental

Cost/Benefit Study on British Forestry. This report concluded that the low returns being obtained from forestry necessitated a change to planting on better quality land, a decrease in planting costs, and the shortening of rotations, where possible, to 40 years (H.M. Treasury 1972). The FC criticised the report, arguing that it had focused on the public sector, while over half of British forests were privately owned at the time (Miller 1996). The cost-benefit analysis approach was also perhaps overly simplifying an issue within which many benefits, such as biodiversity, could not be easily quantified. However, the Treasury report was to influence forest policy in the following years, with the move towards multiple use put on hold, in favour of a more intensive phase of planting (Miller 1996), particularly outwith England and Wales, with over 85% of all forest plantations in Britain during the 1970s and 1980s being in Scotland (Mackay 1995).

Despite the intensification of planting in the 1970s, mechanisms were also put in place at this time to support the planting of more broadleaves and Scots pine woodlands. This move towards more 'eco-friendly' species was indicative of an increasing level of public environmental concern generally, which could be attributed to both increased awareness of environmental issues and easier access to the countryside through increased levels of car ownership (Miller 1996).

The publication of a 1980 report on British forest policy, by the Centre for Agricultural Strategy (CAS), a private institution, was symptomatic of this growing public concern for the environmental impacts of forestry. This report recommended that future planting proceed in a manner which increased the proportions of broadleaves planted and carefully considered the impact of planting on wildlife (CAS 1980). However, the report also recommended the planting of a further 2 million hectares of forests, to which the conservation movement strongly objected (Miller 1996). The arrival of the Wildlife and Countryside Act in 1981, which offered a measure of protection to important woodland habitats, was welcomed by conservationists. However, the continued rapid and widespread establishment of exotic

conifer plantations, often in areas of upland habitats, ensured the rift between foresters and conservationists remained and even developed further.

The importance of the private sector in terms of forest expansion was to grow in Scotland from the 1960s onwards, with the yearly level of private sector planting rising above that of the public sector for good in the early 1980s (Warren 2002a). This surge in private sector planting was encouraged not just through enhanced grants and tax incentives, but also from a government-initiated programme of disposal of FC land to private owners. The switch in terms of the FC's approach to the private sector to provide an increasing percentage of the overall planting implied two things: that overall planting rates were likely to become more unpredictable; and that policy implementation mechanisms operating within the private sector were to become more important to the delivery of national forest policy.

3.2.1.3 1985 and beyond – real multiple-use forestry

The National Broadleaved Policy, established in 1985, was a direct response to concerns relating to the widespread planting of exotic conifers across Britain and particularly the conversion of broadleaved woodlands (such as birch) to conifer plantations. The policy promoted greater use of broadleaves in plantations and the conservation of existing broadleaved woodlands, with the aim of developing a forestry resource of greater value in terms of conservation, recreation, landscape and timber production (FC 1985). Policy implementation measures included increases to broadleaved plantation and restocking grants, tighter controls on felling and the production of management guidelines for foresters (FC 1985). The 1985 amendments to the 1981 Wildlife and Countryside Act also included an amendment to the 1967 Forestry Act, which qualified the FC's duty, requiring them to endeavour to achieve a reasonable balance between:

a. *the development of afforestation, the management of forests and the production and supply of timber,*
    and

b. *the conservation and enhancement of natural beauty and the conservation of flora, fauna and geological*
    and physiographical features of special interest (UK Government 1985)

The third development of importance in 1985, the Forest and Woodland Code, was the private sector's response to the changing perception of the functions of forestry. The code, published by Timber Growers UK, the private woodland owner's trade association, recommended the incorporation of three elements in forest management: economic viability, ecological sustainability and social acceptance (Timber Growers UK 1985). The code was indicative of the increased recognition by the private sector of their responsibilities in terms of forest multifunctionality and was based in the ideas which now dominate forestry in the form of SFM. The code was well accepted by the FC and, although created as a voluntary management guidelines, it quickly became known that the awarding of FC grants was based on adherence to the code (Miller 1996). The FC published its own management guides in the following years, which gradually replaced the original private sector code as the basis for awarding grants.

A further development in the 1980s was the removal of forestry from the tax system, which resulted in the subsequent loss of tax incentives to private sector foresters, and the development of the Woodland Grant Scheme (WGS) (see Section 3.3.2.1). This was to have a variety of affects, including a reduction of planting on large estates throughout Scotland which, combined with the beginnings of support for farm forestry, resulted in changes in both the scale and type of planting, with smaller-scale landowners becoming increasingly interested in forestry as a viable alternative land use.

3.2.2 Sustainability in British forest policy

3.2.2.1 Sustainability and National (UK) Policy

In an effort to unify the fragmented nature of forest policy from the 1980s, the FC published a unifying document, *Forest Policy for Great Britain*, in 1991, which stated the government's twin aims for forestry as:

> *"the sustainable management of existing woods and forests"* and
>
> *"a steady expansion of tree cover to increase the many diverse benefits that forests provide"* (FC 1991).

This document was in line with, if not ahead of, international forestry initiatives at the time through its promotion of a sustainable multiple-use approach to management (FC 1991).

The application of the concept of sustainability in UK forestry was to be further developed in 1994, in line with the UK's international commitments to sustainability, through the publication of a UK national forest programme in 1994: *Sustainable Forestry: The UK Programme* (FC 1994). This document built on previous sustainability policy, while incorporating a new emphases on local involvement in state forest management and the planting of species native to site. The Programme is based primarily on non-legally binding international policy initiatives (see Section 3.1.1) and while there is an expectation on the part of the UK Government that the devolved administrations will take account of both international agreements and the UK Programme, they are under no legal requirement to do so.

The practical application of sustainable multiple-use forest management was an issue which had not been properly dealt with in the early 1990s, which resulted in an interdepartmental government review on the implementation of multiple-use policy in 1993. This review, the conclusions of which are set out in *Our Forests-The Way Ahead: Enterprise Environment and Access*

(SOED 1994), had included an assessment of the potential applications of increased privatisation of the forest sector. The privatisation of forestry was rejected by this report, however, the review resulted in massive organisational change to the FC. Specifically the FC was divided in 1996 into a management division (Forest Enterprise) and a regulatory division (Forest Authority), with the forest research division also being established as a separate organisation in 1997.

The requirement for practical advice on SFM led to a number of developments in the late 1990s. The first was the UK Forestry Accord in 1996, which comprised of a set of principles for sustainable forest management which had been negotiated between an array of forest and environmental groups (Anon 1996). The FC, in conjunction with others, further expanded the practical application of sustainable forestry by developing standards, which incorporate criteria to guide and monitor sustainable forestry. These include a UK standard for SFM (FC 1998), a UK standard for independent certification (the UK Woodland Assurance Scheme or UKWAS) (FC 2000), and a new regulatory and support framework.

3.2.2.2 The development of the UK Woodland Assurance Scheme

The development of the UK Forestry Standard paved the way for the second key forestry development of the late 1990s, an independent forest certification scheme. Forest certification arose essentially from the campaigning efforts of environmental organisations against the global trade in timber from unsustainable logging, particularly from tropical forests (Goodall 2000). The issue of unsustainably sourced timber is particularly important in the UK, with imports accounting for over 80% of the timber used in Britain (SE 2000a). The demand for certification grew further within the forestry industry through the formation of buyer groups dedicated to sourcing timber from certified forests (Goodall 2000). This in turn led to concern over the possibility that domestic markets would be lost to imported certified material. Two programmes dominated forest certification politics globally at the time: the Forest Stewardship

Council (FSC) and the Pan-European Forest Certification (PEFC) program (see Cashore *et al.* 2003 for more detail on these programs).

The first certification measure in Britain developed independently of these programs, with the Forest Industry Council of Great Britain (FICGB) creating the FICGB Woodmark (Kiekens 1997). These nationally independent moves were largely a result of a view on the part of the government and the private sector that the FSC had an environmental bias and was unnecessary in countries where government regulations were well developed (Cashore *et al.* 2003). However, this view was challenged by both the demand side of the timber industry and the environmental sector which, due to concern that national certification did not address the issue of unsustainable logging in tropical forests, supported the international FSC program (Viana *et al.* 1996). This polarity of views led to an agreement between interested parties that the FC should facilitate the development of a common standard, which led to the development of the UK Woodland Assurance Scheme (UKWAS) in 1999 (Goodall 2000). The UKWAS relies on the FSC as its certification base and is managed by an independent steering group.

To achieve certification through UKWAS, forest management and the 'chain of custody' from source to retail outlet are independently assessed, with products from an UKWAS certified forest able to display the FSC label. By 2002, over 1 million hectares of British forest (834,000ha of which is the FC estate) had achieved UKWAS certification, which represents the dominant form of certification in the UK (Goodall 2002). However, the UKWAS is not the only pathway to certification available in the UK, and many non-industrial private forest (NIPF) owners remain distrustful of the usefulness of FSC Certification (Cashore *et al.* 2003). This has led to increasing interest in the landowner-initiated PEFC (Programme for Endorsement of Forest Certification Schemes) program, which now recognises UKWAS as a legitimate pathway to PEFC certification and is seen as an alternative to FSC-based certification in the UK (FCS 2004a).

Forest certification may increase the competitiveness of British timber globally and improve the standard of forest management. However, registration with UKWAS also means that forest managers have another layer of regulation to deal with. Currently the entire FCS estate is registered under the UKWAS, while under 100,000ha of other forests in Scotland are certified (predominantly under the UKWAS) (SE 2002a). The long-term success and further uptake of the UKWAS is likely to relate both to comparative returns between non-certified and certified forests, and to the level of existing regulations (outside of UKWAS) forest managers have to deal with.

3.2.3 Devolution and policy nationalisation

3.2.3.1 Devolution and forestry in Scotland

The late 1990s and the new millennium have seen continued adoption of SFM, as well as moves towards nationalisation of forest policy. The beginning of a more national (Scotland, England, Wales) approach to forest and general environmental policy in Britain is generally recognised as the dividing of the Countryside Commission, formerly a single British organisation, into two separate commissions, one for England and Wales and one for Scotland, in the late 1960s. It was not, however, until 1995 that the British Government published separate policy proposals for England, Scotland and Wales regarding countryside issues, (including forestry), in the form of three Rural White papers.

These Papers recommended that the area of forest in England should double in the following 50 years, that the area of forest in Wales should increase by 50% (no specific timescale), and that forest expansion in Scotland should continue, with no rates or areas being specified (Aldhous 1997). These targets were ambitious; as Aldhous (1997) points out, the targets for England and Wales alone implied an overall increase in forest area across Britain of 50%, a

target similar to that of the Acland report, but to be achieved in half the time. The government changed in 1997, which led to the white papers being put aside and the expansion targets being dropped, although rapid expansion continued.

Devolution of the UK policy process continued and, in 1997, referenda in Scotland and Wales led to many functions of the UK Government being devolved to the new National Scottish Parliament and National Assembly of Wales. The Scottish Parliament can now create its own legislation for forestry in Scotland (Interdepartmental Review Group 2002). Following devolution, the FC was also subject to change, now reporting separately in England, Scotland and Wales to the respective governments (Interdepartmental Review Group 2002). However, complete devolution of the FC's powers was restricted due to a number of concerns, including: the difficulties in contributing to and implementing international policy agreements with multiple administrations within Britain; the potential disruption to timber trading; and the problems of building up new relationships with a new forestry administration (Inglis 1999).

As a result, the FC was designated as a 'Cross Border Authority', with responsibilities and powers being divided between the British FC administration and the Scottish and Welsh devolved governments. Key activities and responsibilities such as: plant health, international policy formulation and implementation, pensions and direct support for Forestry Commissioners remains the remit of the British FC (Interdepartmental Review Group 2002). The retention of these powers has been seen by some as going against the fundamental reasoning behind devolution, namely to decentralise power and bring the decision making processes closer to those affected (Inglis 1999). However, the Scottish Government do now own the FC's assets of the FC in Scotland, as well as being in control of the appropriation of funds to FCS. Crucially, Scottish Ministers also have the power to alter the structure of, or to disband, public bodies, and could therefore create a new forestry administration in Scotland (Inglis 1999).

The retention of responsibilities for international policy with Westminster does appear to imply, however, that the further development of the UK Forestry Standard and UK Programme for Sustainable Forestry will remain primarily the responsibility of the UK Government and the British FC. The UK Government has stated that it "will involve the devolved administrations as fully as possible in discussions about the formulation of the UK's policy position on all EU and International issues which touch on devolved matters" (Anon 2001). The future success of the FC as a Cross Border Authority is therefore likely to be measured by the success of internationally agreed and implemented indicators and objectives in a Scottish context. The interpretation of international policy is fundamental, especially in relation to issues such as participative management, given the differences particularly in landownership systems, management scale and demographics between Scotland and the rest of Britain.

In practice, the concept of devolution relates well to concept of sustainability through its more localised approach to decision making, currently evident in the Scottish Government's large-scale consultation approach to national strategy development A logical extension to devolution in relation to forestry could be seen as increasing public involvement in management decision making for forestry at multiple scales, which would also relate strongly to the modern interpretation of multifunctional forestry.

3.2.3.2 A national forest strategy for Scotland

Following devolution, the most significant forestry policy move was the publication of national forestry strategies for England, Scotland and Wales in 1998, 2000 and 2001 respectively. The Scottish Forestry Strategy (SFS) was released in 2000 and proposed a vision for the future of Scottish Forestry:

"Scotland will be renowned as a land of fine trees, woods and forests which strengthen the economy, which enrich the natural environment and which people enjoy and value" (SE 2000a)

The strategy was revised in 2006 in line with changes in the broader policy framework. The revised strategy proposes that Scottish Forestry be sustainable, socially inclusive, and integrated with other land uses (particularly farming) and businesses (SE 2006a). To achieve this vision, a number of objectives are proposed, which include: developing greater community participation in forest management and enhancing opportunities for public health and enjoyment of forests; developing markets for timber products, a stronger timber supply chain and facilitating rural business diversification; and contributing to climate change mitigation, landscape quality, biodiversity and the natural and cultural environment through forestry (SE 2006a).

To deliver these objectives, the SFS emphasizes the importance of a number of key areas including: the further development of forest habitat networks; the support of high silvicultural standards; promotion of partnership approaches to management and policy making; and the support of regional approaches to the making of decisions relating to land use. The strategy also proposes that, by 2050, the majority of privately owned forests be under FCS approved long-term forest plans (LTFPs). The SFS is strongly structured towards the development of opportunities for rural communities through diversification of the forest resource and the further development of forestry-related businesses (including tourism) and further involvement of local communities in forest management. This format is a product of the overall focus in the Scottish Government on rural development, evident in the recent Rural Development Programme for Scotland (2007-13) (Scottish Government 2007), as well as in *'A Forward Strategy for Scottish Agriculture – A Discussion Document'* (SE 2000b) and in *A Forward Strategy for Scottish Agriculture: Next Steps,* (SE 2006c).

The SFS predicts timber production as peaking in 2020, to double that of current rates, with a decline predicted beyond 2025. Wood processing businesses require consistent timber supply if they are to continue to invest in the industry and thus the SFS promotes a smoothing of timber supply to combat this potential peak and trough in supply. To facilitate this, the SFS promotes continued forest expansion (to achieve 25% cover by 2050) and the phased restructuring of plantations. This target requires the steady staged planting of some 660,000ha of forest by 2050 at double the current rates (Coppock 2004a). This rate of expansion appears optimistic, given the promotion of expansion by the 2000 SFS and the actual planting of 38,000 ha in the 2001-2005 period (7,600ha per annum) (Towers *et al.* 2006). At a planting rate of 7,000ha per annum, it would take over 90 years to reach 25% forest cover. Towers *et al.* (2006) also conclude that, while the 25% target is achievable from land-use planning and biological perspectives, it is unlikely to be possible without significant changes in the economic attractiveness of woodlands relative to agriculture – due to the largest available land bank for forest expansion being agricultural land.

Regardless of planting rates, it is clear that this staged expansion will not stem the loss of production volume post 2025 (Coppock 2004a). To address this, the SFS also promotes continued plantation restructuring and the use of high-yielding species and improved stock to allow for the sustained annual production of 8.5 million m^3 by 2050. However, restocking and expansion programmes in Scotland are no longer dominated by exotic conifers, with current planting being made up of 15% native Scots pine, 50% broadleaves and 35% exotic conifers (Coppock 2004a). These figures contrast with the current state of the Scottish forest resource, of which 70% consists of non-native conifers (SE 2006a), which in turn contrasts with the Cairngorms region where non-native conifers occur at only 21% and broadleaves at about 18% (CNPA 2006b). The emphasis on plantation restructuring in the SFS also illustrates a change in approach, from one of rapid expansion, to one encouraging higher standards of SFM. The ownership of the Scottish forest resource (now 1.3 million hectares) is divided between the FC, which owns 38%, and a range of 'non-FC' owners (Table 3.1).

Table 3-1 Total forest area in public and private ownership in Scotland (in thousands of hectares) (FC 2002c)

Forest Type	Forestry Commission	Other Owners	Total
Conifer high forest	455	598	1053
Broadleaves and other woodland	23	241	264
Total	478	839	1317

Since 1917, forest cover in Scotland has increased from under 5% to the current level of 17% (Mather 2004), with the objectives for the management of this resource also having broadened considerably. As Warren (2002a p65/66) states: "assessed against twenty-first-century 'quality criteria', twentieth century forest policy appears ill-judged and myopic in its one track focus on quantity". The FC have, however, been successful in terms of their policy remit, having more than tripled the Scottish forest area since the early 1900s. However, past timber-focused policy objectives have left Scotland with a forest resource dominated with large, often low-quality, non-native plantations, while modern policies demand high-quality timber, recreational resources, community involvement, and nature conservation. Two lessons are apparent: firstly, that policy objectives for forestry continually change and are therefore likely to do so again in the future, which necessitates considerate future planning; and secondly, that expansion alone will not rectify the problem of a poor quality existing resource, which necessitates a broad-scale conversion approach as well as further forest expansion.

3.2.4   Relevant British and Scottish Environmental Policy

Perhaps the most significant area of policy to affect forestry apart from direct 'forest policy' is biodiversity and conservation policy. The earliest UK conservation policy developments involved the establishment of the Nature Conservancy (NC) in 1948, followed in 1949 with the passing of the National Parks and Access to the Countryside Act, which introduced National Nature Reserves (NNRs) and Sites of Special Scientific Interest (SSSIs). The SSSI designation constituted the first significant protective measure for Scotland's forests. These

early SSSIs required that authorities consult the NC before granting planning permission within the SSSI. However, farming and forestry are not regulated by the planning acts, resulting in the SSSI concept often being seen as deficient during this period, with some woodland sites still being destroyed regardless of designation (Matthew 2002, Latham and Kirby 2002). The Wildlife and Countryside Act (1981) led to advancements in SSSI procedures, giving a greater level of protection against forestry or agricultural developments within SSSIs.

Scottish SSSIs are dominated by heather moorland, which accounts for 35.4% of all Scottish SSSIs; less than 5% of the total Scottish SSSI area is under woodland cover (Roberts *et al.* 2002). SSSIs are generally privately owned and operate, nowadays, through compensatory management agreements with landowners which often require a minimum or low intervention approach (Latham and Kirby 2002). Active management can also be required and, in woodlands, can involve removal of exotic species or deer control (Latham and Kirby 2002), as well as low-intensity grazing (Mayle 1999). Timber production is not necessarily prohibited in SSSIs, and can even be encouraged, with natural regeneration being the preferred form of re-stocking (Latham and Kirby 2002).

NNRs were initially focussed on areas of high biological and research interest, although NNR management objectives have evolved and now often include access facilitation and education (Pryor and Peterken 2001). Since the creation of SSSIs and NNRs, further layers of protection for Scotland's heritage have evolved. These include Special Areas of Conservation (SACs) and Special Protection Areas (SPAs) - both designated under EU legislation. National Scenic Areas (NSAs), a form of landscape conservation, are also designated in Scotland and can impact on forestry through restrictions on planning proposals. The most recently developed Scottish designation is the National Park (NP) (see Section 4.5.1.5.). There also exist various regional designations across Scotland, as well as Local Nature Reserves, designated by local authorities and NGOs.

In total, almost one fifth of Scotland is now under some form of conservation designation (Warren 2002a) and this is clearly positive for biodiversity conservation. However, concerns related to the degree of overlap and potential conflict between designations and the associated complexities in land management led to a review by the Scottish Office in 1996 (Scottish Office 1996). The consultations on land reform legislation (LRPG 1999) also showed that many stakeholders feel that designations can inhibit rural development. These concerns led to reviews of SSSIs (SE 2001) and NNRs (SNH 2003), which together with the Nature Conservation Act (Scotland) (2004), appear to be leading towards greater community involvement in designated areas management.

Concerns relating to the scattered nature of designations and their limited impact outwith their boundaries (Bishop *et al.* 1997), combined with the development of large-scale conservation concepts such as the Scottish Forest Habitats Network (Peterken *et al.* 1995), led to the promotion of wider-scale approaches to conservation, often involving 'partnership' approaches, in the mid to late 1990s. International biodiversity-related initiatives also influenced the move away from situation-based conservation, towards extensive sustainable land use. The signing by the UK Government of the Convention on Biological Diversity resulted in the publication in 1994 of the UK Biodiversity Action Plan (UK Government 1994). Since then, a range of Habitat Action Plans (HAPs), Species Action Plans (SAPs) and Local Biodiversity Action Plans (LBAPs) have been produced (see www.ukbap.org.uk). Two specific HAPs are particularly relevant: the Native Pine Woodlands HAP (UK Government 1995) and the Upland Birchwoods HAP (Thompson and Holl 2003). Their key targets are shown in Table 3.2.

Table 3-2 Key Objectives of the Native Pine Woodlands and Uplands Birchwoods Habitat Action Plans (UK Government 1995 and Thompson and Holl 2003)

Native Pine Woodlands HAP Objectives (1995)	Upland Birch Woodlands in Scotland HAP Objectives (2003)
Maintain current (1995) wooded areas in the 'core areas' of pinewoods listed in Caledonian Pinewood Inventory (CPI) and improve their condition.	Facilitate natural birchwood dynamics by encouraging core area expansions, the development of uneven-aged mosaics and the development of FHNs.
Expand wooded areas of the native pinewoods by establishing 5600 hectares, predominantly by natural regeneration, by 2005.	By 2010 initiate management of 50% of the total upland birchwoods resource.
Create conditions by 2005 for further 5600ha of native pinewoods to be naturally regenerated by 2025.	By 2015 achieve favourable condition of 50% of the total upland birchwoods resource.
Establish 25,000ha of new native pinewoods by 2005, preferably by natural colonisation.	Restore site native species on 900ha of former upland birchwoods that have been converted to non-native plantations by 2010.
	By 2010 establish 2250ha on non-wooded sites or by conversion from non-native plantations (natural colonisation preferred)

Following devolution, Scottish implementation of international and UK policies also resulted in the production of a Scottish Biodiversity Strategy (SBS) (SE 2004a). Its overall aim is: "to conserve biodiversity for the health, enjoyment and wellbeing of the people of Scotland now and in the future". The strategic objectives of the SBS also include halting biodiversity loss and improving landscape and ecosystem level management (SE 2004a). Both the SBS and recent FCS publications place strong emphasis on forest restoration and the strengthening of the role of natural processes, with key measures seen as including: fence removal; the encouragement of natural regeneration; the reduction of prevalent introduced species; the encouragement of 'natural processes' such as low-intensity grazing (Peterken and Stevenson 2004, SE 2004a and 2004b).

A key area for concern in relation to biodiversity action plans appears to be the lack of financial backing for, and implementation of, these plans. This lack of financial support appears to have been partially addressed, with the SBS having been formally designated as a legal document in 2005, which public bodies now have to take into account. The Nature Conservation (Scotland) Act of 2004 also supports the SBS in a legislative sense, requiring

public bodies across Scotland to "further the conservation of biodiversity" and together with the SBS appears to constitute the most significant moves in this area, in Scotland, since the Wildlife and Countryside Act of 1981. However, the availability of funding for the implementation of BAPs appears to remain an issue.

3.2.5 Other relevant national policy

3.2.5.1 Agricultural and rural development policy

The overall focus of agricultural policy in the post-war period involved increasing productivity, with the key driver having been the same as that for forest expansion; the desire for national self sufficiency (in terms of food supply). The key elements of UK post-war agricultural change were: larger farms, enterprise specialisation and land use intensification (LUPG 2002). This productivity surge was supported with grants, subsidisation of farm expenditure and livestock headage payments, later followed by the supplementation of market returns for farm produce (Thomson 2002). Britain's entry into the EEC in 1972 saw many of these grants and subsidies being discontinued (Dobbs and Pretty 2001), although price support continued through the EU Common Agricultural Policy (CAP) (Thompson 2002). Production support through the CAP during the 1970s and 1980s led to further productivity increases, and the creation of huge surpluses or 'food mountains' of major farm commodities throughout Europe (SE 2004c). The overstocking of sheep, which has occurred in many areas as a result of livestock headage payments (Kirkpatrick *et al.* 1999), has also been associated with inhibiting regeneration in semi-natural woodlands (Mayle 1999, Hester *et al.* 1996a, Nelson 1995), and with the loss of heather moorland habitats (Kirkpatrick *et al.* 1999).

During the 1970s and 1980s, CAP support payments also tended to be capitalised into higher land prices, resulting in farmers being less likely to change their agricultural practices or innovate (e.g. plant trees) (LUPG 2002). This influence of agricultural profitability on forestry was well illustrated in the 1920s and 1930s, when high forest expansion rates were aided by

the availability of cheap land, due to the poor returns available from upland farming at the time (LUPG 2002). The subsequent heavy subsidisation of agriculture, combined with the fact that forestry tax incentives were more attractive to larger landowners, led to post-war forestry expansion, prior to the 1990s, being primarily undertaken by large landowners rather than farmers, and often on poor quality land in upland areas (LUPG 2002). Forestry was not generally seen as a preferential option by farmers at this time, due to a combination of loss of land-use flexibility, loss of agricultural subsidies (Thompson 2002), and traditional perceptions by farmers involving the segregation of forestry and farming as land uses (Warren 2002a), a perception reinforced by the nature of policy itself.

Production support also resulted in a Scottish agricultural sector severely dependent on subsidisation, a situation particularly pronounced in Less Favoured Areas (LFAs) - designated under the CAP. The LFA system accounts for over 90% of Scottish agricultural land, with LFA farms receiving considerably enhanced market support and capital investment, with farm subsidy income often two or three times higher than net farm income (Thompson 2002, SEERAD 2004). The key criticism here is perhaps not the apparent support of non-viable products or a false economy, but rather the lack of recognition of the many other social and environmental services being supplied by farmers in LFAs.

The 1992 CAP reforms marked a change in agricultural policy by moving away from market support towards more direct payments to farmers, which led to the development of agri-environmental schemes (Thompson 2002). The Agenda 2000 CAP Reforms also allowed member states to shift some of their CAP funds away from production support towards Rural Development and Agri-Environmental Programs (modulation) (LUPG 2002, Dobbs and Pretty 2001). In relation to forestry, this funding shift has had two effects: greater availability of grants for agri-environmental and rural development measures - to conserve existing farm woodlands and plant new ones; and potentially greater farm-forestry integration through

decreasing production support, which encourages diversification and indirectly benefits woodland regeneration through decreasing land-use intensity.

Agri-environment schemes had begun in the UK prior to the 1992 CAP reforms, with the establishment of Environmentally Sensitive Areas (ESAs), which involve compensatory agreements with farmers, in 1987. ESAs have led to increases in farm incomes, with increases in annual household income (in 1997) across the nearly 200 scheme entrants in two ESAs in the Cairngorms of £4,000-5,000, with this compensation primarily related to woodland management measures (MLURI 2000). The success in terms of minimising environmental damage appears to have varied, although livestock exclusion has resulted in increased regeneration in certain woodlands (SEERAD 2000). Furthermore, most ESA entrants indicated a greater interest in conservation as a result of ESA scheme participation (MLURI 2000). ESAs closed to new applications in 2000 and the Rural Stewardship Scheme (RSS) took over as the major agri-environment measure in Scotland (SE 2004c).

While agri-environment measures resulted in more farm woodlands being planted throughout the 1990s (FC 2003), the Forestry and Timber Association (FTA) argue that forestry continues to operate on a *'non-level playing field''*, with direct support to the UK forest sector for the 2001/2002 period being less than 2% of that supplied to agriculture (FTA 2003). The FTA conclude that this reflects a lack of recognition of the social and environmental benefits provided by private sector forestry, and argue that annual payments to forestry should equal de-coupled agricultural payments.

The 2000 and 2003 CAP reforms reinforced moves towards a 'de-coupling' of agricultural subsidies and production rates. The Single Farm Payment (SFP), which involves paying farmers per hectare of land in agricultural production, was criticised due to the exclusion of woodlands from SFP calculation, which, in practice, meant that wooded land would decrease in capital value from the farmer's perspective. This was seen as being compounded by further

measures of the CAP reforms, which state that action should be taken to prevent any decrease in the area of 'permanent pasture'. This category of land is, in fact, often made up of degraded moorland and represents one of the main opportunities for forest expansion in the UK (FCS 2003a, Towers *et al.* 2006). Furthermore, the 'Good Agricultural and Environmental Condition' (GAEC) measure of the 2003 CAP reforms states that farmers must avoid encroachment of 'unwanted vegetation' on agricultural land. However, the reduction in grazing intensities likely to result from de-coupling should encourage regeneration on farmland, the product of which could potentially be removed, if 'unwanted vegetation' was interpreted as including regenerating woodland (FCS 2003a). To address the issue of woodland being excluded from SFP calculation, the Scottish Executive announced in 2004 that farmers would be allowed to apply for consolidation of entitlements for the SFP on their remaining land, allowing afforestation of up to 50% of the eligible hectares, under available forestry grants, without loss of SFP (SEERAD 2005).

Further moves towards 'de-coupling' are positive from an environmental perspective and do offer opportunities for the forestry sector. The historic receipts approach adopted to SFP payment in Scotland also implies that payments will be higher where agricultural practices have been more intensive in the past, implying that lowland arable farms will continue to receive high payments and upland farms will continue to receive low payments (WWF 2004). This could actually encourage diversification into woodland establishment on farms in areas like the Cairngorms; however, it also implies that forestry could continue to be viewed as a non-profitable measure on lowland farms and better quality land (LUPG 2002). Increased funding under the CAP for agri-environment and rural development schemes, could assist in increasing the degree of available support for forestry through a predominantly EU-funded channel, a view supported by the FTA (2003) and the WWF (2004).

Since 2001 work has been ongoing to develop a more integrated approach to government support of land management in Scotland, culminating in the introduction, under the *Scottish*

Rural Development Plan (2007-2013) in late 2007, of Rural Development Contracts (RDCs) (Scottish Government 2007). The RDC system represents a fully integrated approach to land-management support as it incorporates the SFP system, most of the main forestry support systems, and a range of other support measures related to rural development. The idea behind the RDC system is the enhancement of land-use integration and a simplification of bureaucracy relating to land management through the development of a 'one-stop-shop' approach. Theoretically, the RDC system could help tackle many farm-forestry integration issues, through the implementation of previously fragmented policies in a more integrated and coherent fashion. As Towers *et al.* (2006) note this system offers real potential in particular to develop deeply integrated agroforestry approaches in Scotland. However, these authors also caution that trying to integrate a range of complex policy areas into a single framework could lead to the creation of a policy 'black box' that land managers and farmers do not understand and are therefore discouraged by.

3.2.5.2 Other key policies of relevance

The issue of land reform has long been debated in Scotland, largely due to the survival of the feudal system of land tenure in Scotland throughout the 20th century and the concentrated pattern of landownership (Wightman 2000). However, despite early land reform measures in the late 1800s and early 1900s, it was not until the 1990s that land reform came back on the political agenda. This was influenced by a change in government in 1997 and growing concerns that the system of large-scale private ownership in Scotland was constraining the 'life chances' of rural communities (Warren 2002b), as well as being associated with considerable negative environmental impacts - including the exploitation of semi-natural pinewoods in the Cairngorms (Shucksmith 2002). The high deer numbers maintained on many Scottish estates for sporting reasons, in particular, have been associated with the inhibition of regeneration and biodiversity loss in woodland habitats (Hunt 2003). The control of predators to protect

game birds on sporting estates has also led to the apparent persecution of rare birds of prey and mammal species (see Lister Kaye 1994).

These concerns (among others) led to the Land Reform (Scotland) Act (2003) (SE 2003a) which gives rural and crofting communities a 'Right to Buy' and increases public access rights on private land. The decision as to whether or not to sell a property remains, in the case of the community right to buy, with the landowner, with the community being given the first opportunity to purchase, while in the case of crofters the decision to buy rests with the crofting community, regardless of whether an owner wants to sell (SE 2003a). FCS has also introduced the National Forest Land Scheme (NFLS) which aims to increase the availability of state-owned forest land for community (and NGO) acquisition (FCS 2004b). Land reform legislation could result in more community buyouts of forest lands, although buyouts were occurring prior to the act, and the legislation does not necessarily mean more money will be available for community purchases. At the level of forest policy impact, further land reform developments could have a fundamental role, with any changes to the scale of ownership potentially influencing the impact of forest policies and the hence the choice of forest policy instruments in the future.

The EU Water Framework 2000/60/EC, (EU 2000), implemented in Scotland through the Water Environment and Water Services (Scotland) Act 2003 (SE 2003c), also has the capacity to affect forestry development in Scotland. In particular, the Scottish act introduces sustainable flood management and encourages a participative river-basin-wide approach to water management. The integration of the act's measures into forestry policy may lead to greater support for the transformation of areas of agricultural land to riparian woodlands and floodplains, as well as enhancing the role of woodlands in flood prevention.

Deer are also of high relevance to forestry in the Cairngorms (see Chapter 4). In terms of policy, the Deer (Scotland) Act 1996 (SE 1996) represents the key measure in Scotland and

grants the Deer Commission for Scotland (DCS) statutory powers to control deer in a given area, regardless of ownership, if it is deemed that environmental damage is being caused from high deer numbers. Such measures have, so far, rarely been necessary in practice. In response to growing concerns surrounding the impacts of high deer numbers on the environment, particularly in sensitive areas, a number of other policy developments have also occurred more recently. These include the long-term vision of the DCS (DCS 2000), which envisions deer in Scotland increasingly moving into more wooded environments and occupying land of greater ecological value, as well as promoting collaborative deer management.

Two joint multi-agency statements, one on deer fencing and one on deer management more generally, were released in 2004 (DCS *et al.* 2004a, 2004b). Specifically, these statements support a collaborative approach and the taking of a considered site-specific approach to deer management in Scotland which attempts to account for private and public interests through the use of both regulations and incentives. The practical administration of landscape-level deer management in Scotland is now also supported by some 70 Deer Management Groups (DMGs), established over the last 30 years. DMGs are voluntary, being run by the representatives of the landholdings in the Group area, with deer counts carried out annually across each DMG. These counts provide a basis for setting the cull requirements to meet the combined objectives of the DMG and ensure that environmental quality and a sustainable deer population are maintained, with many DMGs also producing Deer Management Plans (see www.deer-management.co.uk). The DCS is also currently in the process of developing a Wild Deer Strategy for Scotland, due for completion in 2008.

A final area of relevant policy which has developed considerably in recent years relates to climate change mitigation and renewable energy. Within the Scottish Climate Change Programme (SE 2006b), the forest sector is highlighted as having the capability to contribute to emissions reduction targets through carbon sequestration, by substituting wood for fossil fuels and by substituting wood for more carbon-intensive construction materials. The

programme commits Scotland to ensuring 18% of electricity is generated from renewable sources by 2010, while Scotland's Renewable Energy Strategy (SE 2003d) suggests an aspirational target for Scotland of 40% electricity production from renewable sources by 2020. The 2005 publication Wood Fuel for Warmth (SE 2005) outlines how the development and promotion of woodfuel heating systems in Scotland could contribute significantly to reducing national carbon emissions and addressing high (heating) fuel costs. The SRDP also provides grant schemes to support the establishment of renewable energy schemes for both land managers and communities (Scottish Government 2007).

3.3 Forest policy implementation: regulation, planning and support in Scottish forestry

The FC has been, and continues to be, the key developer and implementer of National Forest Policy in Britain, with FCS assuming this role more recently in a devolved Scotland – as well as acting as the primary planning authority in relation to (public and private) forestry in Scotland. While forestry does not come under formal planning legislation, forest policy implementation and planning does involve planning authorities through both the development of Indicative Forestry Strategies and their capacity as formal consultees of FCS. Key to the implementation of forest policy in the UK and Scotland has been the use of grant systems. FC grants are not a form of direct regulation on the forested lands, but a voluntary system which, once entered, incorporates a formal agreement which acts in turn as a form of control. Further planning and control measures include the regulation of tree felling and the requirement for Environmental Impact Assessments (EIAs) for certain forestry developments. The planning process for Scottish forestry in Scotland also includes spatial planning measures at a range of scales, as well as the various consultation procedures FCS follows, and key control and regulatory measures, are discussed below.

3.3.1 Regulatory instruments in Scottish forestry

3.3.1.1 Tree felling licences

Felling of trees in Scotland is subject to direct control, and all felling greater than five cubic metres requires that the landowner/tenant apply for a licence from the FC (FC 2002a). Felling licences represent a firm regulatory measure for control of felling, particularly at large scales; however, there are some potential areas for concern for small woodlands of conservation importance. Firstly, the regulations apply to felling during *'any given quarter'* (FC 1967), and a firm effort by a landowner to fell up to this limit every quarter, in a specific woodland, could result in the cumulative felling of a large area. Secondly, on tenanted land, the regulations apply to the tenant, meaning one landowner could have multiple tenants each felling five cubic metres, which cumulatively could amount to a significant area of felling, which could be important in areas of high conservation value.

3.3.1.2 Environmental impact assessments

The current regulations governing the requirements for EIAs in Scottish forestry are the EIA (Forestry) (Scotland) Regulations 1999, which developed from implementation of EU Directive 85/337/CEC (1985). These regulations require that, for relevant projects (i.e. deforestation, afforestation, forestry roads or quarries), the FC must determine whether or not an EIA is necessary (FC 2001a). The regulations give *thresholds* to define those projects which will not need to be considered for an EIA, as well as defining *sensitive areas*, within which these thresholds do not apply or are lower (FC 2001a).

In practice, many forestry projects above the thresholds would be unlikely to be determined as requiring an EIA, with larger projects, projects in sensitive areas and those with higher potential impacts more likely to be determined (Gray and Jones 1999). This is not to say, however, that EIAs are carried out infrequently: Figures from Gray and Jones (1999) and FCS (2004c) show that between 1988 and 1996 over half of all planting carried out was within

schemes subject to EIAs. This does not imply that half of the applicants needed to carry out EIAs, as a relatively large area of planting may have been from a relatively small number of applicants.

The EIA requirements for forestry developments in Scotland represent the only statutory regulatory measure relating to tree planting outside of the grant system. Despite this, the practice of EIA in the forest sector has been subject to criticism. Gray and Jones (1999) highlighted weak scoping measures as a serious flaw, which often resulted in Environmental Impact Statements (EISs) being unfocused, as well as failing to sufficiently identify potential proposal impacts. EIA regulations in Scotland (1999) now include provision for a scoping meeting (FC 2001a), which represents an opportunity for more efficient identification of impacts and for increasing the level of 'participative' management in private sector forestry. The FC does not currently define what is meant by 'relevant stakeholders', however, and, while community involvement in the scoping process is encouraged (FC 2001a), it is not required.

A further criticism of the EIA system from the point of view of private foresters relates to the degree of work and expense involved in carrying out EIAs, which has resulted in private foresters often viewing EIAs as an unnecessary regulatory measure in the UK, where the standard of forest management is already relatively advanced. This issue is perhaps further exacerbated by the fact that most forestry EIAs involve the private sector, as 90% of all planting since 1994 has been by the private sector (FTA 2003). The context for EIA legislation in forestry has also changed dramatically since the passing of the original European EIA legislation in 1985, with the scale (and therefore potential impact) of planting (particularly in upland areas) having decreased rapidly from 1988 onwards with the removal of tax incentives, and the standard of forest management having also risen during this period. These concerns have led to FCS querying whether the current regulatory framework is actually

restricting forestry development and whether scope exists for lessening the regulatory burden on the private sector (FCS 2004c).

3.3.2   Fiscal incentives and forestry development in Scotland

3.3.2.1 A brief history of forest policy incentives

The earliest forestry incentives in the UK (basis I and II dedication schemes) were developed in the 1940s and involved landowners entering into compensatory agreements with the FC to use specified areas of land for forestry, with timber production as the primary objective. Early dedication schemes, combined with available tax incentives, were successful in achieving high planting rates. These schemes were criticised by the private sector, however, for being overly restrictive; and by the conservation movement, in relation to the widespread loss of upland habitats (Miller 1996). This resulted in the introduction of basis III schemes in 1974, the objectives of which were more diverse (although the primary objective remained timber production) and included farm-forestry integration and the provision of environmental and social benefits (FCS 2004d).

In 1978, the Native Pinewoods Grants Scheme (NPGS) was also developed, with native pinewood planting being changed to the broadleaf rate of £330 per ha, as opposed to the £135 rate for non-native conifers (Miller 1996). The early uptake of the NPGS was low, however, mainly due to planting being restricted to areas near Caledonian Pinewood remnants and the scheme's encouragement of ploughing in these areas, which may have actually limited future natural regeneration (Bain 1987). Basis III Dedication remained the overall grant system until 1981, when it was replaced with the Forestry Grant System (FGS), a similar but more streamlined system (Miller 1996).

The FGS ended in 1988, with the introduction of the Woodland Grant Scheme (WGS). The WGS was developed in line with the ending in 1988 of tax relief incentives for forestry operations, with the removal of forestry from the tax system (SE 2002b). Prior to 1988, tax

incentives had allowed expenditure on forestry to be offset against other income, which had promoted heavy investment in forestry, particularly by large landowners (Grayson 1993). This system had encouraged more active management of lowland estates, with considerable social and environmental benefits; however, it also encouraged landowners in upland areas to plant extensive areas of land unsuitable for commercial forestry – which had considerable environmental and landscape impacts (Tompkins 1989). The removal of tax incentives was therefore a positive move with respect to Scotland's upland environments. However, it also resulted in a serious decline in planting, a decrease in employment associated with forestry and a reduction in active management of private forests (Price *et al.* 2002, Grayson 1993). The WGS reflected a broadening of forest policy objectives and incorporated multiple grant schemes including support for timber production, landscape enhancement, habitat creation, and recreation provision. The Farm Woodland Scheme (changed to the Farm Woodland Premium Scheme, FWPS, in 1992) was also initiated under the WGS to encourage afforestation of agricultural land.

The Community Woodland Supplement was also initiated under the WGS (SE 2002b), to support woodland development in and around urban areas and improve access to wodlands (Countryside Commission 1989). Since the late 1980s, community woodlands have developed considerably in Scotland, with community involvement in management and, more recently, full-scale community ownership of woodlands being increasingly common throughout the 1990s and early 2000s (supported by recent land reform legislation - Section 3.2.5.2). The Scottish Executive list 51 community groups with either community control or a community led partnership, managing 64 woodlands and accounting for 21,995ha of the Scottish forest resource (SE 2002b). The Community Woodlands Association website gives similar figures for community led woodland groups, and lists a further 39 groups across Scotland who are either working towards community control of a woodland; working in partnership with shared responsibility for local woodland management; or engaged in community woodland management at small scales and with an annual turnover below £1000

(www.communitywoods.org accessed July 2007). Despite criticisms of community woodlands, relating to the dependence of such initiatives on government funding, the FC appears to have embraced community involvement in state forestry (see FC 1996, FC 2001b), largely as a result of criticism of the lack of rural development and local area benefits delivered by the state forest sector in the past (Inglis and Guy 1997).

In 1989, the New Native Pinewoods Grant Scheme was also initiated through the WGS, with the creation of new native pinewoods being grant-aided, as was the expansion of existing pinewoods. There was criticism at the time that the term 'new native pinewoods' was not restricted to naturally regenerating pinewoods (Mason *et al.* 2004), which led to the creation of grant guidelines promoting natural regeneration as the preferred method of expansion and establishment (FC 1991). The high levels of support to pinewoods resulted in considerable expansion of this habitat in the 1990s, although much of this original expansion was through planting, not regeneration.

The WGS and the associated increased support of broadleaved species and Scots pine were to see increased planting rates for these species (Figure 3.1), balanced with a decline in non-native conifer planting. Grant uptake rose steadily throughout the 1990s with total WGS and FWPS new planting from 1992 amounting to 105,307 ha (SE 2002b). The FWPS had seen a considerable increase in uptake during this period (from low uptake levels in the 1980s and early 1990s) and accounted for 39% of this total (with most of this being small areas of broadleaved woodland), while non-FWPS planting had declined from 10,100 ha in 1994/1995 to less than 5,000 ha in 2000/2001 (under 50% of total planting) (SE 2002b). From 2002, planting has declined across all species groups, with Scots pine in particular seeing a rapid decline in planting since 2000 (FCS 2004c). Grant aid under the WGS and FWPS had been provided on a per hectare basis, which led to concern that large areas of planting, due to economies of scale, were receiving payments in excess of 100% of the total cost (SE 2002b). These concerns, as well as concerns relating to falling planting rates, were addressed following

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the launch of the original SFS through the carrying out of a review of the FWPS and the WGS.
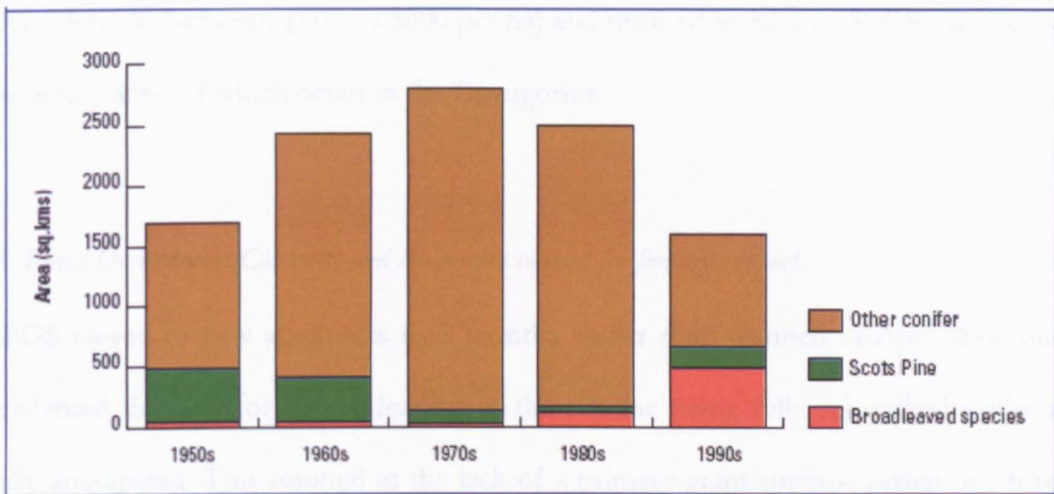
Figure 3-1 The shifts in species choice in planting in Scotland from 1950s onwards (SE 2000a)

3.3.2.2 The Scottish Forestry Grant Scheme

The WGS review (SE 2002b) highlighted a number of areas for consideration in future grant schemes including: land-use integration and community involvement; and the need for improved management of many existing woodlands. These recommendations were followed by the closing of the WGS and FWPS to new applicants in February 2003 and the opening of the Scottish Forestry Grant Scheme (SFGS), which included a revised Farmland Premium, in June 2003 (Rural Property Consultants 2004). The revised grant scheme incorporated a greater level of support for restocking, stewardship and management of forests, and a general decline in support for new planting (RPC 2004).

The issue of large planting areas receiving overly high grant payments was also dealt with through fixed grant rates of 60 or 90% of 'standard operational costs'. The lower rate was applied where the benefit to the owner is perceived to be greater, e.g. if timber production is the primary objective, and the 90% rate applied where the greater benefit lies with the public (FCS 2003b and FCS 2003c). Certain activities also automatically received 90% of costs in

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SSSIs, Natura sites or National Parks (FCS 2003b). The SFGS also targeted certain areas, with locational premiums being paid in addition to the normal grants for new planting in these areas, to support local policy objectives and the establishment of FHNs. These premiums were considerable (between £800 - £3000 per ha) and resulted in 52% of SFGS planting being in these areas, none of which occur in the Cairngorms.

3.3.2.3 Rural Development Contracts and the current context for forestry support

The SFGS closed to new applicants four months earlier than planned in April 2006 due to unprecedented demand for grants, leading to the scheme being fully subscribed earlier than originally anticipated. This resulted in the lack of a primary grant support system for forestry in Scotland, which caused consternation and insecurity across the private sector (FTA 2006). As an interim measure, FCS introduced the Support for Woodland Creation grant for the 2007-08 planting season in early 2007, to run for a year, aimed at tackling the impacts of climate change. The scheme was for creation of new woodland only and incorporated a one-off payment per hectare system and a one-off payment for woodland maintenance.

Currently (November 2007) there is once again no primary grant scheme open for applications. However, the Scottish Strategic Timber Transport Fund was established with a three-year funding base of £13 million to support the development of timber transport initiatives (forest road and small-scale public road initiatives)(COSLA 2005). New forestry grants are likely to be introduced in early 2008 as part of the new Scottish Rural Development Plan (SRDP) - currently awaiting EU approval (see Section 3.2.5.1). Forestry grants have been integrated with the SRDP to aid its delivery and comply with the EU RDR, the primary funding mechanism of the SRDP (FCS 2006). The RDC model involves multiple support mechanisms organized into three tiers (Table 3.3), with all grants available through the SRDP to be administered through the centralized Integrated Administration and Control System (IACS).

Table 3-3 Levels of support for rural development (including forestry) under RDCs (Scottish Government 2007)

Tier 1: Payments made to farm businesses under the SFP system and linked to securing a basic level of food safety, animal welfare and environmental protection
Tier 2: A menu of support schemes to support the delivery of social environmental and economic improvements.
Tier 3: Multiple targeted competitive grants leading to economic environmental and social benefits.

The new forestry grants introduced under the SRDP will aim to support: woodland creation; the management of existing woodlands; woodland improvements; and activities which aim to improve forestry business performance and competitiveness (FCS 2006). The wider proposals related to forestry under the SRDP also include grant support measures for developing tourism facilities; community engagement; information and awareness raising; and access development (Scottish Government 2007). Two specific woodland creation measures are proposed under the RDC system: firstly, the option of a one-off payment of £2,500 per hectare to support the establishment of small woodlands (0.1-1ha), with no requirement for prior approval except in certain designated areas; and, secondly, a more complex system supporting the creation of a range of predetermined woodland types through a series of tariff grants which reflect the different cost levels associated with the different woodland types. The proposed support rates for this system will be 70% of the cost of establishing the woodland. Any necessary fencing will also be grant aided and a further grant will be paid to cover four years of woodland maintenance (FCS 2006).

A number of other grants will also be available through the RDC system including grants for: LTFP development; woodland improvement and restructuring; energy crops (short rotation coppice); and the payment of farmland premiums. LTFPs will now also include annual Forest Environment Payments (FEPs), with annual payments of £28 per hectare being made for forest within the LTFP under low impact silvicultural systems, native woodland under active management, and areas delivering high public recreational benefits (Scottish Government 2007).

The integration of forestry support measures into RDCs would appear to constitute a positive measure in terms of future land-use and policy integration in Scotland. However, a number of issues with the proposed forestry support measure are apparent from the FCS 2006 consultation on RDCs (FCS 2006). In particular, respondents noted that, while the tariff system was likely to be easier to administer than the more complex SFGS system, it could lead to a decline in standards in terms of woodland creation measures – due to the approach of grant aiding woodland types as opposed to specific operations. Furthermore, support for deer management is currently absent from SRDP measures. It is also clear from RDC proposals that LTFPs are to be increasingly required in order to obtain grants; however, the LTFP was seen by some as overly complex for small woodlands. It was also noted that the Plan Preparation Grant (PPG) rates failed to acknowledge the variability in the level of complexity required in plan preparation and consultation.

Furthermore, woodland establishment tariff grants are to be paid to cover 70% of standard costs, because this is the maximum allowable rate under the EU RDR for afforestation (Alex Morris Pers. Comm.). However, the SFGS grant aided afforestation at the 90% rate when this was deemed to be delivering high public benefits, of for certain activities within certain designated areas – including national parks. Certain forestry operations – but not afforestation - can be granted at 100% under the RDR although whether this will occur under the RDC system is yet to be confirmed. Furthermore, due to the RDR's maximum support limit of 100%, top up systems such as the locational premium systems are no longer likely to be provided. These factors are likely to affect grant scheme uptake and the overall response of landowners to the scheme. A further key issue is whether woodland establishment on farmland will be a competitive option relative to alternative agricultural developments. Price *et al.* (2002) also point out the importance of the availability of training of farmers in all aspects of forestry and this would seem crucial, particularly if farm forestry is to become a genuinely sustainable form of rural development and operate at larger scales in the future.

3.3.3 Consultation processes and spatial planning in Scottish forestry

Spatial planning in Scottish forestry is not simply a product of forest policy, FC initiatives, or regional planning authorities. Forest plans were in use on private estates, such as Atholl in the Cairngorms, long before the establishment of the FC. Spatial forest planning now occurs at multiple scales in Scottish forestry and is key to the forest policy and planning system. These planning approaches also include varying degrees of stakeholder participation and consultation. These processes are integral to forestry planning and, like the spatial planning processes, occur at a range of scales. The multiple levels of planning, consultation and participation which occur in Scottish forestry are described below.

3.3.3.1 Consultation on felling and grant scheme planting proposals

The control of felling licences and grant scheme applications (public and private) involves, in a planning context, a formal consultation process and a less formal requirement for '*neighbour notification*' (FC 2002a). These procedures were initiated in 1974, in response to concern regarding the environmental (particularly aesthetic) impacts of large-scale forestry developments. Consultation procedures use the FC's public register as their base, where all felling and planting application information is placed, for 28 days, following approval by the FC. A member of the public can write in and object to any application. A public complaint is not considered as a *formal* objection, although anyone can ask a *statutory consultee* to make a formal objection on their behalf (FC 2002a). No statutory requirement exists for neighbour notification, although the FC "strongly advise woodland planting and felling licence applicants to discuss their proposals with those neighbours whose properties might be affected" (FC 2002a).

The formal side of the consultation process involves the FC consulting local authorities and follows a set procedure, with the particular organisation(s) consulted dependent mainly on

whether the land is designated, and whether the proposal is above certain thresholds (see FC 2002a for details). The local authority is the automatic primary formal consultee and, after being made aware of any given proposal above a certain threshold, can make a formal objection, while in designated areas SNH are also automatically consulted. Furthermore, for any planting proposals above five hectares within a national park, the national park authority becomes the statutory consultee. To avoid duplication with SNH, the CNPA currently comment on proposals outwith designated areas within the park, while SNH comment on proposals within designated areas in the park (CNPA 2006a).

3.3.3.2 Indicative Forestry Strategies

From the 1980s onwards, it became apparent that the felling and grant scheme consultation process alone was insufficient for controlling the cumulative impact of forestry developments (Warren 2002a). Forestry prior to the 1990s also lacked any strategic direction at regional or national level to guide the location of forestry developments (Warren 2002a). These concerns resulted in the development of Indicative Forestry Strategies (IFS) in the late 1980s (see Strathclyde Regional Council 1988, Scottish Office 1990). IFSs constitute statutory policy and were designed to both help frame responses by planning authorities in their role as formal FC consultees and to indicate to landowners and investors the opportunities for, and sensitivity of areas to, new planting (Watson 1995). In practice, this involved the development of regional maps with areas being defined as 'preferred', 'potential' or 'sensitive', according to their suitability for planting (Scottish Office 1990). The IFS approach was adopted across most of Scotland in the 1990s, with IFSs being developed by regional councils within their structural plans, with three separate IFSs currently affecting the Cairngorms region (see: Aberdeenshire Council 2005, Highland Council 2006, Moray Council 2003).

Since their inception IFSs have been subject to a range of criticisms. Tompkins (1993, for example, criticises early IFSs on the basis that they excluded potential felling areas or areas

with regeneration potential. Watson (1995) also noted that areas classified as 'sensitive' do not actually have an automatic presumption against planting. Stuart-Murray *et al.* (1999), for example, showed that planting in the Borders had actually decreased in 'preferred' and 'potential' areas and increased in 'sensitive' areas. At a more fundamental level, Watson (1995) and Tompkins (1993) also argue that accepting IFSs is simply delaying further 'the real solution' i.e. full democratic planning control of forestry and agriculture.

The use of IFSs is set to continue in Scotland, with IFS development promoted by the SFS as the primary means for planning authorities to influence the nature of future forestry activities in their areas (SE 2006a). Less certain is whether or not forestry requires full planning control. Forestry is now certainly more strongly regulated then in the 1970s and 1980s and is also subject to spatial planning measures at different scales. It could be said, therefore, that the requirement for full control has lessened. Full planning control of agriculture and forestry would most probably also result in even greater regulation and an associated loss of flexibility in these sectors. In contrast to this view is the growing idea of social sustainability which many see as necessitating a more democratic approach to forestry planning than currently represented by the FC's central planning role. The Scottish Forestry Forum (SFF) continue to support the development of IFSs and promote their linkage with the regionalisation of policy delivery mechanisms such as the SFGS (FCS 2004e). The Land Reform Policy Group (LRPG) consultation in 1998, showed, however, that a large body of opinion – mainly individuals - favoured the placing of agriculture and forestry within the full planning system, although landowning respondents were not in favour of this (LRPG 1999).

3.3.3.3 Forest and Woodland Frameworks

A further layer of planning and development support, occurring at large scales in Scotland, is that of forest and woodland frameworks. These frameworks provide a level of guidance and policy clarification, which lies between policy (IFSs) and policy delivery mechanisms (CP

1999a). Forestry frameworks, unlike IFSs, are not statutory documents, and are directed at all relevant stakeholders. The objectives of forestry frameworks, as a concept, include: the provision of a context within which FCS can target grant aid packages; the assisting of applicants in the development of 'appropriate' (i.e. more likely to be accepted) forestry proposals; the provision of a vehicle for debate and public involvement in forestry development and design at larger (landscape and regional) scales; and the provision of a strategic frame of reference to forest managers, through identifying appropriate types of forest and woodland expansion, based on 'natural habitats' (CP 1999a). Frameworks also provide a level of spatial guidance for forestry which tends to be more detailed than that of IFSs, which is often of value in sensitive areas such as the Cairngorms. The specific objectives and the process involved in the development of the Cairngorms Forest and Woodlands Framework are outlined in Section 4.5.1.3.

3.3.3.4 Long Term Forest Plans and Forest Design Plans

In 1998, the FC introduced direct support measures for the (optional) drawing up of Long Term Forest Plans (LTFPs) by private forest owners, through its Plan Preparation Grant (PPG). Grant applications have included the requirement for less detailed 5-year plan since the development of the FC's original dedication schemes. However, he LTFP process is much more involved than these 5 year plans, being based on the FC's own Forest Design Plans (FDPs). The process requires landowners to develop a 20-year plan which includes 1:10,000 forest survey maps incorporating key management issues and felling and restocking plans over this period (FC 2001c, see section 3.3.2.3 and FCS 2006 for LTFP grant information). Once the plan is approved following consultation, the landowner is issued a Forest Plan Contract which guarantees payment of restocking grants in conjunction with LTFP prescriptions (FC 2001c). LTFPs therefore allow landowners to predict the financial return they will receive from their forest due to a guaranteed rate of return over a 10-year period. The LTFP process

also requires that a scoping meeting take place, placing the onus on forest owners (with FC assistance) to scope the issues relating to LTFP development with the relevant stakeholders.

The LTFP scoping process currently appears to constitute the key formalised area for non-owner participation in private sector forest management (excluding scoping for EIAs), and is therefore an important part of forest planning procedures, although many forest owners do have their own non-policy-related consultation procedures. Tabbush (2004) showed, however, that the LTFP scoping process appears to be dominated by 'communities of interest', such as NGOs, rather than local community members (with the exception of parish council participants). Tabbush (2004) also showed that: confusion existed among those involved as to the requirements of the scoping process; much consultation consisted of isolated events without follow up; scoping meetings tended to be dominated by one-sided information exchange; and meetings were often 'hijacked' by outspoken stakeholders. Clarification of the procedures would in this respect appear necessary and 'silent participation' approaches, such as secret balloting to incorporate the views of less outspoken stakeholders, may also deserve further attention.

LTFPs represent an opportunity to develop a longer-term approach to forest management, which could increase the level of security of return within the private forest sector. Uptake of the LTFP process has been reasonable, with 28% of private forests under LTFPs in 2006 and a larger area again in the process of LTFP preparation (SE 2006a). The FC have highlighted the LTFP concept as having considerable potential for future development (FCS 2004c), and the SFS states that LTFPs will "increasingly be required as a condition for seeking forestry grants". LTFPs could represent a key measure to support the development of multifunctional forestry in the future, as they incorporate: a long-term approach; the potential for further participatory management; and a strong spatial planning base to decision making.

3.4 Summary and discussion

The FC has been criticised on a range of grounds since its establishment, not least in connection with the numerous large-scale, mono-cultural low-value plantations in upland areas, resulting from various FC-instigated grant schemes and tax incentives. However, the FC has actually been incredibly successful in terms of their early remit, having more than tripled the area of forest coverage in Scotland during the 20th century. The key lesson is that the objectives of national forest policy continually change, both as a result of changing perceptions of the role of forestry in society and changes in national politics, with devolution being the most modern example of this type of change in Scotland. Trees, however, require considerable growing time and changes to policy objectives and political turnarounds often occur at a much faster rate than it takes even a single forest rotation cycle to be fully completed.

The current social and environmental focus of British society and the resulting forest policy is not, by any means, static. As with past forest policy objectives, future objectives will change, targets will be readjusted and the fundamental perceptions of society in relation to forests will change. From a landowner/forest manager perspective, this implies a potential lack of security - the direct implication is that future policy developments may need to ensure longer-term financial security for private forest owners. The encouragement of longer-term planning on the part of managers can assist managers in determining future income.

Forest or forestry policy does not fall into a neat package from a bureaucratic perspective, with agricultural and biodiversity and conservation policies, in particular, impacting upon forestry directly and indirectly. This implies that future land-use policies should be increasingly integrated, holistic, and developed from a total land use perspective, as opposed to fragmented policies relating to single categories of land use. The development of RDCs is clearly a step in a more integrated direction. In practice, however, the delivery of truly integrated land use and

management may necessitate not only broader land-use policy development, but organisational structural changes, with future land-use policy development potentially requiring a much greater degree of synergy and integration between organisations such as the FCS, Scottish Executive Environment Directorate (SEED), Scottish Natural Heritage (SNH) and National Park authorities.

This chapter also highlighted the importance of 'participatory processes' at both the management and policy development scales. The degree to which participation is both emphasized and defined at these levels has been questioned and with this in mind, and given the landownership context in Scotland, the importance of the future development of more detailed and defined participatory management approaches to forest management and to policy development in Scotland is of major importance.

4 THE STUDY SITE: THE FORESTS AND WOODLANDS OF THE CAIRNGORMS AND THE REGIONAL POLICY CONTEXT

4.1 Study area – The Cairngorms region

4.1.1 Area description

The Cairngorms area is host to multiple socio-political boundaries; however, departing from concise borders, the general area is shown in Figure 4.1. The term Cairngorms is often used to refer to the mountain zone above 600m; however, at the largest scale, the Cairngorms can be considered as the area centred on the headwaters of the Rivers Dee and Spey and rising from around 200m to 1200m and extending to over 5000 sq km (Macmillan *et al.* 1997).

Figure 4-1 The position of the wider Cairngorms area in Scotland (www.cairngorms.ac.uk)

The Cairngorms region accounts for over 10% of the Scottish landmass. The largest official boundary which has been developed for the area, is that of the Cairngorm Partnership (CP) (Figure 4.2). The most recent designation in the area is the National Park boundary (Figure 4.3), which encloses some 3,800 sq km. The region can be divided into three altitudinally-based landscape zones (CWP 1993) (see Figures 4.2 and 4.3):

1) The Mountain and Plateau Zone, which occurs above the former tree line (600m), consisting of a plateau of rocks and boulders with deep high altitude valleys and corries and exhibiting a fragile and unique assemblage of flora, fauna and landforms.

2) The Forest and Moorland Zone - consisting of semi-natural woodlands and planted forests, and semi-natural bogs and heath moorlands - lies between the mountain plateau and valley zones.

3) The Valley Zone, which is generally below 300m in Strathspey and below 425m in Upper Avonside/Donside and Upper Deeside. The valleys of the Spey, Dee and Don are major features of this zone and it is here that most of the populace live and work.
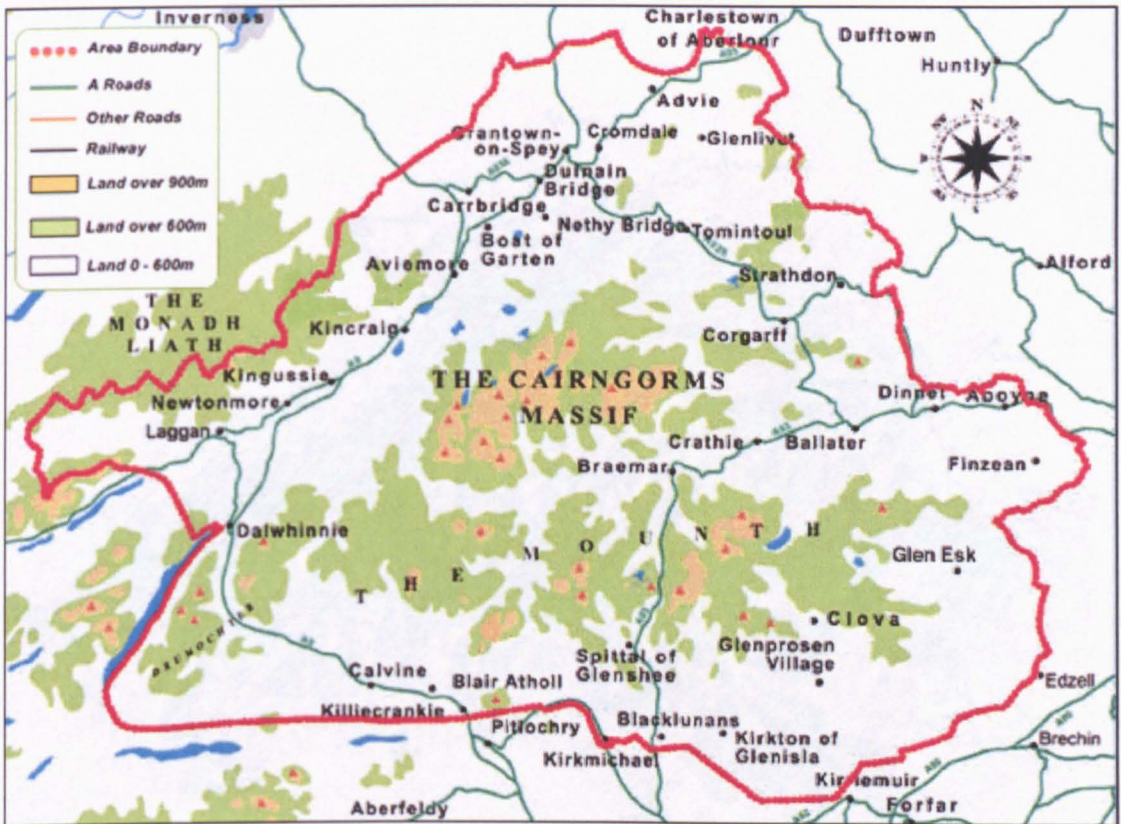
Figure 4-2 CP Area (www.cairngorms.ac.uk).

4.1.2 Physical geography

The regions physical features, particularly on the high ground, are unique, both to the UK and Western Europe (Brown and Clapperton 2002). From a geological and geomorphological standpoint alone, the Cairngorms are highly distinctive.

4.1.2.1 Topography

The Cairngorm mountains form the most extensive highland plateau in the UK and are separated almost entirely from the surrounding uplands by valleys (Brown and Clapperton 2002). In the National Park 10% of the land area is above 800m and 68% over 400m, with 52 summits over 900m. The highest point in the Cairngorms is Ben Macdui at 1309m, while the lowest point, around 134m, is at the river Dee 2km west of Aboyne.

Figure 4-3 Cairngorms National Park Boundary as of 2006 (www.cairngorms.co.uk)

4.1.2.2 Geology and geomorphology

The Cairngorm mountain massif consists of a granitoid mass, composed of one major and three minor units, which intruded over 390 million years ago (Harrison 1986, Thomas *et al.* 2004). These granite intrusions are bordered by Caledonian metamorphic rocks dating from about 500Myr, which are generally lower in elevation and more diverse and complex in composition (Johnstone 1981). The Cairngorms landscape is dominated by smooth, gently rolling slopes and broad river valleys, dating from the Tertiary period. These larger landscape features have been sharply cut by glacial features which developed during the later Pleistocene. The summits of the area are also dotted with tors, remnants of granite bedrock which have survived subsequent glaciations and weathering (Brown and Clapperton 2002). The glacial landforms of the area are generally recognised as being of outstanding national and international importance, with glaciation in the area over the last 800,000 years having produced results more dramatic than anywhere else in the UK (Hall 2002).

4.1.2.3 Soils

The underlying geology, among other factors, significantly affects soil formation, with soils overlying granite being incohesive, porous and barren, and those overlying metamorphic areas usually more compact and less free-draining. Throughout the area, young, mineral soils with relatively high acidity predominate (Brown and Clapperton 2002), mainly due to the acidity of the parent material (Walker 1987). The podzolic soils of the Cairngorms exhibit a strong altitudinal zonation, with humus-iron and cultivated podzols on the low ground, succeeded by peaty podzols, subalpine and alpine podzols (Macmillan *et al.* 1997). The richest soils (brown earths) are confined to the valleys, while organic or peaty soils also develop at low angle, poorly drained sites, where blanket bog often forms, with the main area of blanket peat lying between 550 and 750m (Brown and Clapperton 2002). Eight Sites of Special Scientific Interest (SSSI) in the park area are considered to have soils of international importance and 12 have

soils of national significance (CNPA 2006c). The soils of the semi-natural pinewoods are often classic humus-iron podzols, where a layer of pine needles typically rests on black humus, with the underlying gravel or sand bleached from leaching of the iron content. A secondary humic layer may exist between 30-60cm, sitting on a red to black layer of iron solidification, known as an Iron pan (Hall 2002).

4.1.2.4 Climate

The easterly position of the Cairngorms in Scotland ensures the area's climate is less oceanic and more continental than that of the west coast. A significant difference is evident between winter and summer weather, which is strongly influenced by the area's latitude (57°N). The altitude also affects weather locally, with a drop of 2.2°C per 300m (Brown and Clapperton 2002), resulting in a rapid shortening of the growing season with increasing altitude. In climatic terms, the area is prone to extremities, with Braemar, at 339m, having recorded the lowest temperature in the UK (-27.2°C) during the winters of 1895 and 1982. Precipitation varies from 2250 mm/yr on the summits to less than 900 mm/yr in the valleys and can also tend towards the extreme, with damaging flood events relatively common (Brown and Clapperton 2002).

The Cairngorms is also the snowiest area in Britain, with the average annual number of days with lying snow (at least 50% cover) estimated as 60 days on low ground and up to 200 days on the summits (CNPA 2006c). Prevailing winds are from the south west, and gales are frequent, with the highest wind speed in Britain having been recorded on Cairngorm, at 173mph, in March 1986. Snowfall levels appear to have decreased in recent years, which may be associated with global warming. In general, regarding global warming, the region appears to straddle zones of increasing winter precipitation and decreasing summer precipitation and there is some evidence of increasing windiness (ECN 2001). Climate change has the potential

to affect a variety of the features of the area, such as the treeline altitude and growing conditions for a variety of vegetation types.

General climate change models for the UK (see Hulme *et al.* 2002) and forestry specific models (see Ray *et al.* 2008) have predicted a number of key potential changes in the future climate which may affect Scottish forests and the forestry industry. A number of the key predictions of these models include:

- Throughout Scotland summers are likely to become warmer and winters milder

- Precipitation levels are likely to increase during winters, with increased frequency of high intensity rainfall events. Summers, in contrast, are likely to become drier, particularly in the eastern and south-eastern lowland areas.

- Average wind speeds may increase and an increase in maximum gust speeds during storm events is likely. As a result, tree stability is likely to become even more important in Scottish forestry in the future.

- The growing season for trees in Scotland is likely to increase and annual growth rates are also likely to increase.

- A number of new tree species may become suitable for growing commercially in Scotland in the future, although Sitka spruce will remain a key species. New pest species may also begin to occur with changes in climate.

Climate change therefore has the potential to impact significantly on forest resources and their management in Scotland. Ray *et al.* (2008) concludes that mixing tree species within forest

stands and the implementation of contingency plans on the part of the Scottish forestry industry are likely to be key to successfully combating the uncertainty associated with climate change and in particular the likely increased frequency of extreme weather events.

4.1.3   Ecology

The flora and fauna of any landscape are strongly linked, particularly in an evolutionary sense, with the physical geography of that same landscape. In this regard, the unique physical geography of the Cairngorms goes a long way towards explaining the endemic nature of much of the flora and fauna of the region. Altitudinal zonation in particular allows for a wide variety of habitats, evident in the Cairngorms Biodiversity Action Plan (CP 2002), which divides the CP area into four key habitat groups: farmland and grassland, montane, heath and bogland, wetland and water, and woodland.

The vegetation of the Cairngorms, in general, is dominated by plant communities tolerant of low nutrient levels and includes elements more typical of oceanic climates. The tundra-like plateau and surrounds support a range of rare plant communities from the low and middle alpine zones and are dominated by lichen-rich heaths (Gimingham 2002). In total, 40% of all British upland plant communities are unique to this country and 30% of these occur in the Cairngorms (Gimingham 2002). The lower areas also contain the largest remnants of native woodland in the UK, dominated by Scots Pine and Birch, which support a specialised boreal flora and fauna (Gimingham 2002).

The lochs and burns of the high areas are particularly low in nutrients and although the species present are few, they are also endemic (Davidson *et al.* 2002). The Spey and Dee rivers are also considered to be of national importance for their flora and fauna. The entire region is also of huge national and international importance for the bird species it supports, with 235 species occurring in the area and 135 frequently breeding (Dennis 2002). The CP area also

constitutes the largest area of near-natural vegetation in Britain (Nethersole-Thompson and Watson 1981). The area is also home to a quarter of the UK's threatened species, and the transitional nature of much of the flora and fauna of the area has created a range of rare ecotonal environments.

4.1.4 Social Geography

4.1.4.1 People, history and culture

The Cairngorms have long been subject to human activity, with evidence of post-glacial hunters active in the area back to at least 7,000 BP (CNPA 2006c). The earliest human remains found in the area were of farming people, near Granton-on-Spey, dating from 6,000 BP. The area is dotted with remains of settlements from the Bronze Age onwards, and it is clear that even 500 years ago the Cairngorms was not a thinly inhabited 'pristine wilderness', but a cultural landscape affected by thousands of years of human use and modification (CP 1996a). By the 17th Century, communities existed at subsistence level, relatively far up the glens, dependent on a pastoral economy of transhumance (Nethersole-Thompson and Watson 1981). Following the 1715 and 1745 rebellions, evictions began to occur; however, population growth continued during the 1800s. The glens began to empty sometime after 1840, with growth only apparent in the towns in the second half of the 1800s (Nethersole-Thompson and Watson 1981). The arrival of the railway from Inverness through Aviemore during this period opened up the area to visitors, and wealthy landowners began to buy large areas for hunting reserves, beginning the Highland estate culture, prevalent in the area today (Glen 2002).

The current population of the park area is estimated as 16,024, with over half this number residing in the Badenoch and Strathspey area (CP 1996a, CNPA 2006c). The population density is low at 0.04 people per hectare, compared to a Scottish average of 0.65. The trend across the region is one of population growth. Certain areas are, however, experiencing a decline in population and changes in population structure, with increasing elderly populations

and fewer people of working age (CNPA 2006c). In particular, populations in the more remote north eastern part of the region are in decline, with higher levels of population decline and increasing numbers of elderly people in the Strathdon and Tomintoul areas. The Deeside area (with the villages of Braemar and Ballater) is also somewhat less accessible then the Strathspey area, with higher numbers of elderly (often retired) people residing in Deeside then in Strathspey (CP 1996a, CNPA 2006c).

4.1.4.2 Economy

The region contains a higher proportion of economically active people (70%) than Scotland as a whole (65%), with the level of self-employment almost twice the national level (CNPA 2006c, CP 1996a). Tourism and recreation are key to the economy, with 19.4% of people employed in hotels and restaurants, and 12.6% in wholesale and retail trading in 2001 (CNPA 2006c). This can be compared with 5.7% in agriculture, hunting and forestry; 15.2% in manufacturing and construction; and 20.1% in health, public administration and education (CNPA 2006c). The rates of pay associated with distribution and catering are generally low and work is often seasonal (CNPA 2006c). This is of particular relevance, in light of the low availability of affordable rental accommodation in the area, a growing issue, particularly in the light of the recent NP designation (CNPA 2003).

4.2 Cairngorms forests and woodlands - History and land-use context

4.2.1 Early forest and woodland history

The earliest trees to colonize the Cairngorms area, following the retreat of the Pleistocene ice sheets around 9,500 years ago, appear from the pollen record to have been Birch (*Betula spp.*), Juniper (*Juniperus communis*) and Willow (*Salix spp.*) (Birks 1989). Scots Pine (*Pinus sylvestris*) followed from 8,800 BP and began to dominate the area, rapidly expanding its range across Strathspey and Deeside (MacKenzie 2002). This Scots Pine-dominated woodland cover is

likely to have reached its peak between 7,000 and 5,000 years ago, prior to any significant clearances by Neolithic man (Bennet 1988). The tree line during this time period appears to have reached a maximum of 880m (Huntley *et al.* 1997). Forest cover would probably have accounted for 50% - 80% of the landcover below this altitude, being interspersed with clearances resulting from disturbances, such as windthrow, fire, boar and beaver influence and human activities (Atterson and Ross 2002, CWP 1993).

A significant change in the climate of the Scottish Highlands is apparent from 4,000 BP, which appears to have caused an increase in blanket bog formation and an associated decline in pine forest (Bennet 1995). The Cairngorms appear to have suffered much less than areas to the north and west in this respect; however, the lowering of the tree line associated with this climate change appears to have occurred throughout Scotland and would therefore certainly have affected the area of tree cover in the Cairngorms (Anderson 1967). This contraction of the forest is likely to have led directly to the gradual expansion of heath, scrub and tundra-like vegetation.

Humans are likely to have impacted on the landscape in some way as soon as they began to settle in the area, some 6,000 years ago. This impact is likely to have increased slowly over time, and forest clearances for agriculture in Strathspey have been dated from 3,600 BP (O'Sullivan 1973). Trees would also have been felled for buildings or fuel, and livestock grazing is likely to have affected regeneration (CP 1999a), opening up the forest and possibly altering the structure and species composition of woodland communities. The pine forests of the Cairngorms, although certainly altered by humans, appear to have been relatively well husbanded and remained largely cohesive up until about the late 1600s, much longer than any other British forest area (MacKenzie 2002). Stephen and Carlisle (1959) note that, in contrast, the forests of the Scottish lowlands had been massively exploited by the end of the 16th Century.

The total area covered by forests in the early 1600s is somewhat unclear, although it appears that the main forests of the Spey and Dee valleys were both significantly larger and more cohesive than they are presently (Dunlop 1994, Callender and Mackenzie 1991). The areas of heather moorland and agricultural land across the area would also have been less substantial than they are today. The Cairngorms area of 4-500 years ago was not, however, a continuous forest, or an uninhabited "pristine wilderness", but rather a cultural landscape, consisting of a mosaic of integrated land cover types, which had been affected by thousands of years of human use and modification (CP 1996a).

4.2.2 Ownership change and exploitation

The Cairngorms area of the 16th Century was owned by four clan chieftains, with clan members following common property regimes regarding land use (Shucksmith 2002). This communal tenure system was common throughout the Highlands at this time and involved a small-scale, communal and labour-intensive approach to agricultural and forest related activities. The English takeover of Scotland in 1707 and the 1745 Scottish rebellion led to the clan system being dismantled, with property rights being forfeited to the English or vested in clan chieftains unsupportive of the uprising (Shucksmith 2002).

Throughout the 18th and 19th centuries, private landowners cleared large areas of the peasant population, to make way for large-scale exploitation, which consisted primarily of timber harvesting and intensive sheep ranching (Shucksmith 2002). The earlier denudation of lowland forests led to the growing iron ore and ship building industries turning to upland areas, creating a hugely profitable timber market for landowners in the Cairngorms. The inaccessibility of the Cairngorms had previously acted as a protective measure for these forests; however the building of local saw mills and the development of log rafting, with trees sent down both the Spey and the Dee, was to open up the area for large-scale exploitation (Stephen and Carlisle 1959). Mar, Abernethy, Rothiemurchus, Balmoral, Glen Feshie and

Glenmore estates were all partially or completely felled between 1700 and 1850 (Mackenzie 2002), often to finance agricultural improvements and estate infrastructural development. The continued expansion of estates during this period led to a growth in cattle farming, as well as the planting of crops in certain areas (Shucksmith 2002), which further compromised woodland cover.

The availability of low-cost timber imports from the mid 19th Century onwards lowered the potential return from the local timber resource and discouraged felling and planting, leading to the end of what was to be the first phase of timber exploitation in the area. Forest regeneration also appears to have occurred at various locations, with Smout (1999) for example, noting that the Caledonian woodlands of Rothiemurchus regenerated well from at least two massive clearfells prior to 1850. The growing popularisation of deer stalking and grouse shooting around this time also led to significant growth in Red Deer (*Cervus elaphus*) populations on many estates, as a result of deer-favourable management (Mackenzie 2002). These increases in deer numbers, as well as the use of many woodland areas for intensive sheep grazing, was to increasingly affect tree regeneration (Mackenzie 2002).

4.2.3 Wartime clearances, policy impacts and land-use trade offs

National-level forest policy developments (Chapter 3) began to have a number of impacts in the Cairngorms during the first half of the 20th Century, although these impacts appear to have varied across the region. The planting levels promoted by the Acland Report appear to have had limited impact in the area, at least on private land, with notable exceptions including planting programmes during the 1920s on Seafield, Glen Tanar and Ballogie estates and FC planting occurring at the newly acquired Alltcailleach, Glenmore and Inchriach areas (Atterson and Ross 2002). Planting during this period incorporated exotics for the first time and included Douglas fir (*Pseudotsuga menziesii*), Sitka spruce (*Picea sitchensis*), Noble fir (*Abies procera*)

and Grand fir (*Abies grandis*), although a preference for Scots pine appears to have remained on certain estates (Atterson and Ross 2002). These scattered 1920s plantations survived the massive WWII fellings in the area only 15 or so years later, which resulted in the region's forests reaching their lowest ever level in 1946 (CP 1999a). The continued growth of populations of red deer, which was to replace the sheep as the dominant herbivore throughout the area, compounded the problem through widespread inhibition of regeneration of felled woodlands (Miller *et al.* 1998, Staines and Balharry 2002). In response to both the devastation inflicted on the region's forests by these WWII fellings and FC grant initiatives, private planting began to increase in the area, with a mixture of different coniferous species being used (predominantly Scots pine). The FC also went on to acquire more land at Strathdon, Glenlivet and Glen Doll, planting over 13,000ha by the early 1960s, utilising Scots pine predominantly, as well as Spruce (*Picea abies and P. sitchensis*) and Larch (*Larix Spp.*) (Atterson and Ross 2002).

A dramatic increase in the forest area of Scotland and the Cairngorms was to occur during the period 1950-1990, due mainly to intensive state planting and FC policy initiatives, initiated to compensate for the wartime losses in treecover (Hester *et al.* 1996b, Aldhous 1997). However, the region's native pinewoods continued to decline after 1950, with Bain (1987) noting a loss of 18% of the native pinewood area between 1957 and 1987. Hester *et al.* (1996b), in an analysis of land cover data from 1946 to 1988, showed that much of this loss of natural woodlands was due to the activities of man and specifically the large-scale planting of coniferous forests, coupled with agricultural expansion and regeneration inhibition.

Government policy from the 1970s onwards has offered a measure of protection to the region's forests. There has also been a considerable increase in the use of Scots Pine in plantations in recent years, and policy increasingly promotes the use of natural regeneration for woodland expansion. In line with the general trend of the FC encouraging private sector planting from the 1960s onwards, the FC sold both Glenlivet estate and Alltcailleach,

decreasing their landholding in the region by over half by the early 1990s (Attersson and Ross 2002). The early FC policy-driven planting has, however, left a legacy of exotic conifer plantations spread throughout the region, which are of questionable value, from both a timber and a conservation perspective. High deer numbers also continues to inhibit regeneration in many areas (Staines and Balharry 2002). The woodland history, in this regard, has resulted in an imbalance of age classes, in both pine and broadleaved woodlands, a young forest resource which is largely planted, as opposed to naturally regenerated, and large tracts of non-native conifers scattered throughout the region (CP 1999a).

4.2.4 The current land-use and landownership context for forests and woodlands

The current dominant land use in the Cairngorms is generally considered to be agriculture, with over 70% of the total 519,170ha of the CP area categorised as agricultural land (CP 1996a). This can be further divided into 376,000ha of rough grazing (predominantly upland heath and bog) and 24,000ha of improved pasture and cropland (Thompson 2002). Recreation is also widespread and includes skiing, walking, climbing, biking and watersports. There are also over 70 sporting estates in the Cairngorms (Hudson 2002); deer stalking and grouse shooting are common, with much of the land classed as 'agricultural' also grazed by deer and burned to develop grouse habitat. Forest and woodlands, which account for over 100,000ha (see Chapter 6), therefore, exist as a component of a wider multifunctional landscape.

The recognition of nature conservation as an increasingly legitimate 'land use' in the second half of the 20th century has led to multiple conservation designations in the region, with 39% of the NP area alone under designations (see Figure 4.5). Conservation also occurs in conjunction with other land uses, such as low-intensity forestry, outside designated areas, although conservation and biodiversity enhancement are increasingly managed for as land uses

in their own right, such as at Abernethy where conservation is the primary management objective of the RSPB.

The relationship between ownership and land use is complex and, while landownership changes in the region appear to have influenced land use, it is the objectives of management which are key, and not necessarily the ownership structure itself (Scottish Office 1998). A number of different landownership 'formats' exist for the region's forests (and more generally) including: private landowners, which include large-scale estates and smaller farm-holdings; conservation oriented NGOs; community groups; and the Crown Estate. The majority of the area is privately owned, with this category including long-term family owners and private individuals/groups who have purchased land more recently, usually for recreational and/or investment reasons. Private forests are often not managed by their owners, but rather by contracted forest management consultants or land management agencies. A range of management approaches are evident on private landholdings, including (usually smaller) landholdings focused on farming; estates primarily managed for sporting reasons; and mixed estates, which often include tourism development, sporting, forestry and agriculture (tenanted or estate managed). Historically, forestry development has been confined to larger estates, with woodland establishment on farmholdings having increased in recent years (Thompson 2002).

Governmental organisations which own forested land in the CP area are Scottish Natural Heritage (SNH) and FCS. SNH are primarily concerned with conservation oriented land management, while FCS engage in different management approaches depending on the site, with the overall aim of delivering multiple social, economic and environmental benefits.

The NGOs owning large areas of land (and forest) in the region are the National Trust for Scotland (NTS) and the Royal Society for the Protection of Birds (RSPB). These organisations have large public memberships; however, this does not imply that their forests are managed for

multiple objectives. The objectives of these organisations are generally conservation-focused, although this can include interpretation and visitor facility development. The Crown Estates' Glenlivet site was also reviewed within the research. For the purposes of analysis, the Crown Estate was classed as an NGO, although unlike conventional NGOs (such as the RSPB and NTS), the Crown Estate does not have a public membership. However, Crown Estate lands are managed by an independent (non-governmental) management board and, as such, represent a unique form of non-governmental ownership. Community woodland ownership accounts for a relatively small amount of forest area in Scotland and in the Cairngorms; however, it is an expanding type of ownership. Not all community woodland initiatives own the woodlands they manage outright; Birse Community Woodland initiative, for example, shares rights of tenure for the woodlands they manage with a private owner due to the re-establishment of historical community rights of tenure.

4.3 **The Forest and woodland resource**

4.3.1 Forest and woodland classification and distribution

The classification of the forests and woodlands of the Cairngorms is not limited to species type, with tree age, woodland site antiquity, and whether the woodland is planted or self-sown also important. Planted woodlands can also be classified according to their management and timber quality and using the National Vegetation Classification (NVC) system (Hall *et al.* 2004, Peterken 1981). The whole forest resource can be split into nine basic categories of woodland (Table 4.1.).

Table 4-1 The main categories of woodland in the Cairngorms region (adapted from CP 1996a and CNPA 2006b unless stated otherwise)

Broadleaved Woodland
<u>Self-sown Birch</u> (*Betula spp.*): Accounts for the majority of broadleaved woodland in the region, growing to an altitude of 650m.
<u>Other self-sown native broadleaved</u>: These include Oak (*Quercus pubescens*), Aspen (*Populus tremula*), Hazel (*Corylus avellana*), and Alder (*Alnus glutinosa*) woodland, which often occur as components of mixed broadleaved woodlands.
<u>Mixed native and non-native broadleaved</u>: Most Oak stands in the area were planted, as were some stands of Ash (*Fraxinus excelsior*), Beech (*Fagus sylvatica*), Sycamore (*Acer pseudoplatanus*), and Poplar (*Populus nigra*). These often occur on farmland or near towns or villages.
Coniferous woodland
<u>Caledonian pine</u>: Dominated by Scots Pine (*Pinus sylvestris*) trees which have descended naturally from one generation to the next (Stephen and Carlisle 1959). Juniper is often an important understorey element and broadleaved species (especially Birch) can be present.
<u>Planted Scots Pine</u>: Can be more uniform in structure than Caledonian or self-sown Pine (Mason *et al.* 2004) The origins of seeds for planted stock vary, with most appearing to be of local origin.
<u>Self-sown Scots Pine (from planted pines)</u>: These resemble Caledonian woodlands, at least structurally. The seed origin, being from planted pines, may be from outwith the region.
<u>Planted non-native conifers</u>: Many of the plantations in the area, mainly consisting of Lodgepole pine (*Pinus contorta*) and Spruce (*Picea abies and P. sitchensis*) and some plantations of Larch (*Larix spp.*), Douglas Fir (*Pseudotsuga menziesii*) and other species.
Mixed coniferous/broadleaved woodland
<u>Self-sown native Pine and Birch</u>: Co-dominant Pine and Birch woodland which tends to contain the pioneering species which occur on open ground prior to Pine woodland development.
<u>Planted conifers and broadleaved species (native and exotics)</u>: These woodlands often occur as existing planted conifer stands are thinned and self-sown broadleaves are left standing.

The CP area is heavily wooded, with some 15-20% of the area under woodland cover, dependent on how the region is defined and which figures are used (see CNPA 2006b and Chapter 6). The woodlands are concentrated in the main river valleys, with over 25% of the land below 600m in the Spey and Dee valleys under tree cover (CNPA 2006b). Scots Pine is the dominant species, although non-native conifers also cover a significant area, followed by Birch. In total, some 50% of the forest cover constitutes self-sown native trees; coniferous species are dominant across the region.

The Cairngorms Forest and Woodland Framework (CNPA 2006b) divided the region's forests and woodlands into five sub-areas: Atholl and Glen Shee; The Angus Glens; The Deeside Forest; Strathdon and Glenlivet; and The Forest of Spey (Figure 4.4). The Strathspey sub-area is the largest, covering over 230,000ha. Forest cover in this area stretches to over 44,000ha, covering over 15% of the total area and 24% of the land below 600m (Dunlop 1994, CNPA

2006b). Native woodlands predominate, with over 65% of woodland being Scots Pine (including 8,700ha of Caledonian pine), 15% Birch and 2% other species, with over 16% being under exotic conifers (Dunlop 1994). The Birch of Speyside is predominantly self-sown, while over 50% of the Scots Pine has been planted (Dunlop 1994). The Deeside catchment covers 131,983ha, with over 25,000ha of forest or 18% forest cover; with over 27% of the land below 600m forested. Pine and Birch are the most common species, accounting for over 85% of the woodland area between them (CP 1999a). The remainder of the forest area is mainly non-native conifers (Callander and MacKenzie 1991).
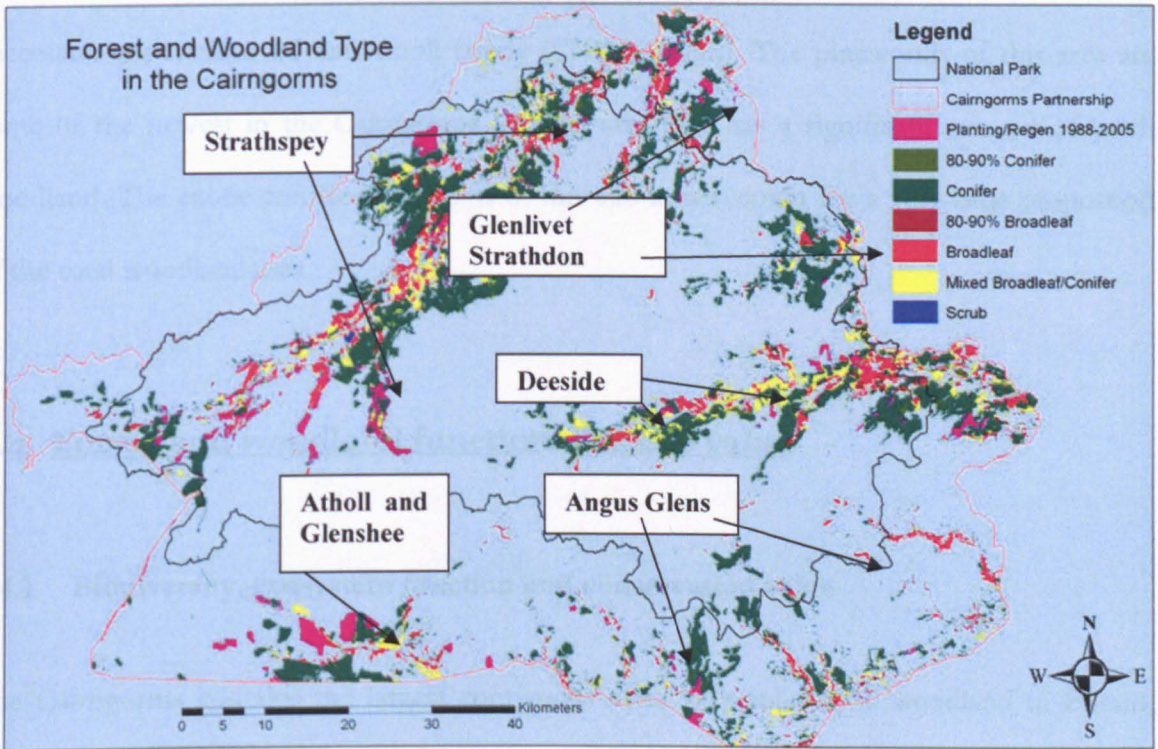
Figure 4-4 The main forest and woodland regions in the CP area

The Strathdon and Glenlivet sub-area is spread over 80,000ha and can be divided into Strathavon (67%) and Strathdon (33%). These valleys are smaller than the Dee and Spey valleys and more similar in character to the Angus Glens, with over 14,000ha of forest cover accounting for over 18% of the landcover (Mackenzie 1997). Native woodland in Strathdon/Strathavon comprises some 45% of the total forest cover (Mackenzie 1997). Native broadleaves are the dominant native woodland type in the northern Strath Avon/Glenlivet

side of the sub-area, while Scots pine is dominant in Strathdon. This sub-area, in comparison to Strathspey and Deeside, is both less populated and more isolated.

The Angus Glens sub-area is dominated by Birchwoods and exotic conifers. Broadleaved woodland accounts for almost all the native woodland (CNPA 2006b). The largest woodland areas are all exotic conifer plantations. This sub-area is more fragmented in terms of overall woodland cover, with a predominance of non-native species. The Atholl and Glenshee sub-area is dominated by the Atholl estate. The woodlands in this area have a history of skilled management, primarily as a result of the strong interest in forest management shown by successive generations of the Atholl family (CNPA 2006b). The pinewoods of this area are some of the newest in the Cairngorms and the area also has a significant amount of birch woodland. The exotic conifer plantations of this sub-area account for a very large proportion of the total woodland area.

4.4 Forest and woodland functionality and value

4.4.1 Biodiversity, ecosystem function and conservation value

The Cairngorms contains the largest contiguous areas of semi-natural woodland in Britain, over a quarter of all Scottish native woodland and the only known example of a natural (climate-related) treeline in Britain (French *et al.* 1997, CP 1999b, CWP 1993). The Caledonian pinewoods and ancient birchwoods have remained the region's climax vegetation since their colonisation, and rank among the most valuable ecosystems in Britain (Nethersole-Thompson and Watson 1981). The region's forests constitute a key element of the broader landscape, beginning at 150m and rising to 600m in several locations (Dunlop 1994, Callander and Mackenzie 1991).

4.4.1.1 Native pine woodlands

Most native pinewoods in the region occur well below the maximum tree line, usually on strongly leached podzolic soils (Macmillan *et al.* 1997). The plant and animal communities of Scots Pine forests are not very diverse relative to other forest ecosystems; however, they exhibit a range of rare and distinctive species (Lust *et al.* 2001). The ground vegetation for example, often includes heather (*Calluna vulgaris*), Blaeberry (*Vaccinium myrtilis*), Cowberry (*V. vitis-idaea*) and Wavy Hair-grass (*Deschampsia flexuosa*) and often exhibits a rich moss flora (Gimingham 2002). Some freely drained woodlands also exhibit a lichen-rich ground flora (Amphlett 2002), while less well drained areas of native pinewoods can contain stunted Scots Pines growing in ombrotropic bogs (McHaffie *et al.* 2002). Rare plants also occur in these pinewoods, including the Twin-flower (*Linnea borealis*) and One-flowered Winter Green (*Moneses uniflora*), as well as a huge range of agaric, tooth and bracket fungi (CP 2002). The faunal element also includes several species of conservation importance, including the Wood Ant (*Formica spp.*), Red Squirrel (*Sciurus vulgaris*) and Pine Marten (*Martes martes*). A number of bird species also occur, which are largely confined in their distribution to Scottish pinewoods, including the Capercallie (*Tetrao urogallus*), Crested Tit (*Parus cristatus scoticus*) and the Scottish Crossbill (*Loxia scotica*), Scotland's only endemic bird (Dennis 2002).

4.4.1.2 Broadleaved woodlands

The regions Broadleaved woodlands are dominated by two species of Birch; Silver (*Betula pendula*) and Downy (*Betula pubescens*). The ground flora of Birch woodlands is often similar to pinewoods or can be more grass-dominated (SE 2003b) and underlying soils tend to be brown earths (Miles 1985). Silver Birch appears more dominant below 350m, with Downy Birch faring better on higher ground (SE 2003b). Aspen, upland mixed Ash, upland Oak, mixed riparian and montane woodlands are also important constituents of the area's woodlands (CP 2002). Despite Aspen being a commonly occurring tree, as little as 160ha of Aspen woodland remains in Britain and some of the largest areas of this occur in the Cairngorms Straths (CP

2002). Riparian woodlands are also scattered throughout the area, occurring on poorly drained soils and generally consisting of Alder, Birch, Willow and to a lesser extent Ash, Oak and Scots Pine. Floodplain woodlands occur, which contain a number of important lower plants and fungi (RSPB 2001).

4.4.1.3 Montane scrub and exotic conifers

Montane scrub consists of trees and shrubs growing above the tree line, often in twisted and windblown, dwarf form (French *et al.* 1997). Four main types occur in the area: Krummholz Scots Pine scrub, Montane Willow scrub, high-altitude Juniper scrub and Dwarf Birch (CP 2002). Montane scrub essentially represents diversity of form and structure of the region's commonly occurring native species. The area's planted exotic conifer plantations, despite being criticised on various grounds, also have ecological value. Capercaillie, Red Squirrels and Crossbills utilise Larch forests, particularly as a food source for seeds and buds (CP 2002). Thinning conifer plantations can also result in a diverse semi-natural ground flora (CP 1999b) and high levels of invertebrate biodiversity have also been associated with the soils in these habitats (Humphrey *et al.* 2003).

4.4.1.4 The state of ecosystem function and conservation value

The Cairngorms LBAP (CP 2002) highlights habitat loss and fragmentation of the pine and birch forest areas as the most significant issue the region's forests have faced over the last century. Widespread uncontrolled grazing of forests by sheep and deer, and heather burning for grouse management, have also inhibited both woodland regeneration in many areas and the development of a natural treeline across almost all of the region (Miller *et al.* 1998, Staines and Balharry 2002).

The under-planting of birchwoods with exotic conifers which occurred extensively, between the 1950s and 1980s, has also led to the shading out of typical birchwood features in many areas (SE 2003b). The region's forests are also predominantly young and planted, resulting in low structural diversity and the absence of older trees and dead trees, both important components of natural pinewood ecosystems (Lust *et al.* 2001, SE 2003b). Past forest management also involved drainage and ploughing, which have considerably reduced the numbers of natural glades and bogs in valuable forest areas, such as Abernethy (Amphlett 2002). The development of forest roads, for timber extraction and deer stalking access, and the use of fences to exclude deer and encourage regeneration, have also both been criticised for degrading the naturalness of certain woodlands, with deer fencing also associated with Capercallie mortalities through in-flight collisions (Storch 2003). The introduction of non-native species, including Sika Deer (*Cervus nippon*) and the Grey Squirrel (*Sciurus Carolinensis*) are also seen as representing a minor threat to the region's ecosystems (CP 2002). The presence of exotic conifers (although important in a silvicultural context), across the Cairngorms, could also be seen as widespread habitat degradation through intentional introduction of alien species.

In comparison to the native forests of the past, the Cairngorms' forests therefore constitute a species-poor and considerably fragmented ecological system. These ecosystems are, however, of massive conservation importance and represent a major opportunity from an ecological restoration perspective. A key issue is deciding what actually constitutes natural native woodland systems in terms of area, spatial structuring and species present. The woodlands of the past would, for example, have supported populations of animals such as the European Beaver (*Castor fiber*) and Wolf (*Canis lupis*) (Dennis 2002) The potential for landscape-level restoration of the area's forests through the development of forest habitat networks has been recognised (Ratcliffe *et al.* 1998), and the FHN concept provides a clear basis for the future restoration of these forests.

4.4.2 Timber and traditional forest products

Annual timber sales from Deeside were estimated at £1.6 million at mill gate values in 1998 (Bell Ingram Rural 1998), with an equivalent annual output for the whole region of 250,000 tonnes (5% of the UK timber output) with an estimated mill gate value of £5.5 million (CNP Management Group 2001). Timber production is supported by a local processing industry, with two of the most productive and modern sawmills in Britain located at Aboyne and Boat-of-Garten. Scots Pine is the main species felled for timber, with Birch being utilised to a lesser degree; most non-native conifer plantations were also established for timber production.

The average growth rate for timber in the Cairngorms is lower than the UK average of $10m^3$ per ha/yr, being closer to $9m^3$, due to the soils, elevation and the high ratio of Scots Pine to Spruce (Atterson and Ross 2002). The use of faster-growing Spruce throughout Britain also affects the marketability of Scots Pine timber and the longer timber lengths harvested from Spruce forests tend to comply more competitively with recent timber quality specifications (CNP Management Group 2001). The immaturity of so many of the trees also ensures that much of the timber produced in the region is from thinnings, with these operations often remaining as marginal, a factor compounded by an increase in fibre recycling, which decreases the requirement for the type of timber derived from thinnings (CNP Management Group 2001). High deer numbers and associated low regeneration levels also impact on the timber sector, through the expense involved in deer control or fencing (Worrell and Ross 2004). Semi-natural woodland areas are also rarely felled or thinned, as they are usually protected and also lack young trees, due to low regeneration (Mason *et al.* 2004). The development of management approaches such as CCF (see Section 2.2.1), should enhance the viability of semi-natural woodlands as timber resources.

The Cairngorms' timber resource has been predicted as peaking in terms of harvestability in 2020, when timber production is likely to increase to £10 million per annum (CNP

Management Group 2001). The continual expansion of the forest resource, which is likely to occur over the next 20 years (CP 1999a), is also likely to help compensate for the slower growth, relative to national levels. The development of the non-timber forest products (NTFPs) market is also of increasing interest (Emery *et al.* 2006 Dyke and Primrose 2002). NTFPs are related mainly to five product areas: edible goods, herbal medicines, decorative goods, pharmaceuticals and cosmetics, and aromatics. The extent of NTFP industries in Scotland is considerable, with 18 companies having been associated with the edible goods sector and 26 in Scots Pine-related craft industries (Coppock 2004b). Caledonian Wildfoods, who source most of their products from Scots Pine or Birch woodlands, had a turnover of £2 million in 2002 (Coppock 2004b), highlighting the value of this resource.

4.4.3 Tourism and recreation

The region's semi-natural woodlands are of key importance to the tourist sector, with many wildlife tourism companies operating in the area, such as Speyside Wildlife, which employs 17 tour leaders (Dowden 2004). These forests are also utilised for diverse recreational interests including walking, mountain biking, cross-country running, off-roading, horse riding, orienteering, cross-country skiing and dog sledding. The region is renowned for mountains; however, (excluding downhill skiing) far more people utilise the forests for recreation (CWP, 1993). Bell Ingram Rural (1998) estimated that some 500,000 people make day visits to the Deeside forest every year, while an estimated 350,000 people visited the Rothiemurchus and Glenmore area between 1998 and 1999, spending over £18m in the wider area (SNH, 1999). Deer stalking is also economically important in the Cairngorms and much of this both depends on and contributes to the area's woodlands (CP, 1999a).

Path improvement and access development are among the most significant issues facing recreational development in the area's forests. Forest areas are well suited to mixed

recreational interests, as trees can screen large areas, minimising visual impacts, while recreational pressures tend to be focused on pathways. Despite these advantages, Scots Pine forests can attract very high visitor numbers, which necessitates careful visitor management, to minimise disturbance to sensitive species and habitats.

4.4.4   Landscape and cultural values

In an economic analysis of the social and environmental benefits of UK forests, the annual value of forest landscapes was estimated at over £150 million, with an accrued capital value of over £4,000 million (Willis *et al.* 2003). This is an indication of the importance of the contribution forests make to an area's aesthetic quality, which can affect its tourism potential and standard of living, and, in turn, land values. Mason *et al.* (2004) state that "in certain areas... ...remnant [Caledonian] woodlands are the key components that help to define a sense of place and set it apart from the rest of the highlands". This "sense of place" is well defined in the Cairngorms, and the Caledonian pinewoods are a strong contributory factor. The history of human involvement with these woodland landscapes has also created a rich woodland culture and folklore in the area, of significant value in its own right.

Forested areas, due to their height and density, often act as the dominant landscape element, particularly in lower areas, regardless of their actual proportional area across a landscape (Bell 2003). The structure and species mix of forests therefore have a considerable effect on landscape value; Willis *et al.* (2003), showed strong preferences among the British public for forest landscapes with strong structural diversity. Many of the Cairngorm's forested landscapes are therefore likely to be of low value, with many views dominated by straight-edged polygons of planted or fenced evenly-structured woodland (CP 1996b). These areas contrast heavily with irregularly spaced and structured self sown Pine and Birch. The potential now exists for landscape restoration through removal and thinning of dense even-aged stands.

Increased use of regeneration will also lead to more structurally diverse forests, with natural treelines and uneven regenerating edges, and the development of valuable ecotonal landscapes.

4.4.5   Rural development and employment

Rural development can be interpreted broadly to include activities such as environmental education and development or improvement of an area's natural and social environments. Rural development forestry is generally interpreted in a more narrow social context, as forestry development which is: rural in nature; involves local people in management; and provides direct local benefits through employment (McPhillimy 2000). The Highland Regional Council indicated in 1993 (HRC 1993) that there were 81 people employed in forestry in the Badenoch, Strathspey and Nairn area and predicted this figure would rise to over 200 by 2020. There are also over 50 businesses in the CP area directly associated with forestry activities, with over 100 people employed in the Aboyne and Boat of Garten Sawmills alone (CNP Management Group 2001). The development of industries such as forest-related recreation and wildlife tourism, NTFPs, and timber product expansion all have huge potential for rural development in the area. The issue of local involvement in forest management is one which also shows signs of improvement, through Community Woodland initiatives, and the development of farm woodlands and crofting group woodland initiatives (Jean Balfour Pers. Comm.).

4.5 The impacts of international, national and regional level policy and planning initiatives in the Cairngorms

4.5.1 The impact of conservation policy and regional management approaches

4.5.1.1 Increasing land-use control and wider area management

The earliest significant move in terms of conservation in the Cairngorms involved the establishment by the Nature Conservancy (NC) of SSSIs from 1949 onwards, and the designation of the Cairngorms National Nature Reserve (NNR) in 1954. The first Cairngorms NNR management plan was produced in 1959, with the area being controlled primarily through Nature Reserve Agreements (NRAs) with land owners (Curry Lindahl 1990). The primary objectives of this plan were: limiting human disturbance in the reserve area; rehabilitating damaged areas; widespread deer culling in the reserve; and an increased level of research (Curry Lindahl 1990).

During the 1960s, the NC established three more NNRs in the region as well as extending the main NNR through agreements (Matthew 2002). This period also saw the building of the Cairngorms and Glenshe ski lifts and the leisure resort at Aviemore. The early 1970s also saw a second revision of the Cairngorms NNR Management Plan, which recommended a major reduction in deer numbers, an issue not agreed with by many of the landowners at the time (Matthew 2002). The Nature Conservancy was split in 1973 into the Nature Conservancy Council (NCC) and the Institute for Terrestrial Ecology (ITE). Following its formation, the NCC declared three more NNRs in the Cairngorms at Glen Tanar, Muir of Dinnet and Morrone.

International and European policy also affected the Cairngorms from the 1970s onwards. The Ramsar Convention (1971) led to the development of numerous Ramsar Wetland

Conservation sites, including five Cairngorm lochans. European legislation (see Section 3.1.2) also resulted in eight Special Protection Areas (SPAs) and 10 Special Areas of Conservation (SACs) being designated or put forward for designation across the region.

Existing SSSI designations were upgraded and renotified during the 1980s in line with the Wildlife and Countryside Act (1981) (see Section 3.2.4.1). There are now 52 SSSIs within the bounds of the original CP area (Figure 4.5), many of which constitute protective measures for moorland habitats, not woodlands, although the bulk of the area's Caledonian pinewoods do come under SSSI designation (Matthew 2002). The 1980s in the Cairngorms were also marked by increasing land-use conflict, with ski development applications for Lurchers Gully being turned down twice in ten years, through staunch opposition from conservation bodies. The re-notification of SSSIs also generated a measure of hostility in some areas, through insensitive dealings with owners and occupiers on the part of the NCC (Matthew 2002).

The Cairngorms region is also host to National Scenic Area (NSA) designations, which offer a measure of landscape protection: the Cairngorms NSA and the Upper Deeside and Lochnagar NSA (Figure 4.6). Two Environmentally Sensitive Areas (ESAs) (see Section 3.2.5.1) also occur within the region: the Breadabane ESA and the Cairngorms Straths ESA. Local designations are also present, with Grampian Local Council, for example, having designated 28 Sites of Interest to Natural Science (SINS: similar to SSSIs) and two Areas of Regional Landscape Significance (ARLS: similar to NSAs). There are also numerous local nature reserves, such as Abernethy Forest and the Insh Marshes Reserve, both owned by the RSPB. The Cairngorms area therefore exhibits a plethora of conservation, agri-environmental and landscape designations as a result of multiple levels of policy. The overlapping nature of so many designations can, in practice, often necessitate multiple planning referrals for a land-use development, which has the potential to lead sometimes to contradictory prescriptions for land management.

The first key move towards a wider landscape-scale approach to environmental management in the Cairngorms, was the establishment in 1991, of the Cairngorms Working Party (CWP). The CWP were charged with assessing what would be necessary to produce a sustainable integrated management strategy for the region and consisted of representatives from key stakeholder groups. They concluded in their 1993 report 'Common Sense and Sustainability': that natural heritage features must be protected and restored, the Caledonian Forest extended and that environmentally friendly farming should be promoted (CWP 1993). They also concluded that the area should be managed primarily according to the voluntary principle and suggested the setting up of a management partnership of local authorities and public agencies. SNH was to remain the primary authority in terms of conservation management, and planning authority was to remain the remit of local authorities.

The views of the CWP were not agreed with by all, and the Cairngorms Campaign, a collaboration of representatives from NGOs, produced *A Manifesto for the Cairngorms* in 1992, within which they argued that the voluntary principle was not a sufficient base for management of the region (see: www.cairngormscampaign.org.uk). This view was supported by two CWP members, who argued for the creation of an independent authority, with planning powers, and suggested the designation of the region as a National Park (CWP 1993; Annex 10). The majority of the original CWP board were landowners, SNH staff, or council representatives (see CWP 1993 Annex 1) and this could have influenced the majority opinion of the board at the time.
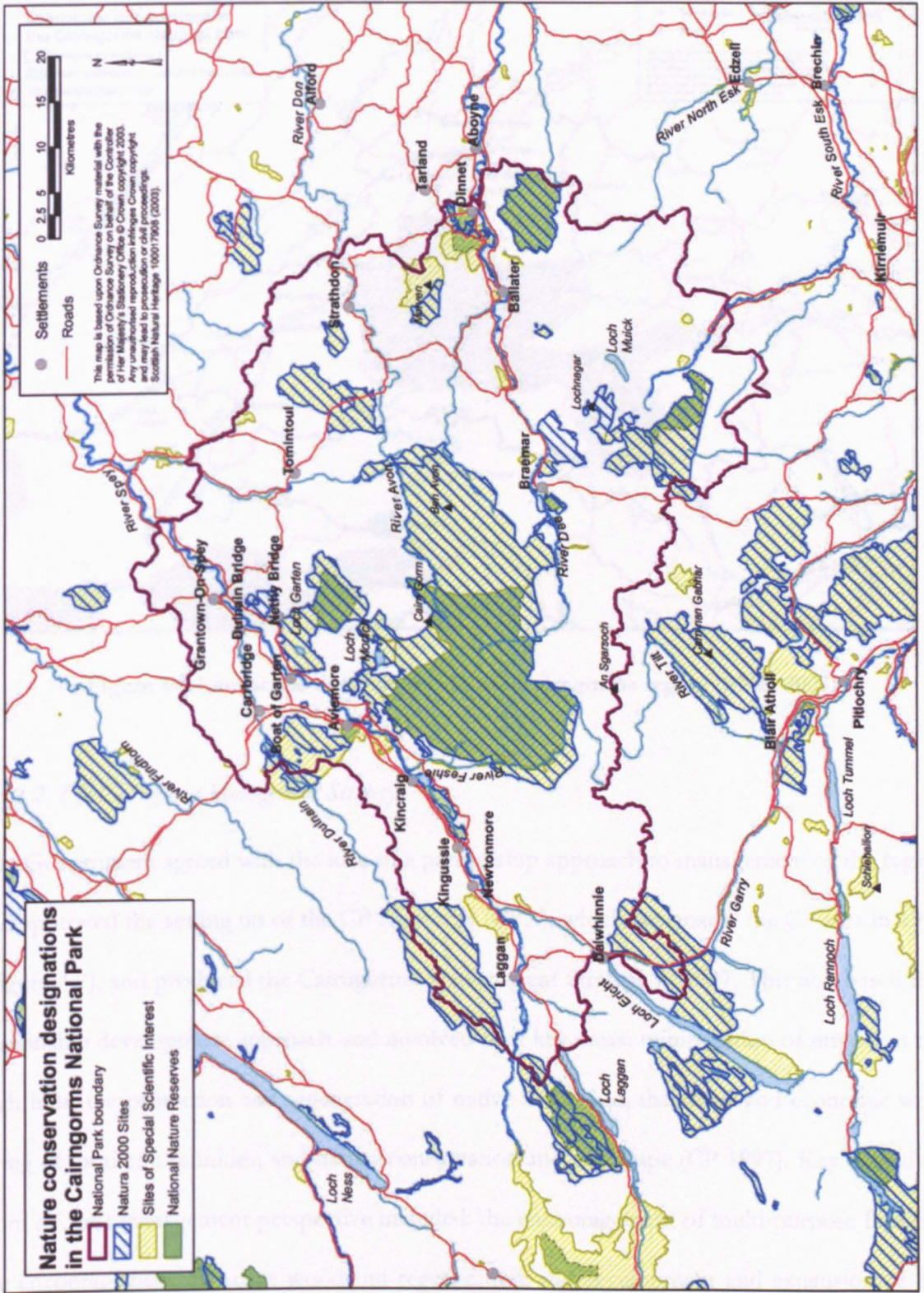
Figure 4-5 Nature conservation designations in the Cairngorms region (SNH 2003)
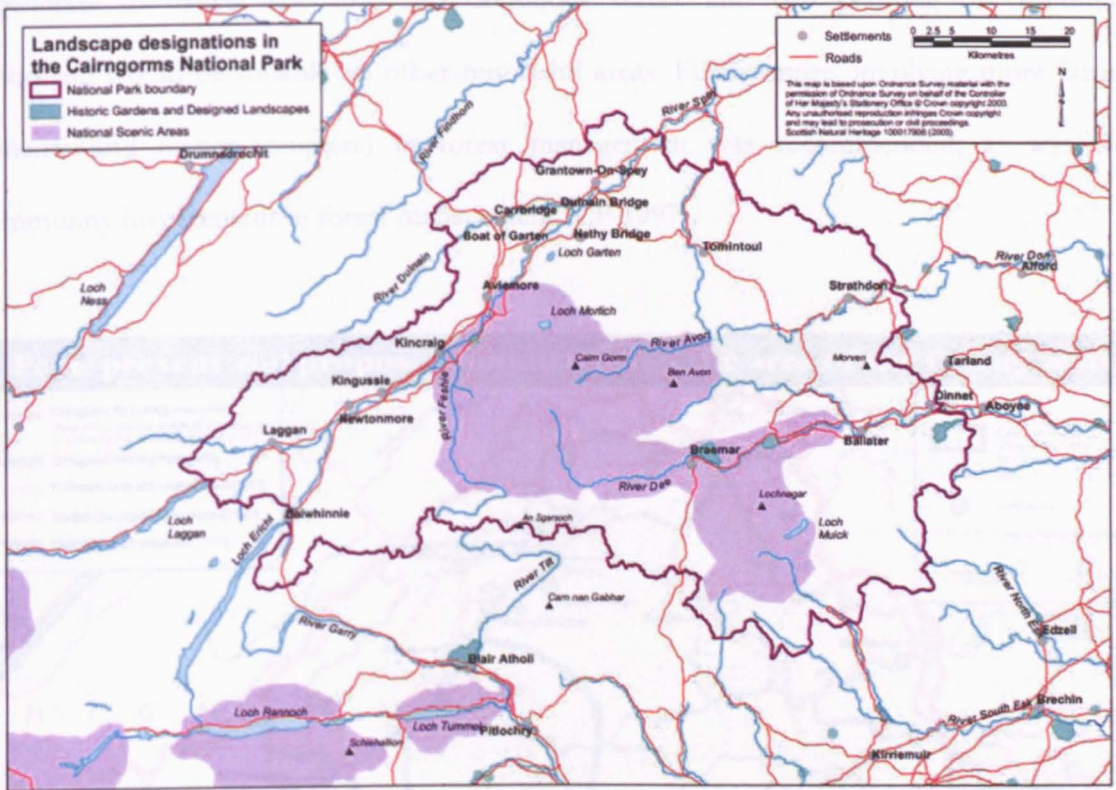
Figure 4-6 Landscape designations in the Cairngorms region (SNH 2003)

4.5.1.2 The Cairngorms Management Strategy

The Government agreed with the idea of a partnership approach to management of the region

and approved the setting up of the CP Authority (CPA), which designated the CP area in 1995

(Figure 4.7), and produced the Cairngorms Management Strategy in 1997. This was based in a

sustainable development approach and involved four key areas: minimisation of impact in the

high hills; the protection and regeneration of native woodland; the social and economic well-

being of local communities; and nature conservation and landscape (CP 1997). Key objectives

from a forest management perspective included: the encouragement of multi-purpose forestry;

the encouragement of native woodland regeneration; the development and expansion of the

Deeside Forest and Forest of Spey as integrated land-use mosaics; the development of greater

local employment in timber production and forestry; and the redesigning of plantations to

diversify age structure. The strategy also promoted sustainable deer management to allow for

the enhancement of native woodland and moorland habitats, and reduce economic losses to

timber production and agriculture. It was suggested that some moorland areas be allowed to

regenerate to native woodland and deciduous scrub, and that planting of commercial woodland would be suitable on other moorland areas. Furthermore, involving more farmers (tenants and owner-occupiers) in forest management was recommended, as was local community involvement in forest management (CP 1997).
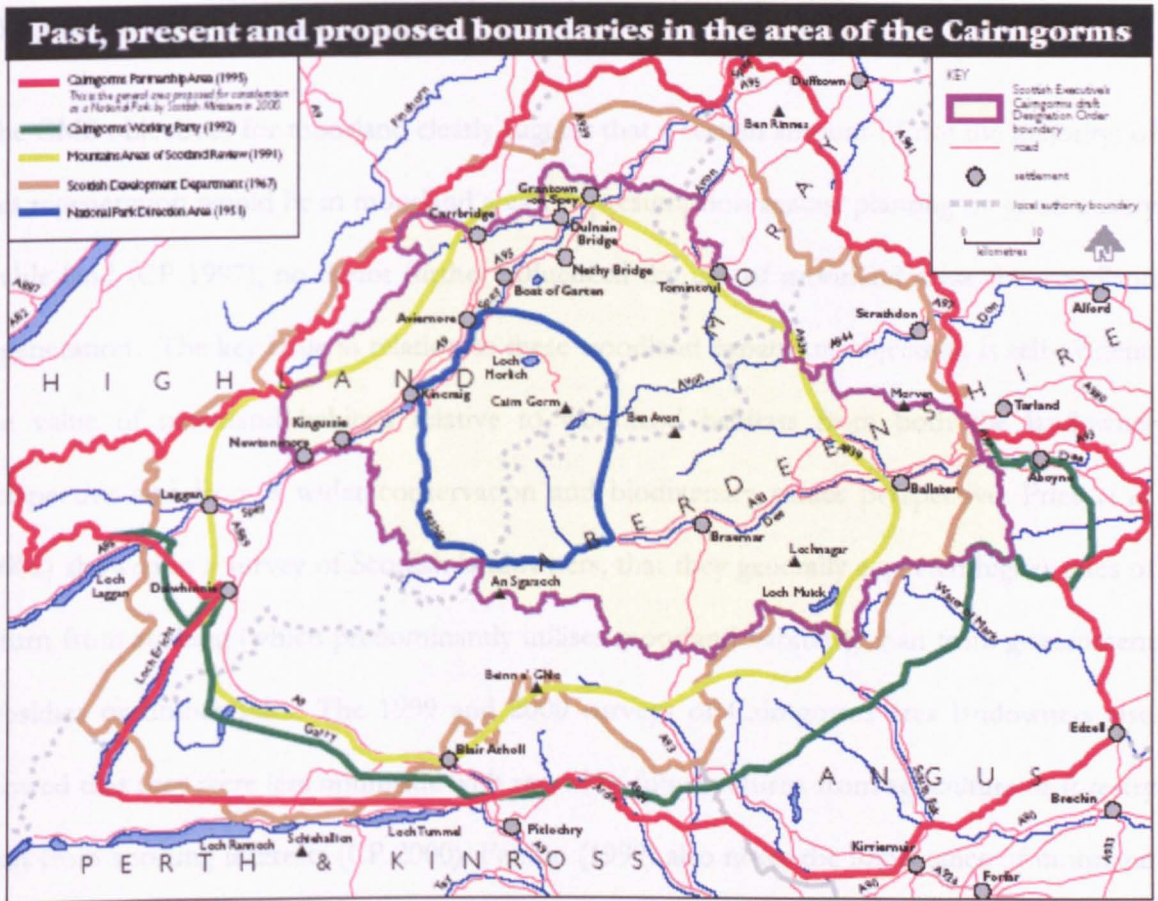

Figure 4-7 A History of boundary proposals in the Cairngorms region (SNH 2003)

The strategy envisaged that certain areas would retain timber production as a primary objective, while other areas would be more focused on biodiversity or recreation, with a range of silvicultural approaches being used across the region (CP 1997). The continued use of non-native tree species and the maintenance of the current proportions of non-native species in Speyside (10%) and Deeside (15%) Forests (CP 1997, CP 1999a) was also recommended. The proportion of non-native trees outwith these areas is much higher, accounting for over 70% of the tree cover in Atholl and Angus; however, the use of non-natives in these areas was not discussed.

The primary objective for forestry was the expansion, through regeneration, of the area's native woodlands, to be carried out over two time spans: 20-25 years and 100-200 years (CP 1997). The strategy avoids any quantitative targets in this regard, however, the CWP (1993) publication *'Sense and Sustainability'*, suggested figures which constituted a doubling of woodland area in both the Spey and Dee Valleys giving a total regeneration target of over 75,000ha for the whole area by 2097.

The CMS objectives for moorland clearly suggest that a certain amount (if not the majority) of this regeneration would be in moorland areas. A presumption against planting on good quality arable land (CP 1997), no doubt further influenced the use of moorland areas for woodland regeneration. The key issue in relation to these woodland expansion objectives is self-evident: the value of moorland habitats relative to woodland habitats from both the landowner perspective and from a wider conservation and biodiversity values perspective. Price *et al.* (2002) showed in a survey of Scottish landowners, that they generally expected higher rates of return from stalking (which predominantly utilises moorland habitats), than from government subsidies or timber sales. The 1999 and 2000 surveys of Cairngorms area landowners also showed that they were less optimistic with regard to future returns from agriculture or forestry than from sporting interests (CP 2000). Fenton (1999) also notes the importance of moorland habitat biodiversity at an international level, while pointing out that Birch and Pine are among the most common species in the northern hemisphere. The 1997 CMS lacked a spatial planning element and therefore did not provide a clear basis for targeted expansion, beyond promoting expansion particularly in the Forest of Spey and Dee areas. This led to the development in 1999 of the Cairngorms Forest and Woodland Framework (CFWF), designed specifically to assist in identifying areas with forest expansion potential.

4.5.1.3 The Cairngorms Forest Habitat Network (FHN) and Cairngorms Forest and Woodlands Framework (CFWF)

The original CFWF was published in 1999 (CP 1999a), with a revised framework released in 2006 (CNPA 2006b). The key objectives of the CFWF are: supporting the local economy and local employment opportunities; conserving and enhancing natural heritage, biodiversity and cultural interest; and assisting in the mitigation of climate change (CNPA 2006b). Two key foci of the framework are the development of the Cairngorms FHN and the support of multi-objective forestry. Specific objectives of the framework include: supporting the development of local markets for forest products; encouraging the management, conservation and expansion of native woodlands; promoting opportunities for farm diversification; and encouraging local community participation in forest management (CNPA 2006b). The framework does not set targets for woodland creation, but identifies potential areas for woodland expansion utilising a Native Woodland Model (see Macmillan *et al.* 1997). The original framework identified some 60% of the region (defined by the CP boundary), as having the potential for woodland expansion, with the area identified as capable of Birch regeneration almost twice that of Scots Pine (CP 1999a).

The CFWF represents a prime mechanism for the implementation of the Cairngorms FHN (Ratcliffe *et al.* 1998). This was proposed originally as the pilot of the much larger FHN for Scotland (Peterken *et al.* 1995). The concept of FHNs is increasingly promoted as a more sustainable basis for forest expansion than simply setting expansion targets (Peterken and Stevenson 2004). The FHN approach involves developing large (500ha+) forest 'nodes' (already in existence in the forests of both Deeside and Strathspey), with further expansion being based on a mosaic approach, with patches of 25ha+ being no less than 1km apart, connected through corridors to the original node and aiming for 30% treecover below the treeline in an FHN area (Ratcliffe *et al.* 1998).

The limitation of non-native species (flora and fauna) and the reduction of herbivores to ensure adequate forest regeneration are key to FHN development (Peterken and Stevenson 2004). The key to a successful full-scale Cairngorms FHN appears to lie in the creation of a corridor of woodland between Deeside and Strathspey, through expansion (preferably through regeneration) in Strath Avon and Strath Gairn. The original focus of the CMS was, in fact, on expansion of the Spey and Deeside forests; however, the FHN focus of the framework also necessitates significant expansion outwith these areas – particularly in Strath Avon. From an FHN perspective, the forest areas of Strathspey and Deeside could actually be considered as relatively advanced, with large central 'nodes' and total forest cover of 22.1% and 19.7% respectively in 1999 (CP 1999a), as opposed to a much lower and more fragmented 13.8% in Strathdon and Glenlivet (CP 1999a).

A key issue relating to the CFWF, highlighted by responses to the 2006 framework consultation, is the lack of implementation mechanisms and financial support to deliver framework objectives - which has led to expansion levels since 1999 being lower than anticipated by the original CFWF (CNPA 2006b). The framework (CNPA 2006b) also notes the importance of moorland habitats to large-scale forest planning in the Cairngorms. However, the native woodland model does not take other habitats into account. Furthermore, while the Native Woodland Model identifies potential areas for all forms of forest expansion, this approach does not assist stakeholders in determining which areas are suited more to non-native commercial forestry than to native woodland regeneration or planting. The revised framework also recognises the importance of areas outwith the park boundary to the development of the Cairngorms FHN. However, the NP boundary is smaller than the original CP boundary (which the 1999 CFWF was based on) and excludes certain forested areas included in the original Cairngorms FHN document (Ratcliffe et al. 1997), which were included in the CP area (see Figure 4.4). No clear targeted mechanisms exist as yet for the implementation of either the FHN or CFWF. In fact, the question must be asked as to

whether a framework revision was necessary, considering that, since the development of the framework in 1999, no framework-specific implementation measures have been developed.

4.5.1.4 The Cairngorms Local Biodiversity Action Plan

The Cairngorms Local Biodiversity Action Plan (LBAP) represents a further measure related to a wider scale of application for conservation and biodiversity management. The LBAP, like the CMS and CFWF, recognises that moorland constitutes the primary habitat area available for future forest expansion, while also recognising the potential for woodland development in boundary areas of farmland and grassland habitats (CP 2002). The LBAP also notes that moorland habitats are often undervalued in the Cairngorms from a conservation perspective, as they are a 'managed' habitat. In this regard, the LBAP promotes natural tree regeneration on *species poor moorlands* (CP 2002).

The LBAP also highlights the lack of public financial support for moorland habitat management relative to woodland and agricultural habitats. The lack of a moorland framework for the Cairngorms is seen as a key issue, particularly given the emphasis of recent policy initiatives on forest expansion. The LBAP, like the CFWF, supports the FHN approach to habitat management, identifying habitat network development as central to addressing habitat fragmentation, highlighted as a key threat to all habitats in the region. The implementation of the LBAP's objectives is seen as being carried out not necessarily by the LBAP steering group, but rather by all relevant organisations. This is in line with the more recently developed SBS (Section 3.2.4.1), which promotes biodiversity plan delivery through the actions of all members of society, with a particular emphasis on public bodies.

4.5.1.5 The Cairngorms National Park Authority

Prior to 1997, the UK government had been unsupportive of national parks for Scotland. However, in 1997 the new (Labour) government declared itself in favour of Scottish National

Parks. This was followed by the passing of the National Parks (Scotland) Act in 2000. Following an extensive consultation (SNH 2001a), the designation order for the Cairngorms National Park (CNP) was approved, resulting in the disbanding of the CP and the establishment of the Cairngorms National Park Authority (CNPA) in September 2003. The CNP, as a Scottish National Park, follows legislation which is considerably different to that of the national parks of England and Wales. This is reflected in the four key aims of the park:

- To conserve and enhance the natural and cultural heritage of the area

- To promote sustainable use of the natural resources of the area

- To promote understanding and enjoyment of the special qualities of the area by the public

- To promote sustainable economic and social development of the area's communities.

The promotion of social and economic development is new to British national park legislation and one which is against the grain of the usual approach to National Parks. To ensure that local community development is not dominated by other park aims, 20% of the Park Board are elected by park residents and 10 members (5 of whom must be local) are appointed by the 4 local authorities, with the remaining 10 appointed by Scottish Ministers (CNPA 2003). This aspect of the legislation has obviously had an effect in the Cairngorms, with 18 local residents on the board in 2004 (Rennie 2004). The Cairngorms Campaign and The Mountaineering Council of Scotland, have expressed concern as to whether such a high level of local members can properly represent national interests (Rennie 2004). Illsley and Richardson (2004) point that a key conflict area in the region previously has been the division between national and local interests, and this represented itself in the conflict regarding the allocation of planning powers to the CNPA.

The CNPA is responsible for the day-to-day running of the Park. It is an 'enabling body', which exists not to enforce or formulate regulations but to enable the achievement of the park's objectives through developing grants, and ensuring nature reserves are provided for and that educational and information services are available to sufficient standard (CNPA 2003). The CNPA, unlike other British National Parks, has not been allocated full planning authority and currently shares its planning authority with the four local council authorities (Moray, Angus, Highland, and Aberdeenshire) (Illsey and Richardson 2004). The arguments surrounding the division of planning powers are complex, although it can be said that a key issue has been the idea that: "SNH gave far too much weight to the opinions of the local authorities and that the outcome has been influenced by political expediency" (Illsley and Richardson 2004). The NP designation has therefore been received with a certain amount of scepticism in some quarters, with a key area of discontent being the retention of planning powers by local authorities, seen by some as a concession to long-standing interests in the region.

The integration approach promoted by the CNPA implies that potential now exists for a genuinely integrated landscape-scale approach to land-use planning. The CNPA has also recently taken on the role of formal consultee to FCS for forestry proposals in the park, which gives the park authority a clear opportunity to influence future forestry development within the park (CNPA 2005, CNPA 2006a). The CNPA published the National Park Plan in 2007 (CNPA 2007). The plan includes strategic long term objectives for the park's forests and woodlands. These are: maintain existing native woodland cover and expand habitat networks; support multi-objective forestry; encourage a mix of tree species, ages and woodland structures; encourage the redevelopment of woodland types which have declined and a gradation of tree to scrub cover from valley floor to tree-line in certain areas; support the development of local forestry markets; and promote community participation in forest management.

The plan also promotes the management of deer at densities consistent with the natural heritage qualities of the park and the enhancement of the socio-economic sustainability of the deer resource. Deer fencing, where appropriate, is also supported, and the plan emphasizes that management decisions relating to a changing balance of forest and moorland will be taken, utilising spatial guidance to help target networks in the most effective locations. The 'Priorities for Action' document also incorporates the idea of identifying areas for targeting incentives to introduce favourable management systems and to further the development of the Cairngorms FHN.

4.6 **Summary and discussion**

The history of the woodlands of the Cairngorms highlights that these environments have evolved for millennia, with the presence of humans as an extremely influential factor. This implies that: a) the complete removal of that influence could result in considerable change to these environments; and b) these forest-wider-habitat mosaics are cultural landscapes, with much of their value deriving from their significance, not just as reservoirs of biodiversity or valuable ecosystems, but as historical cultural artefacts. The periods of exploitation which characterised woodland history from the 1750s onwards appear to have been influenced by changes in land ownership, with the earlier system of communal tenure appearing to have been less exploitative. The growth in sporting land uses, such as deer stalking, also appears to have seriously influenced forest development through the inhibition of forest regeneration. The relationship between land ownership and forest management is, however, complex and in some respects poorly understood, with factors such as national and global timber markets, government policy and owners' personal motives all appearing to play a role in determining management objectives.

The loss of native woodland in the region during the 20th century can be directly linked with various land-use changes or 'trade-offs' apparent during this period, which highlights the importance of considering other land uses (and other land-use policies) when developing forest policy. The overall area of forested land may have increased in the latter part of the 20th Century; however, the decline in native woodlands during this period is of much greater significance. The cultural aspect of these woodlands is important, as stated; however, it must also be recognised that humans activities, particularly in the last century, has left a legacy of exotic conifer plantations, unsustainable deer populations and an imbalance in woodland age classes. The current land-use and ownership contexts for forests are more complex and diverse than ever, with forests under multiple different forms of ownership located in a landscape dominated by low-intensity agriculture, and increasingly protected with natural heritage designations and under increasingly heavy visitor pressures.

The regional timber resource is increasing significantly in value as the forest ages, and the production of high-quality timber, as well as NTFPs, has considerable potential for rural development. The recreation and tourism values related to forestry in the region are clearly significant, and the 'shadow values' associated with Scots Pine and the massive influence of the area's woodlands in attracting people to the area should not be underestimated.

5 METHODOLOGY

This chapter presents the methodology used to carry out the research for this study, the findings of which are presented in Chapters 6, 7 and 8. The methodology consisted of three interlinked approaches, all carried out using the Cairngorms region (defined by the Cairngorms Partnership boundary) as the study area: GIS analysis of existing datasets; a postal questionnaire survey of landowners; and the interviewing of 24 respondents. Specifically the GIS analysis and postal survey, in unison, attempted to profile the characteristic of the forests of the region (research objective 3). The postal survey, in unison with the in-depth interviews, also attempted to evaluate the management of this resource with a view to clarifying different management approaches evident in the region, and the key drivers behind these approaches – using the previously developed definition of multifunctional forest management (research objective 4). The postal survey also explored management constraints and opportunities (in brief), with these being explored in a more in-depth fashion through the interviews (research objective 5).

5.1 Research strategy and design

The overall research design for this entire research project was the case study approach. As Bryman (2004) points out, while the case study approach is often referred to as a qualitative methodology, it is in fact a broader research *design* concept which can include both qualitative and quantitative approaches, in an effort to procure a range of different evidence types to address the problem under study. Case study research designs attempt to develop an in-depth, contextualised and holistic understanding of the case under study (Creswell 2003). The 'case' in this instance being forestry management and policy within the Cairngorms region (and the

associated research objectives shown in Chapter 1), as defined by the original Cairngorms Partnership boundary (see Figure 4.2).

In case study research designs it can be difficult to generalise research findings beyond the case in question to the wider universe – as opposed to survey research, where being able to generalise findings is key (Bryman 2004). However, as Yin (1984) points out, case study design approaches are not taken so that findings can be generalised, but rather so that a) the case in question can be fully understood and effective conclusions and recommendations made and b) theory (which in itself can be generalised to the wider universe) can be generated from the findings of the study. In the case of this research, specific conclusions and recommendations have been made in relation to forest management and policy in the Cairngorms region, while theory has also been generated through the development of a forest management typology and scale mis-match theory (see Chapter 7 and 8) which allows the results to be generalised beyond the case in question.

The approach to sampling for the survey and interviews carried out within this case study was non-random. The overall approach, to circumvent issues of how representative samples were of the wider regional populations in question (landowners and forest managers), was to attempt to access as many members of these populations as possible. So all accessible landowners in the region were asked to fill in a survey and as many forest managers as possible were interviewed. The overall land area and forest area covered by the survey respondents is also discussed as it is as relevant as the number of respondents. Within the overall case study method three different and complimentary methodologies were undertaken in the interests of developing a more rounded picture of the issues in question: a postal questionnaire survey, which incorporated (quantitative) analysis; a number of in-depth (qualitative) interviews with forest managers; and a minor amount of GIS analysis to profile the regions forests and woodlands. The interviews began prior to the postal questionnaire as initial results of the interviews were used to refine the postal questionnaire prior to sending it

out. The participants of the study were therefore directly involved in the overall design of the research following what Creswell describes as a participatory research strategy.

5.2 GIS development and analysis

To accurately profile the characteristics of the forests and woodlands of the Cairngorms region, information was extracted from existing datasets and analysed. The majority of the existing datasets for the region have been developed in, or are compatible with, the Arc™ suite of programmes developed by the Environmental Systems Research Institute (ESRI). As a result, Arcview 8.3™ was installed and utilised in opening, viewing and analysing a range of datasets. The datasets used in this study are shown in Table 5:1. All datasets were obtained in Arcview™ Shapefile format and directly transportable into Arcview 8.3™. Appendix 1 contains more information on the details of the datasets used.

An ownership dataset was obtained from the CNPA; however, due to a legal agreement between local landowners and the relevant authorities, the dataset only consisted of ownership boundary lines, with no actual ownership details attached to the delineated parcels of land. To establish who owned which land parcel, landownership information was acquired from the website: www.whoownsscotland.org.uk and in addition, a detailed ownership dataset was acquired from the Highland Council for over 50% of the CP area (specifically the Spey Valley area). This dataset was merged with the ownership dataset obtained from the CNPA. The combinations of these datasets resulted in a relatively comprehensive map of landownership for the region. The results of the GIS analysis are presented in Chapter 6.

Table 5-1 Datasets used in GIS Analysis

Designation datasets	Source	Scale
Sites of Special Scientific Interest (SSSIs) boundaries	SNH	1:10000
Special Areas of Conservation (SACs) boundaries	SNH	1:10000
National Nature Reserves boundaries	SNH	1:10000
National Park Boundary	SNH	1:10000
CP area boundary	SNH	1:25000
Forest and Woodland Cover Data		
The Semi-Natural Woodland Inventory (SSNWI)	Highland Birchwoods	1:25000
New planting and regeneration from 1988-2000	FCS	1:25000
New planting and regeneration from 2000-2005 (SFGS)	FCS	1:25000
New planting and regeneration from 2000-2005 (WGS)	FCS	1:25000
Ownership data		
CP Ownership dataset	CNPA	1:25000
Highland Council Ownership dataset	Highland Council	1:25000

5.3 Postal questionnaire survey

5.3.1 Survey sample

A postal questionnaire survey of the landowners of the Cairngorms was used to address the objectives shown in Chapter 1. While the CNPA has a dataset of landowner names and addresses within the CP area, this information was not available for this research for legal reasons. The largest available dataset of landowner addresses available outside the CNPA was found to be that of the Scottish Rural Property and Business Association (SRPBA), which agreed to send the postal questionnaires to its members in the region for this research. The sample population was therefore that of SRPBA members within the CP area, rather than a complete sample of all landowners within the region. Questionnaires were sent by the SRPBA to its 114 members within thirteen postcode districts, which accounted approximately for the original CP area. These were:

AB34 Aboyne, AB35 Ballater, PH19 Dalwhinnie, PH20 Newtonmore, PH21 Kingussie, PH22 Aviemore, PH24 Boat of Garten, AB36 Strathdon, AB37 Glenlivet/Tomintoul, PH18 Pitlochry, PH23 Carrbridge, PH25 Nethy Bridge, PH26 Grantown on Spey.

The total number of landowners within the sample area was therefore unknown prior to beginning this research. The view of the SRPBA in this regard was that it has a high level of membership across the private landowning community and that more than 60% of private landowners in the region would be accounted for within their address database. Non-private landowners such as charitable NGOs, SNH and the FC would not, however, be fully accounted for. Thus, while the original research objectives for the survey had included an assessment of the affects of landownership type on forest management, this objective could not be adequately achieved, due to address database restrictions; the survey was therefore developed predominantly to engage private landowners in the region.

5.3.2 Questionnaire development and distribution

The postal questionnaire aimed to assess, in a primarily quantitative manner, how landowners in the Cairngorms view the forests and woodlands on their land and the policies which affected them, particularly from a broader whole estate context, and how they are planning to manage their woodlands in the future. The questionnaire attempted the following:

I. To assess a number of parameters for properties in the Cairngorms (primarily those with forests and woodlands) including: property size, ownership type, main land uses, property age, and main forest and woodland types present.

II. To assess the land-use context for forests and woodlands on these landholdings and to identify the relative importance of forests and woodlands within this broader context.

III. To evaluate landowners' views on the forests and woodlands on their properties.

IV. To assess landowners' management objectives for their forests and woodlands, their approaches to management, and how objectives vary with property size, age and type.

V. To assess key potential constraints and opportunities for multifunctional forest management in the region in the future.

Questionnaires were distributed with a reply-paid envelope. To encourage responses, awareness about the research was raised through an advert in the SRPBA magazine 'Land Business' and through word of mouth, as some potential respondents were personally known. A draft of the questionnaire was piloted on three landowners prior to distribution and refined accordingly. A covering letter was also sent with the questionnaire to explain the purpose of the survey and to state who was conducting and funding the research. All responses were anonymous; this was stated in the covering letter to encourage owners to respond in full. The questionnaire utilised closed questions to simplify completion and to ensure that data gathered could be subjected to statistical analysis. For a number of questions, an 'other' category was provided to ensure respondents had the opportunity to give different responses to those listed (see Appendix 2 for full questionnaire). Questionnaire analysis involved the use of both Excel and SPSS.

5.4 Semi-structured interviews

5.4.1 Interviewee selection

A number of forest managers, forestry consultants, land agents and landowners operating within the boundary of the CP area were selected and approached for the purposes of obtaining an interview to address core objectives 4, 5 and 6 (Chapter 1). Interviewees were selected using a snowballing approach, where initial interviewees are selected by contacting a small number of key informants and further potential interviewees are identified through interview discussions as they progress (Bryman 2004). A driver of interviewee selection was to ensure that all the main landownership types, forest and woodland types, and distinct forest management approaches evident in the region were represented, to allow for comparative analysis of management across different ownership types from a multifunctionality perspective. Twenty four respondents were interviewed (See Table 5.2), representing 22 separate landholdings (see Table 5.3), with two respondents being interviewed twice (once at the start and once near the end of the interviewing process) giving a total of 26 interviews. Seventeen of those selected spoke with reference to specific sites, while the two FCS respondents were questioned on the management of four sites in total. Four respondents represented forest management consultants and land management agents and did not represent any specific landowners or sites, but rather spoke on forest management issues within the region generally. One respondent who was interviewed twice spoke both as a part-time manager on a specific site and as a forestry consultant.

Selected respondents and their respective positions are shown in Table 5:2. Respondents were predominantly professional forest managers active on a full- or part-time basis on private estates (one from an NGO landholding), as well as two FCS district managers, four conservation land managers (two from NGO- and two from SNH-owned properties), two

managers from community-managed forest initiatives, three forestry consultants (one of whom was also a part-time estate forestry manager), and two land management agents. Respondents were all highly experienced and, towards the end of the process, a number of interviewees commented that the sample group constituted a highly knowledgeable group, as well as representing the majority of key personnel active in forest management within the region. The sample was intentionally biased towards estates with larger forest resources and a history of forestry, in an attempt to capture the experience of those with a history of large-scale estate-level forest management. It should be noted, however, that smaller areas of forest exist on many estates and private farm holdings, which were not well represented within the sample. These smaller-scale forest owners were, however, somewhat represented within the respondent group of the postal questionnaire survey component of this research (Chapter 6).

Table 5-2 A list of interviewees and their position and capacity in which they were interviewed

INTERVIEWEES	POSITION/INTERVIEWEE CAPACITY
Private Estates	
Irvine Ross*	Forest manager Glentanar Estate (part-time)/independent forestry consultant
Stuart Blackhall	Forest manager Rothiemurchus (full-time)
Jamie Williamson	Owner Alvie/Dalraddy estates and professional forest manager.
Simon Williams	Forest manager Dunecht estates (full-time)
Andrew Barber	Forest manager Atholl estate (part-time)
Stuart MacKenzie	Forest manager Balmoral estate (full-time)
Bob Furniss	Forest manager Seafield estates (full-time)
Captain Mark Nicholson	Owner Mar Estate
Ian Hill	Forest manager Invercauld Estate
James Spencer Nairn	Assistant Factor Dalhousie estates
Thomas MacDonnell	Estate factor (manager) Glenfeshie estate
NGOs	
Damien Ward	Forest manager Glenlivet estate (contracted from Smiths Gore) (full-time)
Alistair Clunas	Mar Lodge Estate manager
Jeremy Roberts	RSPB Abernethy Estate Manager
Government	
John Thomson	Operational Director SNH (West Scotland). Interviewed in relation to Invereshie NNR
Peter Duncan	Reserve manager Creag Meagaidh NNR
David Jardine	Forest District manager, Inverness district. Interviewed in relation to FCS sites Glenmore and Inshriach
Charlie Taylor	Forest District manager, Tay Forest District. Interviewed in relation to FCS sites Glendoll and Glenprosen
Community	
John Addy	Chair of Birse Community Trust
Piers Boysey	Forest manager, Anagach Community Woodlands
Land Agents/Forestry Consultants	
Edward Mountain	Land management agent, Bidwells Property Consultancy. Interviewed as a professional land manager with experience of the Cairngorms region
Will Anderson**	Forestry Consultant, Bidwells Property Consultancy
Andrew Nicol	Private Forestry Consultant operating in the Cairngorms region.
James Adamson	Savills Property management agent. Interviewed as a professional land manager operating in the Cairngorms region.

*This respondent was interviewed twice, once in his capacity as the forest manager at Glentanar Estate and once as a forest management consultant operating within the cairngorms region as a whole.

**This interviewee was also interviewed twice, due to his considerable experience and willingness to participate. The first interview was at the beginning of the interview process and the second was at the very end of the process to test initial findings of transcript analysis.

5.4.2   Data collection

An interview 'guide' was developed, following an extensive literature and documentation review of forest management and land-use policy for the region. Two key areas were addressed: forest management objectives and management drivers for the site under

consideration; and the constraints forest managers faced, and the future opportunities for forest management. The key interview discussion themes were (see Appendix 3 for a full interview guide):

- The main characteristics of the forest resource

- The key objectives of forest management and main management practices

- The key fundamental drivers of forest management

- Land-use conflicts (particularly between forestry and other land uses) within and between estates

- The impacts of land-use policy (regulations and incentives) on forest management

- The Cairngorms FHN and Forest and Woodland Framework

- Farm-forestry integration

- Key constraints and future opportunities for forest management generally.

The semi-structured interview format was used to allow for an open, flexible question order and discussion format and to ensure the field of discussion was not overly narrowed (Rubin and Rubin 1995). Initial interview analysis also assisted in focusing questioning on certain areas as interviews progressed. Some respondents were often particularly interested in certain themes, depending on their own areas of expertise and management experiences. Respondents were initially contacted by phone or email and emailed a brief description of the research project prior to the interview. All but two of those approached agreed to being interviewed and were generally happy to contribute, giving freely of their time. As a minority of interviewees requested confidentiality of responses, a blanket confidentiality approach was used, with interviewees named (Table 5:2) but no responses being directly attributable to an identifiable respondent within the results shown here. Respondents were grouped into five groups based on landownership, with a sixth group for forestry consultants and land management agents (Table 5:4). This coding helped to establish how opinion varied between

the different respondent groups and demonstrates the grounding of analysis in the transcript dataset.

Interviewees were generally very busy and, therefore, interviews were arranged at their convenience and at their place of work, usually somewhere in the Cairngorms region. Due to the structuring of the project (to allow for some initial analysis prior to final interviews being carried out) and the availability of interviewees, interviews were carried out over a relatively lengthy period beginning on the 28th June 2005 and ending on the 28th November 2006.

Twenty five interviews were carried out in person at the interviewee's place of work, with one interview carried out by phone due to the impossibility of organising a face-to-face interview. Twenty four of the twenty six interviews were recorded, with one private estate respondent asking specifically for the interview to be unrecorded (notes were taken) and the phone interview being unrecorded for technical reasons. Interviews were recorded using a digital voice recorder, with recordings being transferred to a laptop following the interview. The duration varied from just over 20 minutes to over two hours, with a total recorded interview time of 1598 minutes and an average interview time of 67 minutes. These figures do not include the two unrecorded interviews which both lasted approximately one hour. In addition, the process usually involved some preliminary (unrecorded) informal discussion and some respondents spent considerably more time with the researcher than suggested by the recorded time, with two interviewees, for example, kindly giving him a driven tour of their sites.

Table 5-3 List of reviewed sites

Private	Landownership at time of interview	Forest Management System	Size (Ha)	Forest and woodland (Ha)
Glentanar Estate	Michael Bruce	Part-time manager	11823	3000
Atholl Estate	Trustees of Atholl Estates	Part-time manager	50231	6000
Mar Estate	Captain Mark Nicholson	Forestry consultant/owner	10175	350
Rothiemurchus Estate	John Grant and Trustees	Full-time forest manager	9846	3800
Alvie and dalraddy	Jamie Williamson and Trustees	Owner and full-time forest manager	5,092	800
Strathspey Estate	The Earl of Seafield	Full-time forest manager	23,310	8000
Dunecht Estates	Hon. Charles Pearson	Full-time forest manager	21448	5000
Balmoral Estate	The Queen and Trustees	Full-time forest manager	15860	2832
Invercauld Estate	Captain Farquharson and Trustees	Full-time forest manager	44515	3500
Glenfeshie Estate	Anders Holch Povlsen	Factor/consultant managed	42191	550
Dalhousie Estates	Earl of Dalhousie	Full-time forest manager	22257	400
NGO				
Glenlivet Estate	The Crown Estate	Full-time contracted forest manager	20839	3500
Mar Lodge	NTS	Full-time conservation (site) manager and forestry consultant managed	30351	2000
Abernethy	RSPB	Full-time conservation (site) manager	10302	3800
SNH				
Invereshie	SNH	Conservation (site) manager	3142	700
Creag Meagaidh	SNH	Remotely managed by SNH staff	3940	1000
FCS				
Glenmore	FCS	FCS district office managed	3657	3657
Inshriach	FCS	As above	3707	3707
Glendoll	FCS	As above	703	584
Glenprosen	FCS	As above	879	721
Community Organisation				
Birse Community Forest (part ownership)	Birse Community Trust	Community group and Forestry Consultant	1000	1000
Anagach Woodlands	Anagach Woodland Trust	Full-time forest manager	382	382

Table 5-4 Interviewee groups based on key landownership types and their analysis codes

Landowner/Respondent Group	Interview Code
Private Estates	P1, p2 etc (11)
Non-governmental organisation (RSPB, NTS and The Crown Estate)	NGO1, NGO2 etc (3)
SNH	SNH1, SNH2 (2)
FCS	FCS1, FCS2* (2)
Community owned/managed initiatives	C1, C2 (2)
Forest management consultants and land management agents	A/c1, a/c2 etc (4)

*As FCS respondents were both representing two sites, a further level of coding was used to show specifically which site was being referred to: FCS1A, FCS1B, FCS2A, FCS2B

The majority of interviews (17) were fully transcribed verbatim by the researcher. For the remaining interviews (most of which occurred towards the end of the interview process), following the advice of Strauss and Corbin (1990), only as much as was needed was transcribed. For the two unrecorded interviews notes were taken and later transcribed. All transcripts and recordings used within this analysis are included on a CD with this thesis. All quotes used are unaltered although, in some cases, a gap punctuated by full stops (......) is used where conversation was inaudible or comments are thought be superfluous to the quote's content and meaning. The final 3-4 interviews involved an element of theme 'testing', with some of the key management constraints and opportunities recognised in the analysis at that point being discussed with respondents to assess if they agreed with preliminary findings.

5.4.3 Data analysis

5.4.3.1 Forest management typology development

Following interview transcription, detailed data were entered into an Excel spreadsheet on the characteristics of each site's forest resource, the site's forest management objectives, and practices and key management drivers. A range of forest management objectives were apparent (see Table 5:5). Respondents were also asked about objectives relating to rural development and tourism; however, these issues are not dealt with here, as both were generally stated as being more related to wider estate activities and perceived more as a

positive by-product of estate management (particularly tourism-related activities) rather than as specific objectives. Carbon sequestration and water quality maintenance were also referred to as objectives on some landholdings, although many perceived these more as by-products of sustainable management, rather than key objectives. As such, they are not referred to within the results section. To clarify what having a specific objective implies, detailed definitions of objectives (as referred to within the typology and tables in Chapter 7) are outlined in Table 5:5. These definitions were developed from the interviews, rather than being assigned beforehand, and are therefore a reflection of what respondents themselves perceived these objectives to mean.

A typology of different management approaches was then developed, based on variability in management objectives, to explore how management varies in relation to ownership and to illustrate the key approaches to forest management within the sample group. It should be noted that management objectives discussed within the typology relate to the forest resource rather than to the estate as a whole. A range of management criteria, or specific forest management practices, were also used to assist in further refining the typology: these are shown in Table 5:6. To increase transparency and clarify how sites were placed within the typology, tables were developed from the spreadsheet data which show management objectives and practices across the sites assigned to each management 'type' (see Chapter 7). Estates have been assigned to typology categories based on a 'best fit' approach, although some estates were borderline between two categories. In these cases, the reason for assigning the estate to one category over another is explained.

Table 5-5 Description of what having a specific management objective implied

Timber: A primary objective when silvicultural methods are employed to produce marketable timber products. Thinning will have occurred in the previous five years or is ongoing and species will have been planted (or regenerated) with timber production in mind. On sites where timber appears as a secondary objective, it was clearly a much lower priority.
Recreation/Access: A primary objective when stated as such and when being actively managed for. A secondary objective when apparent that management considered these aspects and, in some cases, catered for them through grant support, but where other objectives were obviously of much greater importance.
Biodiversity/Conservation: Relating to management which aimed to protect, conserve or enhance forest habitats and species. Generally a primary objective. Active measures to achieve this objective were being carried out on most sites.
Landscape: A primary objective when respondents highlighted the importance of conserving and enhancing landscape within their management, either because of owner priorities, or a combination of owner priorities and policy. A secondary objective when landscape was considered but was of lower importance than other objectives or managed for only because of legislation.
Sporting: A primary objective when stated as such and when sporting activities were occurring within the forest either commercially or as a private interest. This did not include deer control which was considered as a separate activity (see management activities table). A secondary objective when it occurred within the forest infrequently and was not a strongly considered objective of management.
Education/Interpretation: A primary objective when stated as such and when measures were in place on-site (interpretative boards/rangers). Education was also being delivered through interpretative (guide/ranger-led) site visits by school/college groups on some sites. A secondary objective when it was considered, but a much lower priority in management.
Public participation: A primary objective when public involvement was explicitly stated as being important to management and participatory measures in place were perceived as going beyond those required by policy. A secondary objective if it occurred, but in a weaker format, of relatively low importance and mainly policy driven.
Farm-forestry integration: A primary objective when measures were, or were being put, in place to attempt integration of these two land uses. Considered secondary when limited evidence was apparent that some integration was occurring/being encouraged. Not applicable in some cases, due to the absence of agricultural land/activities on-site.
Research: This was mainly related to field studies of species/habitats from a conservation perspective. Considered primary when emphasized as key to management and secondary when respondent stated that it occurred but was a low priority.
Forest expansion: Considered as high where expansion is an important objective at potentially large scales (above 100ha over five years). Moderate where expansion is a possibility, but at small-scales (below 100ha over five years). Considered as a low priority objective when seen as unlikely to occur.

The typology has been developed considering the key attributes of modern multifunctional forestry management (as outlined in Chapter 3): public awareness of and involvement in management; long-term planning; a demonstrated awareness of the limitations of the forest ecosystem; and fundamentally, sustainable management for a range of social, economic and environmental benefits. The key drivers of forest management are also briefly referred to within the typology, in terms of how they varied across the different management 'types', Chapter 8 provides a detailed analysis of drivers from a constraints and opportunities perspective.

Table 5-6 Description of specific management activities used to develop the management typology

Public involvement in management: Low: minimum legislative consultative requirements and/or notifying neighbours/those affected when carrying out certain types of management. Medium: Where respondents expressed interest in going beyond policy requirements for consultation/participation and actively encouraged the public to comment on management. High: Participation in management is high and a major influence on management.
Rangers on site: Whether or not rangers or guides were employed on-site for purposes of interpretation of site activities to the general public.
Regularity of thinning: Low: Thinning not carried out for at least five years and usually more. This category ranked as low for all conservation sites, as thinning for silvicultural reasons was not occurring, although on some, thinning was occurring for deadwood creation reasons. Medium: Thinning recognised as important but had not occurred for up to five years due to financial or other constraints. High: Thinning for silvicultural reasons key to management, carried out frequently, usually yearly.
Natives or exotics emphasis: The overall emphasis within management (taking the standing resource and future objectives into account) on native versus non-native tree species.
Regeneration or planting emphasis: An indication of whether the overall emphasis within management in terms of re-stocking and forest expansion methods was on natural regeneration or planting. Usually both were used, often with an emphasis on one or the other.
Deer control (cull/fence/hybrid): Whether the overall deer control strategy within forest management was one of intensive culling or placed a greater emphasis on fencing to exclude deer from the forest environment, or was more of a combination of the two.
Emphasis on long-term planning: Low: Where long-term planning was not evident as a serious component of management, at least not in any tangible way (e.g. written plan). Medium: Where a degree of long-term planning was evident (with written plans for up to 5 years or sometimes more). High: Where the development of detailed long-term (20 years plus) forest management plans (FCS funded or otherwise) was evident, including detailed maps.
Long-term forest plan (LTFP): Whether or not the site had, or was developing, a FCS approved and funded long-term forest plan

5.4.3.2 Interview coding and thematic analysis – constraints and opportunities recognition

The second stage of interview analysis involved coding interview transcripts (Bryman 2004) with the aim of recognising key themes of constraint and opportunity to multifunctional forest management, at both the estate and the inter-estate or regional level. Transcripts were gone through by hand, with codes being developed and written in beside particular comments, keeping in mind the overall aim of the coding. Nearly a hundred codes were initially developed from the first transcripts, representing various arguments relating to constraints, key management conflict areas, future management opportunities, and key issues which generally reoccurred in transcripts. Transcripts were then entered into the qualitative software package NVIVO™ with coded comments/quotes being selected and grouped under headings (secondary codes). The secondary codes were then further reviewed and developed and then

grouped (according to their linkages with other codes) under key thematic headings representing the key areas of opportunity and constraint for the application of a multifunctional forest management approach at different scales in the region (these represent the key theme headings of Chapter 8 shown in Table 8:1).

Following the development of various thematic headings and the grouping of quotes under key headings and various sub-headings, the data were transferred back into a Microsoft Word™ document, resulting in a document with numerous headings and sub-headings with selected quotes under each heading. This document was reviewed by placing explanations of what each heading signified and how headings were interlinked within the document. It was then written up in detail, explaining the complexities of each heading and how the various themes of constraint and opportunity interlinked. Six key themes were developed in total (with numerous sub-themes), with each theme having a section relating to constraints and a corresponding section on opportunities. It should be noted that respondents often discussed constraints to management at length; however, many respondents were less likely to engage with the issue of opportunities in certain areas. As some pointed out, many opportunities relate more to national or regional policy development, an issue with which forest managers are less familiar than practical forest management. The issue of potential future policy development in terms of dealing with recognized constraints is therefore not always fully developed; however, the discussion and recommendations section attempts to address this through reference to the results in a wider research and policy context.

5.5   Methodological Issues

5.5.1   GIS analysis

The GIS analysis carried out was relatively limited, due to time constraints, and data accessibility issues. The ownership data, in particular, were compiled from three separate

sources, including some data that were over 10 years old. The final ownership dataset used within this analysis was also incomplete, due to the unavailability of ownership data for certain areas. Given the diversity of ownership within the Cairngorms region and the variability in both forest and wider land management objectives across these landowners, as well as the development of the Freedom of Information (Scotland) Act (OPSI 2002), this is an issue which requires attention.

Despite these shortcomings, the GIS results constitute the only available ownership breakdown for the region's forests. The results for forest cover and type are, in terms of their relative proportions, similar to those of the revised CFWF (CNPA 2006b); however, the figures for forest cover are significantly higher (by almost 30,000ha) than the framework figures. There are two reasons for this. Firstly, the framework figures are based on the Landcover of Scotland 1988 (LCS88) dataset (MLURI 1993) using a minimum woodland size of 2 hectares i.e. any woodlands smaller than this would not occur within the final forest dataset created from the LCS88 data. However, the analysis in Chapter 6 uses the Scottish Semi-Natural Woodland Inventory (SSNWI), which was also based on the LCS88 dataset, but developed a final dataset which included woodlands down to 0.1ha (Highland Birchwoods 2001), giving a higher total woodland area. Secondly, the CFWF data does not appear to include the new planting since the development of the LCS dataset. This is included in this analysis, with over 12,000ha of forest cover being added to the final figure as a result.

5.5.2 Postal questionnaire survey

The postal survey response rate (46% with 29% usable for analysis) was reasonable and may be compared with work by O'Brien (2006), reporting findings from a survey on urban woodlands with a return rate of just 11%, and Robson *et al.* (2000), reporting on surveys of forest area residents with return rates of 44 to 47%. The survey contained numerous questions on forest management; this may have discouraged some owners from responding, due to low

levels of forest cover on their sites. The SRPBA also noted that not all of its members are landowners; non-landowning members obviously could not reply. Taking these factors into account, and given that the total area owned by respondents was nearly 265,000ha (as opposed to 380,000ha for the National Park and 649,058ha for the CP area), the response rate may be considered to be somewhat higher than 29% of the landowners within surveyed postcodes. Furthermore, the area accounted for by the respondent group represented over 40% of the CP area and approximately one third of the forest area (or closer to 50% if framework figures are used). From land management and policy perspectives, the land area represented may be seen as more important than the response rate.

The SRPBA's membership dataset provided a useful source for contacting a large number of landowners; however, using this meant that private landowners were over-represented within the sample group, while public landowners were not represented and only some NGOs were. Furthermore, amongst private landowners only those which had joined the SRPBA could respond. This made it impossible to compare the effects of landownership type with other variables from the postal survey dataset, as non-private landowners were not fully represented. The respondent group was also likely to have been biased towards landowners with a genuine interest in the woodlands on their land, and may not have accounted for less interested or 'absentee' landowners. The actual number/area of forests managed by consultants and land agents in the absence of the landowner could therefore be higher than indicated by this dataset.

5.5.3   Semi-structured interviews

The interviewee sample group constituted a diverse range of forest management and ownership interests, thereby allowing for a qualitative cross-ownership comparison of forest management practices and objectives that was not possible from the postal survey. Interviewees predominantly represented larger-scale forest managers or owners. A number of

smaller forest areas also exist in the region, on both farm-holdings and private estates (often managed by consultants, forest management companies or land agents), which were not represented within this group. The postal survey has, however, accounted for the opinion of a number of smaller-scale landowners, including some farmers. The interviewee sample group was, therefore, an intentionally focused group of forest managers and owner-managers. A range of other forest stakeholders do obviously exist; however, this study intentionally focused on those directly active in forest management.

The long timescale over which the interviews were conducted (16 months) sometimes affected the consistency of interview discussion areas, as some key issues changed over time - mainly due to rapid evolution of related policy was evolving in Scotland. Future qualitative reviews related to policy development may wish to consider this, although the time-scale also gave the researcher the opportunity to assess responses to an evolving policy framework. Transcribing interviews was also extremely time-consuming, with an average one-hour interview taking up to eight hours to transcribe. Where time constraints are an issue, future studies may wish to consider minimising interview time, contracting out interview transcription, or investing in professional transcription equipment to speed up the process. Partial transcription of only the most relevant interview data would also speed up the process; however, analysing incomplete transcripts may affect coding and result in the analysis 'missing' certain relevant codes, particularly in the earlier stages of the coding process.

Meeting interviewees face-to-face did, however, have advantages: interviewees appeared to feel at ease and often engaged in lengthy discussion on areas of obvious importance to them; and it allowed the interviewer to get a clear 'feel' for the site and its management, through seeing the site and meeting the interviewees in person. Phone interviews would not have allowed for such in-depth and variable discussions or the development of such a clear picture of site-management on the part of the researcher.

It is recognised that the interviews focused more on management objectives and activities, than the (more quantifiable) 'outputs' of management. This was intentional, research objectives and time limitations meaning that all areas of relevance could not possibly be explored. However, future research could address this, through a more quantified assessment of management outputs (e.g. timber volumes; visitor numbers; metres of fencing removed; numbers of deer culled), which could then be compared to the objectives of the same sites.

6 GIS ANALYSIS AND A POSTAL QUESTIONNAIRE SURVEY OF LANDOWNERS IN THE CAIRNGORMS REGION

6.1 GIS analysis results

6.1.1 New planting, forest type and level of designation

Table 6:1 shows the results of the GIS analysis of new planting/regeneration datasets, the Scottish Semi Natural Woodland Inventory (SSNWI), and the designation boundary datasets. The rate of grant-aided new planting and regeneration has been significantly lower since 2000 than for the 12 preceding years. Figures 6:1 and 6:2 also illustrate that this new planting/regeneration was spread across the CP area.

Table 6:1 and Figure 6:1 also show a breakdown of the different woodland types in the region. Coniferous forest, at 80,660 ha (+2187 ha of 80-90% Conifer) can be seen to be the most common woodland type in the region, with almost four times as much conifer forest as broadleaf. Areas of broadleaved woodland also appear more fragmented in Figure 6:1 than areas of conifer forest. Figure 6:2 is a map of relative naturalness of the forests and woodlands. Naturalness as a term is taken directly from the dataset (Highlands Birchwoods 2001). Forests and woodland areas classed as semi-natural are those which are regenerating without tree-planting occurring or are the result of an expanding (naturally) regenerating forest/woodland. Less natural forests and woodlands are those which resulted either wholly or partly from tree planting, with naturalness seen as declining with increased importance of planting to both establishment and maintenance of the forest and woodland. As can be seen from Table 6:1 and Figure 6:2, proportions of semi-natural and planted forest/woodland are similar. As Figure 6:2 shows, however, the majority of the semi-natural forest is concentrated

in the Spey and Dee valleys, with planted woodland being more common outside of these core forest areas.

Table 6-1 Results of the GIS analysis for areas of new planting, tree type, naturalness and level of designation for the forests and woodlands of the CP area

NEW PLANTING Source: FCS datasets of grants scheme applications for periods shown	Hectares	Percentage of total
Planting from 1988-2000	10665	87.5
Planting from 2000-2005 (SFGS)	168	1.4
Planting from 2000-2005 (WGS)	1358	11.1
Total New Planting	12191	
TREE TYPE Source: The SSNWI, developed from 1988/89 Aerial photographs and Landcover of Scotland (1988) Dataset* by Highland Birchwoods (scale down to a minimum woodland size of 0.1ha).	Hectares	Percentage of total
80-90% Broadleaf	924	0.8
80-90% Conifer	2187	1.8
Broadleaf	20805	17.6
Conifer	80661	68.2
Mixed Broadleaf/Conifer	13342	11.3
Scrub	302	0.3
Total	118221	
TOTAL OF 1988 FOREST COVER AND NEW PLANTING	130,412	
NATURALNESS** Source: The SSNWI	Hectares	Percentage of total
80-90% Planted	5322	4.5
80-90% Semi-natural	382	0.3
Mixed Semi-natural/Planted	6874	5.8
Planted	53931	45.6
Semi-natural	51636	43.7
Urban Woodland	76	.06
Total	118221	
LEVEL OF DESIGNATION Source: SNH designation datasets (2005)	Hectares	Percentage of forest cover (not including new planting)
Total woodland area under NNR	7747	7
Total woodland area under SAC	19239	16
Total woodland area under SSSI	20624	17
Total woodland area under both SSSI and SAC	16571	14
Total woodland area under all three (SSSI, SAC, NNR)	6792	6

*Landcover of Scotland (1988) Dataset is a digital dataset of landcover in Scotland created by The Macaulay Land Use Research Institute using aerial photographs
**The terms used here (semi-natural/planted etc.) are taken directly from the existing dataset (SSNWI). The guidance notes for this dataset define these terms in full and are included in Appendix 1.

The key conservation designations applicable to forests and woodland in the region (and not other habitat types) are also mapped in Figure 6:3, with the area of each of the key three designations - NNR, SSSI and SAC - shown in Table 6:1, along with areas under two or all of these designations. The SSSI designation is the most common. As shown in Figure 6:3, a number of areas are also under SSSI and SAC designation, with a smaller proportion under common NNR, SAC and SSSI designation.

6.1.2 Forest and woodland ownership

Table 6:2 and Figure 6:4 show the ownership of the forests and woodland of the region. The predominant form of ownership is private, accounting for 63% of the total forest and woodland, with FCS owning 13%, followed by the NGOs at 6%, and the Crown Estate (4%). For 13% of the forests and woodlands, no ownership information was available (i.e. unknown). In relation to new planting, 81% was on privately-owned land and 14% was on land of unknown ownership, while FCS, the Crown Estate and NGO landowners were each responsible for between 1 and 2% of the remainder of the new planting.

Table 6-2 Results of the GIS analysis for forest and woodland ownership within the CP area

OWNERSHIP	HECTARES	PERCENTAGE
Community	389	0.3
Unknown	15237	13
Crown Estate	4925	4
FCS	15871	13
NGO	7132	6
Private	74163	63
SNH	504	0.4
Total	118221	99.7

Forest and Woodland Type in the Cairngorms

Legend

- National Park
- Cairngorms Partnership
- Planting/Regen 1988-2005
- 80-90% Conifer
- Conifer
- 80-90% Broadleaf
- Broadleaf
- Mixed Broadleaf/Conifer
- Scrub

Kilometers
0 5 10 20 30 40
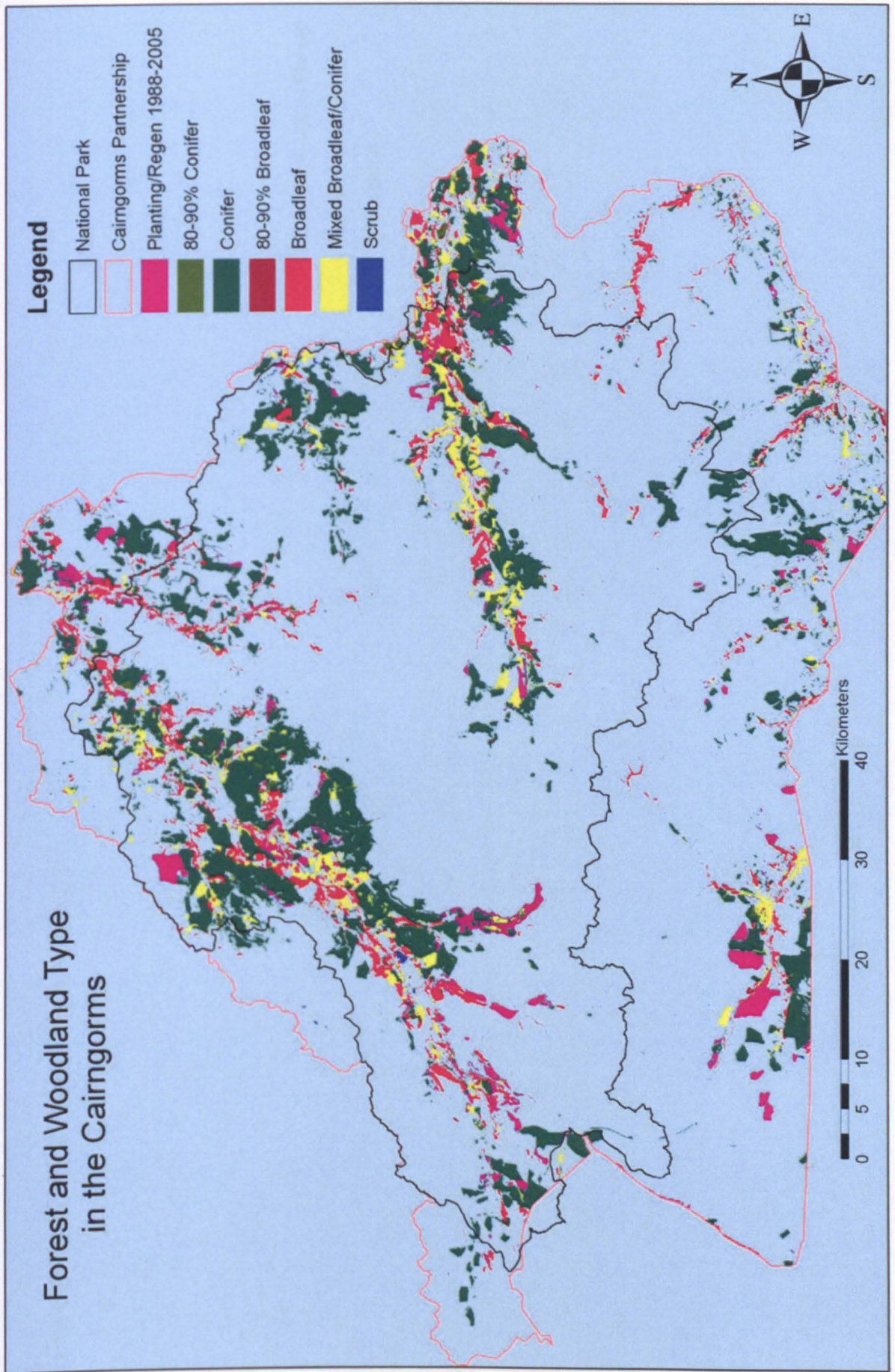
Figure 6-1 Forest and woodland type in the Cairngorms region. Source: Scottish Semi-natural Woodland Inventory

Legend

- National Park
- Cairngorms Partnership
- Planting/Regen 1988-2005
- Urban Woodland
- Planted
- 80-90% Planted
- Mixed Semi-natural/Planted
- 80-90% Semi-natural
- Semi-natural

Forest and Woodland Naturalness in the Cairngorms

Kilometers
0 5 10   20   30   40
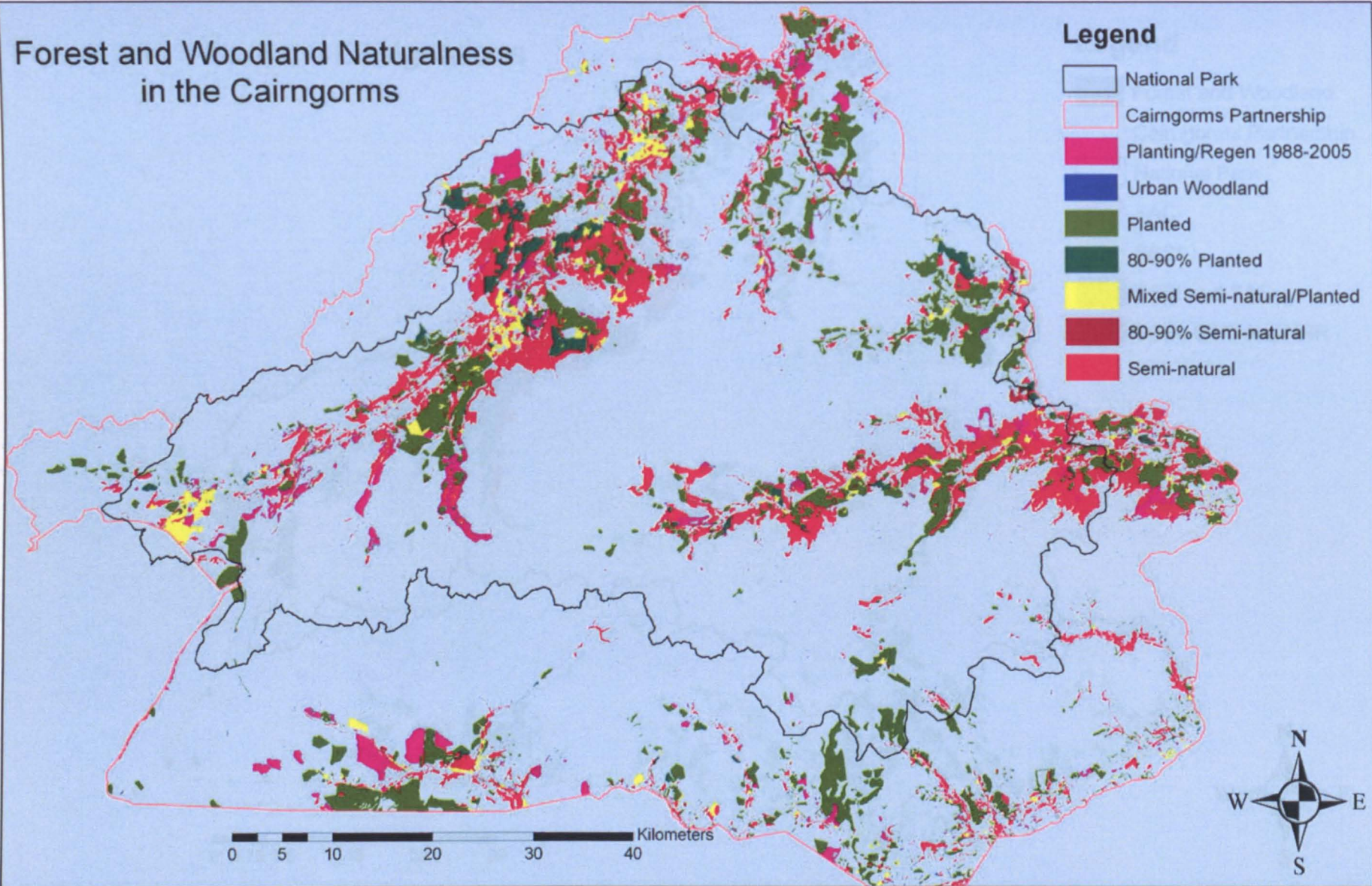
Figure 6-2 Forest and woodland relative naturalness for the Cairngorms region. Source: Scottish Semi-natural Woodland Inventory

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Forest and Woodland Designations in the Cairngorms

Legend

- Forest and Woodland
- Cairngorms Partnership
- National Park
- SAC
- SSSI
- SSSI and SAC
- SSSI, SAC and NNR

Kilometers
0 3.75 7.5   15   22.5   30
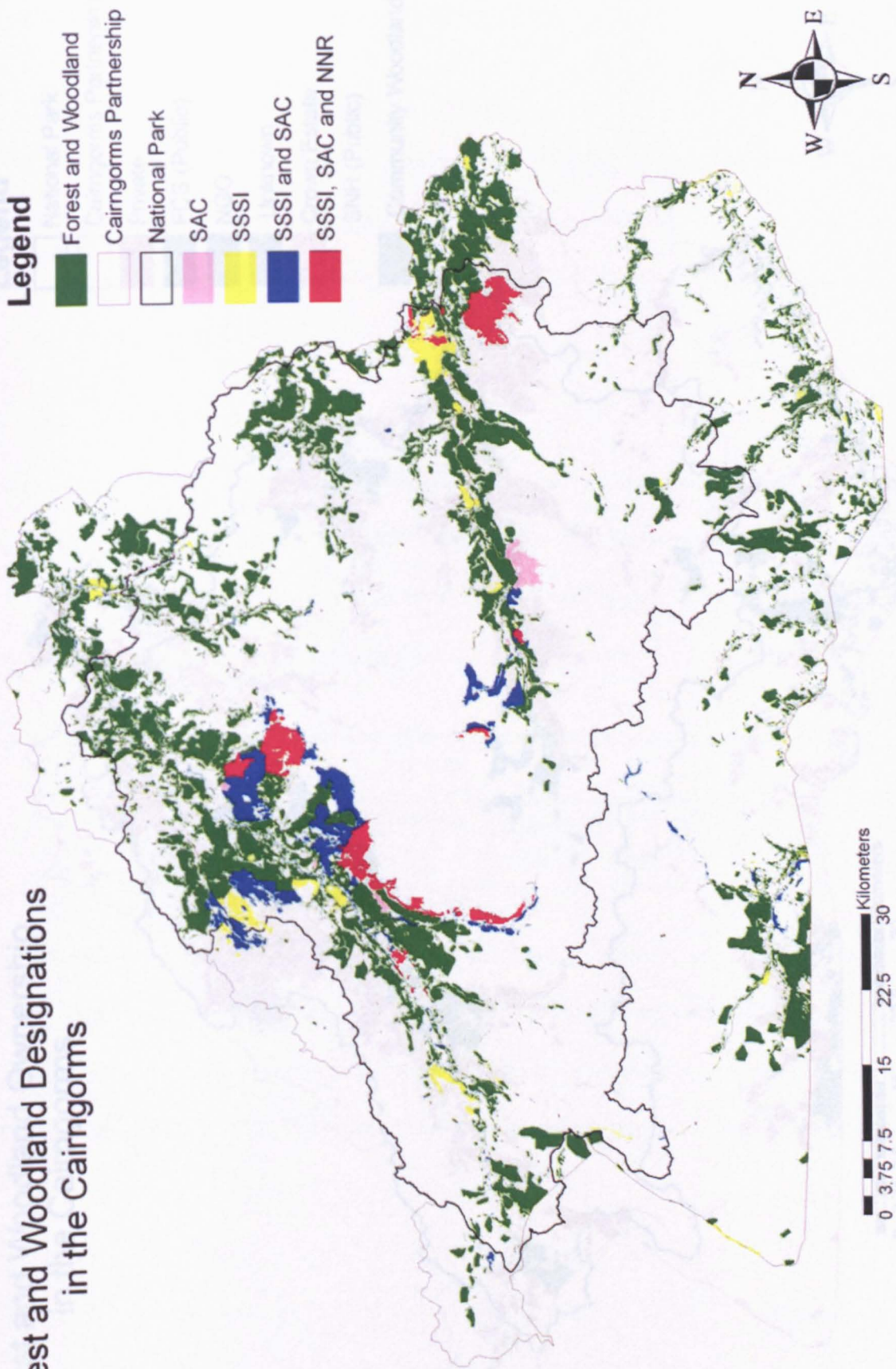
Figure 6-3 Forest and woodland in the Cairngorms region showing areas and levels of conservation designation. Source: SNH designation datasets.

Forest and Woodland Ownership
in the Cairngorms

Legend

- ☐ National Park
- ☐ Cairngorms Partnership
- ■ Private
- ■ FCS (Public)
- ■ NGO
- ■ Unknown
- ■ Crown Estate
- ■ SNH (Public)
- ■ Community Woodland

Kilometers
0 3.75 7.5   15   22.5   30
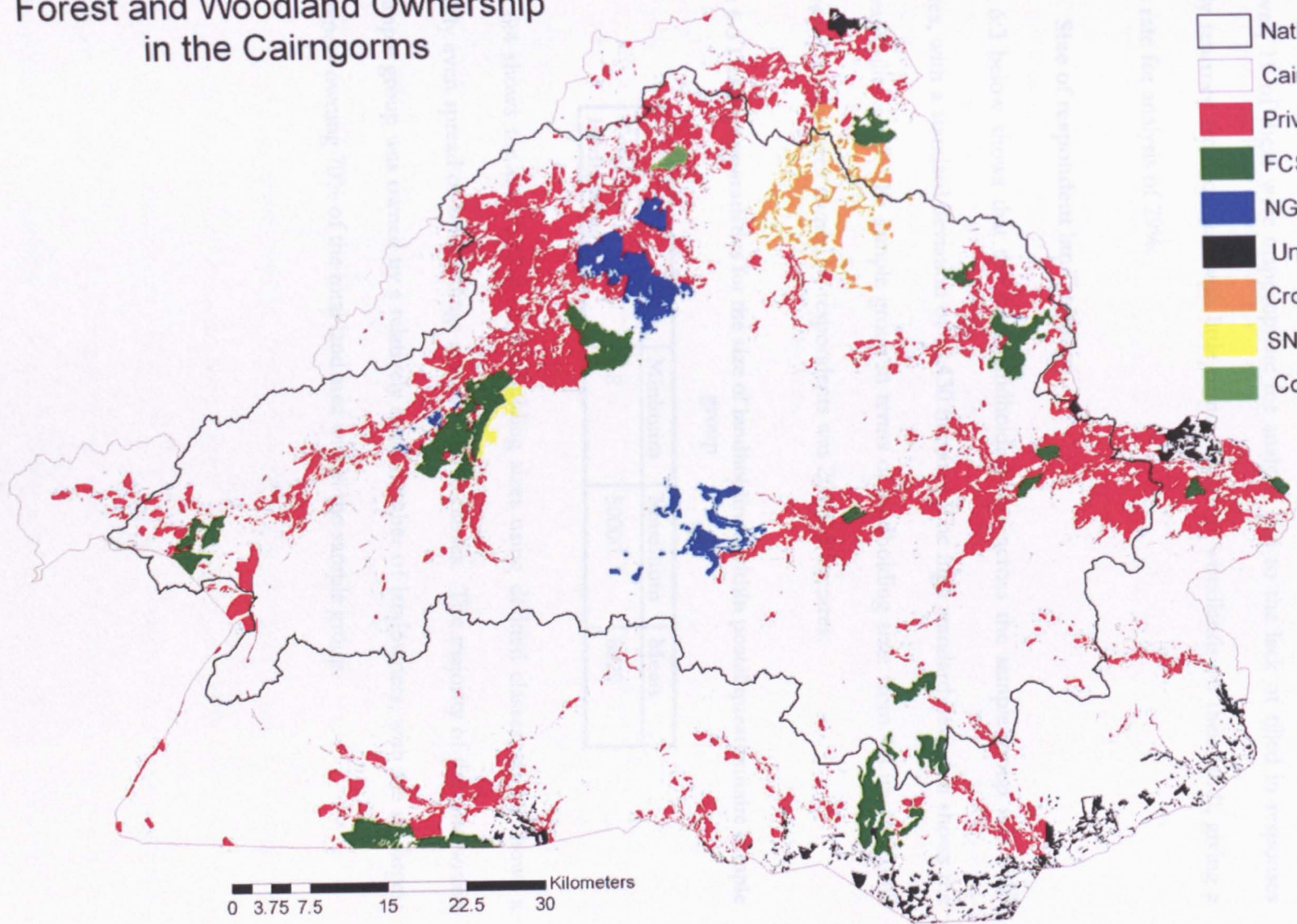
Figure 6-4 Forest and woodland ownership in the Cairngorms region

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6.2 Postal questionnaire results and analysis

6.2.1 Questionnaire return rate

A total of 52 of the 114 posted questionnaires were returned, giving a 46% return rate. However, 19 of these were inappropriate for analysis due to the lack of filled in responses (mainly returned from owners with little or no forests or woodlands on their land), giving a return rate for analysis of 29%.

6.2.2 Size of respondent landholdings.

Table 6:3 below shows that the mean landholding size across the sample group was 8029 hectares, with a standard deviation of 12,430 hectares. The high standard deviation shows the high variability across the sample group in terms of landholding size: from 4.8 up to 50,000 hectares. The total area owned by respondents was 264,968 hectares.

Table 6-3 Descriptive statistics for the size of landholdings within postal questionnaire sample group

	N	Minimum	Maximum	Mean
Total size of landholding	33	4.8	50000	8029

Table 6:4 shows the distribution of landholding sizes using defined classes, which shows a relatively even spread of landholdings across the five classes. The majority of the land within the sample group was owned by a relatively small number of landowners, with the six largest landowners owning 70% of the total land area within the sample group.

Table 6-4 Frequency table for landholding size (some totals may not add up due to rounding errors)

Landholding Size range	Frequency	% respondents	Land area covered by group (Ha)	% of total area covered by sample
Size 0 -100Ha	7	21	252	0.1
101-1000Ha	5	15	1587	0.6
Size 1001-5000	8	24	22,350	8
5001-15,000	7	21	55,610	21
15,000-50,000	6	18	185,170	70
Total	33	100.0	264,969	100

6.2.3 Ownership category

Table 6:5 shows the percentages of respondents within each of the provided ownership categories. As the population for this study was SRPBA members, Table 6:5 does not represent the landownership situation accurately: as private landowners are overrepresented, due to the lack of non-private landowners among SRPBA members.

Table 6-5 Frequency table showing percentage and number of respondents in the different ownership categories (some totals may not add up due to rounding errors)

Ownership category	Frequency	% of respondents	Land area represented (Ha)	% of total represented land area
Personal/Private	24	72.7	220,409.50	83.2
Business	5	15.2	5049	1.9
Trust (investment group)	1	3.0	10.15	>0.001
Voluntary organisation/charity	2	6.1	16,500	6.2
Other	1	3.0	23,000	8.7
Total	33	100.0	264,968.65	100

The business category was created by respondents under the 'other' option. In these five cases, the ownership could be considered as closer to private rather than any of the other categories. Two of the landowners listing their property as a business also classed themselves as farmers, while the other three classed themselves as mixed estates. The 'other' category shown in Table 6:5 was one large landowner, believed to be the Crown Estate at Glenlivet.

6.2.4 General landholding description

Table 6:6 shows the frequency of different landholding types across the sample group. Respondents were given a choice of three main categories: traditional sporting estate, mixed estate and farm holding. Two other categories were also added by respondents using the 'other' category: conservation area (2) and forestry (1), with 'forestry' accounting for a landholding covered in forest and with purely forestry interests. The predominant description used by respondents to describe their land holding was mixed estate (14 respondents), with traditional sporting estates and farm holdings accounting for 8 respondents each. Farm respondents noted that a variety of different types of farm holdings existed. The majority of farm respondents in this group (5) listed themselves as hillfarms, with one categorising his landholding as an arable farm, one as a hobby farm, and one as a large mixed farm.

Table 6-6 Frequency table for landownership type within sample group

Landholding type	Frequency	Percent	Land area (ha)	Percentage of total land area (in sample)
Farm	8	24	774	0.3
Traditional sporting estate	8	24	89,337	34
Mixed estate	14	42	154,638	58
Conservation area	2	6	19,700	7
Forestry	1	3	520	0.2
Total	33	100	264,968	100

6.2.5 Length of ownership

The average length of current ownership among the 33 respondents was 151 years, with a standard deviation of 181 years, a minimum of five years and a maximum of 650 years. Figure 6:5 shows a histogram of the distribution of respondents based on length of property ownership. The majority of properties (20 of 33) lie within the 0-100 years category, with the remaining properties spread out across the different 100-year categories. A second frequency distribution analysis (Figure 6:6) using user-defined ranges shows that more respondent

landholdings (48%) had been owned for less than 50 years than for 50-100 years (12%), while 21% of all sample landholdings had been owned for less than 20 years. In general, both long-term and short-term owners occur frequently within the sample group, while medium term ownership (i.e. 51-100 and 101-200 categories) is less common.
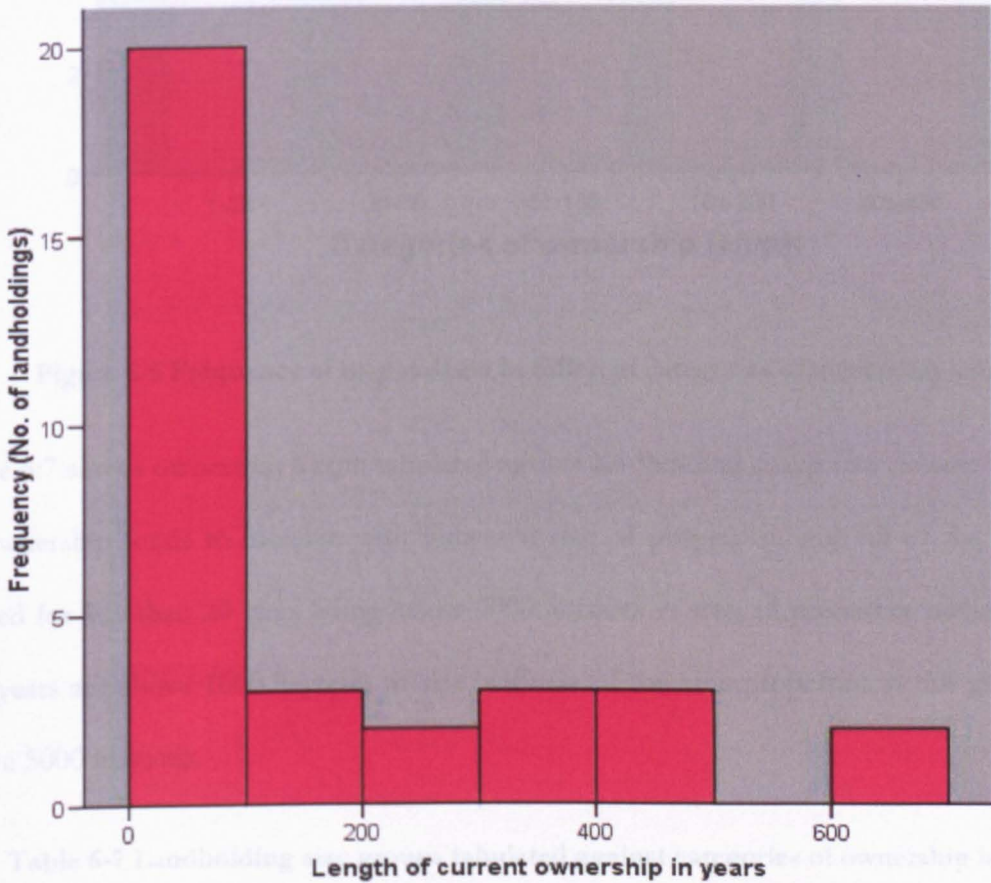
Figure 6-5 Histogram of current ownership length of sample group properties

Figure 6-6 Frequency of respondents in different categories of ownership length

Table 6:7 shows ownership length tabulated against landholding group size classes. The length of ownership tends to increase with increased size of properties; with all of the properties owned for less than 20 years being below 5000 hectares in size; all properties owned for 201-650 years are above 1000 hectares in size, with six of the nine properties in this group being above 5000 hectares.

Table 6-7 Landholding size groups tabulated against categories of ownership length

Landholding Size Class (hectares)	Categories of ownership length					Total
	1-20	21-50	51-100	101-200	201-650	
0 -100	2	3	1	1	0	7
101-1000	3	2	0	0	0	5
1001-5000	2	1	1	1	3	8
5001-15,000	0	2	1	1	3	7
15,000-50,000	0	1	1	1	3	6
Total	7	9	4	4	9	33

6.2.6   Activities on landholdings and relative incomes

Respondents were asked to specify which activities were mainly engaged in on their land. The options provided were all further divided between commercial and non-commercial and, in many cases, respondents ticked both the commercial and non-commercial boxes for one activity. Results for the options for activities shown in the questionnaire are shown in Figure 6:7. While some respondents also utilised the 'other' category, in all but two cases, the examples listed fitted within the tourism category. The two exceptions were examples of small estate businesses and are not included in Figure 6:7.

The most common commercial activity recorded was domestic stock grazing. In the vast majority of cases, this would most likely be low-intensity sheep grazing on hill ground. Non-agricultural lets was the second most common commercial activity across the sample. Non-agricultural lets in the Cairngorms consist mainly of holiday cottages, business property lets, and longer-term residential lets. However, this category was non-specific and so the actual breakdown within this category is unknown. Forest management and deer stalking both occurred as commercial activities on 63% of landholdings, and were the second most frequent commercial activities. It should be pointed out, however, that as the questionnaire was directly concerned with forestry and woodland, the respondent group was probably biased; forest management as an activity might not occur at such a high level among all landowners in the region. Recreation, which in many cases is likely to have had a certain amount of dependency on the presence of forest and woodland, was also a common activity (as common as forest management). However, across all listed activities, recreation ranked as the most common non-commercial activity. In contrast, forest management, property lets, timber production and stock grazing all occurred as predominantly commercial activities. Firewood collection also occurred commercially, but more commonly for non-commercial reasons.
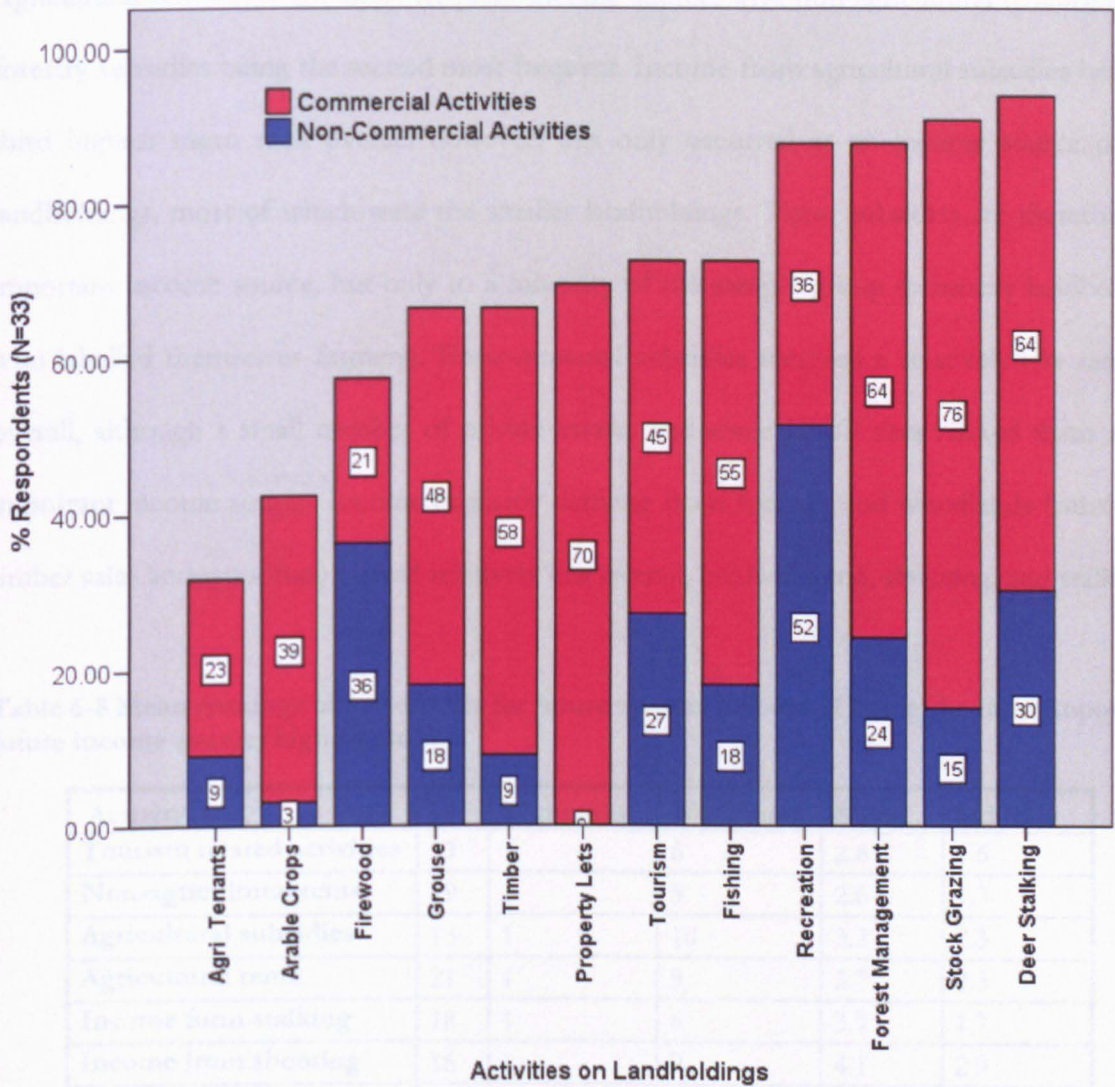
Figure 6-7 Commercial and non-commercial activities on landholdings of respondent group

Respondents were also asked to rank a range of potential income sources in relation to their importance over the given year in terms of relative income, with 1 being the highest ranked income source. The results are shown in Table 6:8. The key finding from this question is that, within this sample group, tourism and non-agricultural rents were ranked as the most important income sources for respondents engaged in these activities. An important point in this regard is that many non-agricultural rents are in fact from holiday homes, which further emphasizes the importance of tourism-related activities from an income perspective on Scottish landholdings.

Agricultural rents were the most frequent income source, with non-agricultural tenancies and forestry subsidies being the second most frequent. Income from agricultural subsidies had the third highest mean rank overall; however, this only occurred as an income source on 13 landholdings, most of which were the smaller landholdings. These subsidies are therefore an important income source, but only to a minority of the sample group (primarily landholders who labelled themselves farmers). Environmental subsidies received a relatively low ranking overall, although a small number of private estates and some NGO sites ranked them as an important income source. Income explicitly deriving from forestry and woodlands (subsidies, timber sales and woodfuel) ranked relatively low overall, below fishing, shooting, and stalking.

Table 6-8 Mean rankings of importance for future income streams (1 being the most important future income source/highest rank)

Activity	N	Minimum	Maximum	Mean	Std. Dev
Tourism related activities	17	1	6	2.6	1.6
Non-agricultural rents	19	1	5	2.6	1.3
Agricultural subsidies	13	1	10	3.2	2.3
Agricultural rents	21	1	9	3.7	2.3
Income form stalking	18	1	6	3.9	1.7
Income from shooting	16	1	9	4.1	2.9
Income from fishing	15	1	8	4.1	2.3
Timber production	10	1	8	4.4	2.3
Forestry subsidies	19	1	9	4.6	2.1
Environmental subsidies	15	1	9	4.6	2.8
Woodfuel sales	6	4	6	4.8	.75
Venison sales	15	1	10	5.5	2.7

6.2.7   Forest and woodland habitats

Landowners were asked if they had any woodland or forest habitats on their land; all 33 respondents replied positively.   They were also asked which types of woodland and approximately what area of each type occurred on their land. The options given were: broadleaved, semi-natural pinewood, coniferous plantation and mixed woodland. The coniferous plantation category was not divided between native and non-native species. Plantation forest was the most commonly occurring woodland type, occurring on 25

landholdings and accounting for the largest area within the four woodland types (see Table 6:9). The total area of forest and woodland covered by respondents was 43,830 hectares, which is equivalent to approximately one third of the total forest and woodland area in the CP area, as shown by the GIS analysis in Section 6.1.1.

Table 6-9 Minimum, maximum and total area of woodland types across sample group

Forest and Woodland Categories	N	Minimum (ha)	Maximum (Ha)	Total area (ha)
Broadleaved woodland	17	1	500	2,201
Semi-natural pinewood	12	5	3262	13,184
Plantation forest	25	2	3900	21,257
Mixed woodland	15	2	5431	7,183
Total woodland area				43,831

6.2.8   Landowner opinion

Owners were asked about their attitudes to the woodlands on their landholdings by indicating the extent to which they agree or disagreed with five statements. These statements and the results are shown in Table 6:10 and Figure 6:8. The large majority of respondents perceive their woodlands as being of high personal importance, however 50% do not consider their woodlands as sources of income and a further 56% state that their woodland does not pay for itself. In general, these results show that having forested ground on one's land can often be an overall expense, so that the importance of the woodland is often not, at least currently, directly linked to economic gain but, rather to personal interest. Owners also almost all view their woodlands as being managed; only two respondents stated that their woodlands were neglected and unmanaged.

Table 6-10 Landowner attitudes to woodland ownership by percentage of responses

My Woodland Is: (n=32)	Strongly Agree	Agree	Don't Know	Disagree	Strongly Disagree
Of great personal importance to me	50	44	0	3	3
An income earner	6	31	13	28	22
Just about pays for itself	6	28	9	34	22
Costs me more money than it makes me	13	25	22	28	12
Unmanaged and neglected	0	6	13	34	47
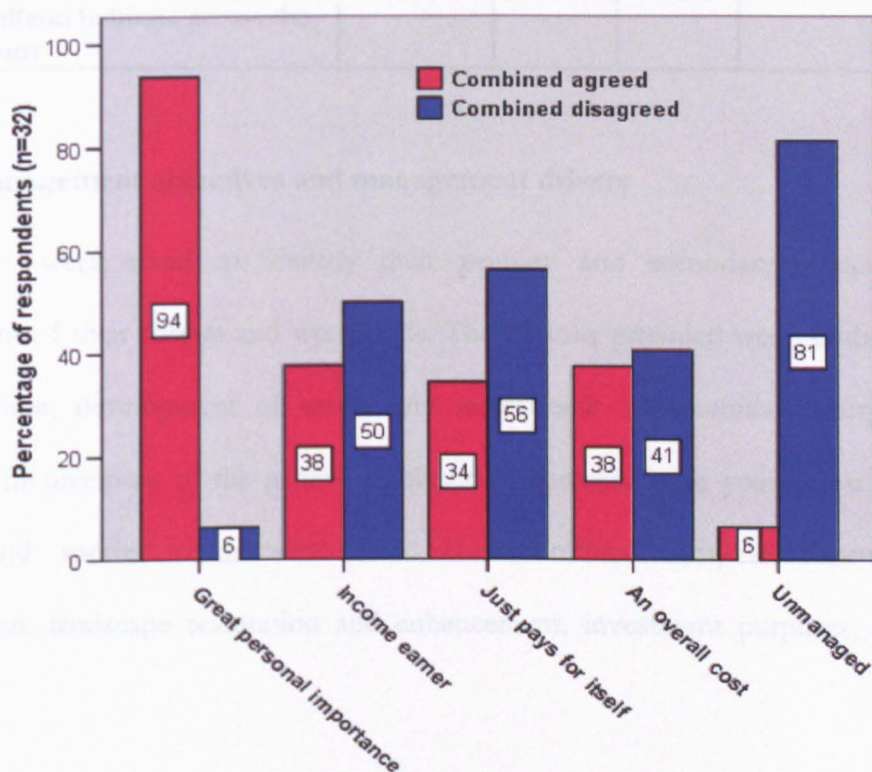
Figure 6-8 Landowner attitudes to woodland ownership by percentage of responses

Landowners were also asked to what extent they agreed with two statements relating to how isolated or connected they felt their forests and woodlands were, in relation to other forests and woodlands in the Cairngorms region. The statements and results are shown in Table 6:11. The majority of landowners (67%) felt their woodlands existed and developed as a component of a much larger network. 36% stated however, that their woodlands existed in isolation to other woodland areas. Two respondents noted that their view (that their woodlands were

isolated) was not a perception but a fact, related to their woodlands being too far from any other woodland areas and that any potential linkages were barred by local topography.

Table 6-11 Landowners views on their woodlands relative isolation and degree of connectedness

The forests and woodlands on my land....... (n=33)	Strongly Agree	Agree	Don't know	Disagree	Strongly Disagree
Exist and develop in relative isolation to other areas of forests and woodland in the Cairngorms region	15	21	3	46	15
Exist and develop as a component of a much larger network of forest and woodland habitats across the Cairngorms	15	52	12	18	3

6.2.9 Management objectives and management drivers

Landowners were asked to identify their primary and secondary objectives for the management of their forests and woodlands. The options provided were: timber production and extraction, development of access and recreational opportunities, interpretation and education, involvement of the general public/local community in your forest management, habitats and species conservation and restoration/biodiversity enhancement, carbon sequestration, landscape restoration and enhancement, investment purposes, sporting, and other.

A large majority (97%) of respondents had at least two objectives and 79% had at least three objectives when primary and secondary objectives were combined (see Table 6:12). Taking primary objectives alone, the degree of multi-objective management does, however, decrease somewhat, with 64% of owners having at least two primary objectives and 33% having three primary objectives.

Table 6-12 Number of primary, secondary and combined forest management objectives on landholdings (n=33)

No. of objectives (primary and secondary combined)	Percentage of landowners
At least 2	97
At least 3	79
At least 4	68
Five or more	55
No. of primary objectives	
At least 2	64
At least 3	3
Four or more	18
No. of secondary objectives	
At least 2	79
At least 3	49
Four or more	21

As Figure 6:9 shows, most owners consider conservation and biodiversity, landscape, timber, and sporting uses of their forests and woodlands as the key objectives of management, with timber and biodiversity/conservation the most common primary objectives overall. Other options generally occurred much less frequently, with 'public benefit' objectives such as interpretation/education, recreation and public involvement occurring much less frequently across the sample group, particularly as primary objectives. A small number of owners used the 'other' category, with four private owners listing shelter for livestock as a prime objective for management, and three listing woodland grazing as a primary or secondary objective
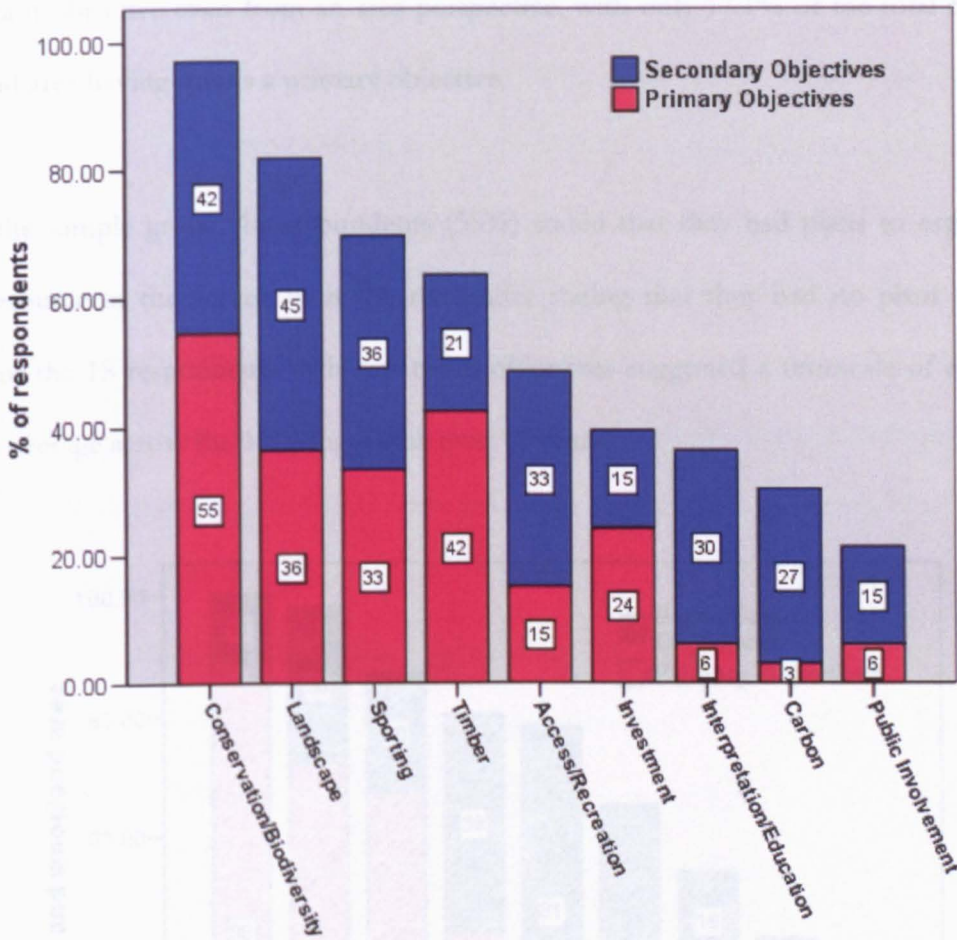
Figure 6-9 Primary and secondary forest management objectives by percentage of responses

6.2.9.1 Management objectives and the area of private ownership

If the area of forest and woodland covered by respondents is taken into account (see Figure 6:10), rather than the percentage of respondents, the percentages for different objectives change dramatically. Most probably, this is because owners of smaller forests have fewer objectives. In particular, conservation and biodiversity can be seen to be a primary objective for 89% of the surveyed forest and woodland area. From an area perspective, landscape also replaces timber as the second most common primary objective. Timber is also more important when area is taken into account, being a primary objective for 67% of the surveyed forests and woodlands. Recreation/access and interpretation/education are more important from an area perspective, suggesting that owners of larger forests are more likely to have 'public benefit' objectives than owners of smaller forests. Public involvement, however, remains a relatively

uncommon objective even from an area perspective, with only 17.1% of the total forest and

woodland area having this as a primary objective.

Within the sample group, 18 respondents (55%) stated that they had plans to expand their

forest resource in the future, with the remainder stating that they had no plans to do so.

Fifteen of the 18 respondents with expansion objectives suggested a timescale of expansion,

with the average across the 15 being 378ha over 12 years.
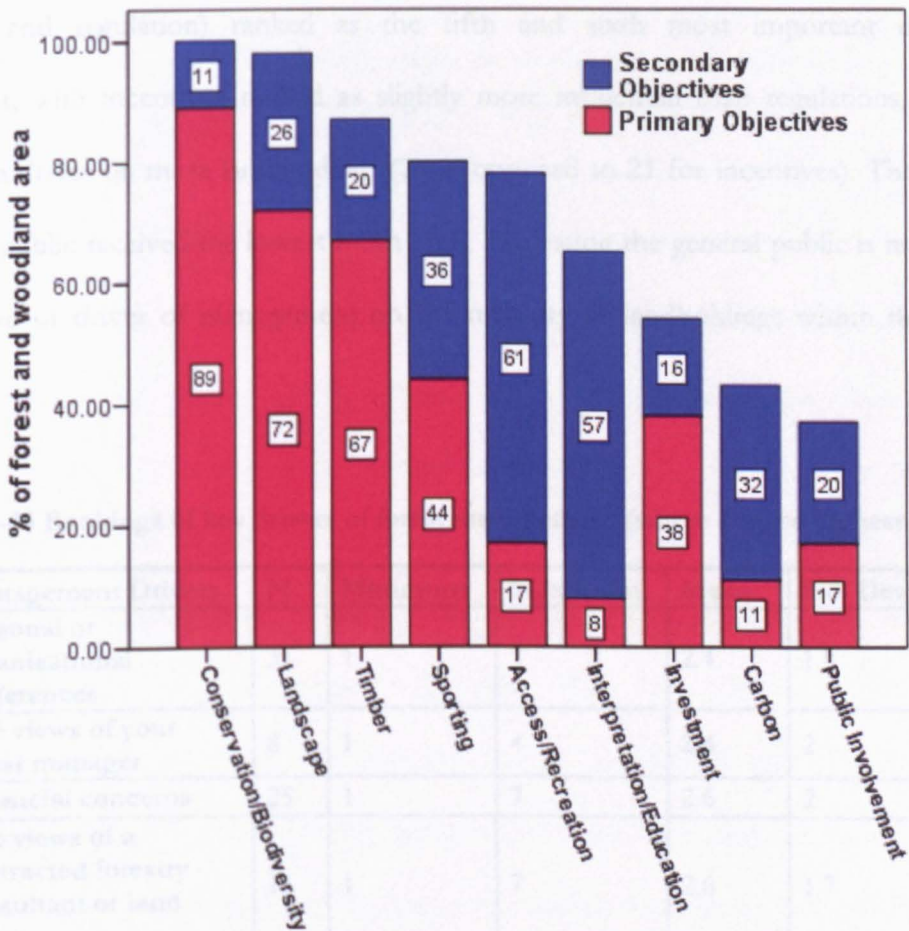
Figure 6-10 Primary and secondary management objectives by area

6.2.9.2 Management drivers

Table 6:13 shows how respondents ranked a number of suggested key drivers of forest

management. Personal or organisational preferences were the most common driver and

received the highest mean rank across the greatest number of sites. Forest managers were also

159

a strong influence on management, receiving the same rank as personal preferences, however, forest managers were only evident on 8 sites, and as such had much less impact on management across the group as a whole relative to personal or organisational preferences.

Financial concerns followed with a mean rank of 2.6 across 25 respondents. The views of a contracted consultant or agent also received a ranking of 2.6, but only across 16 respondents, suggesting this was a driver when a consultant or agent was involved in management, but was not always important as not all respondents contracted consultants or agents. Policy drivers (incentives and regulation) ranked as the fifth and sixth most important drivers of management, with incentives ranked as slightly more influential than regulations, although these were a driver on more landholdings (25 as opposed to 21 for incentives). The views of the general public received the lowest mean rank, suggesting the general public is not a major consideration or driver of management on the majority of landholdings within this sample group.

Table 6-13 Rankings of key drivers of forest management (where 1 is the highest rank)

Management Drivers	N	Minimum	Maximum	Mean	Std. Dev
Personal or organisational preferences	31	1	7	2.4	1.8
The views of your forest manager	8	1	4	2.4	2
Financial concerns	25	1	7	2.6	2
The views of a contracted forestry consultant or land agent	16	1	7	2.6	1.7
Policy - available incentives	25	1	7	3.0	1.5
Policy - Regulation	21	1	7	3.3	1.7
The views of local communities/the general public	23	1	7	4.2	1.6

6.2.10 Who carries out forest management ?

A total of 48 FTE jobs across all landholdings were seen as directly attributable to the forest and woodland resources on those landholdings; an average of 1.4 jobs per landholding. This figure was raised considerably by two NGO respondents attributing most of the jobs on their sites to the presence of the forest resource (including interpretation for example). When these two sites were removed from the sample group, the average figure became 0.9 FTE jobs per landholding. Table 6:14 shows the breakdown of FTE jobs directly attributable to the forest resource across the sample group.

Table 6-14 The number of FTE jobs on sample sites, grouped using defined ranges (n=33)

FTE Job ranges	0	0-0.5	0.51-1	1.1-2	2.1-6.5	7-13
No. of respondents	14	6	5	4	2	2

Figure 6:11 shows who carries out forest management. The most common management format was owner management (30%), followed by 24% being managed by forest manager (one of whom was part-time and the remainder full-time). On 39% of surveyed sites, a forestry consultant, forest management company or land agent was involved in forest management, with varying levels of input from the landowner – with 18% stating that a consultant or forestry company managed their forest, while 12% felt they carried out their own forest management in conjunction with a consultant. A relatively high proportion of the sample group therefore utilised forestry consultants or land management agents to some degree within their forest management. This is particularly significant as Table 6:13 shows that, where consultants and agents are used, they can have a considerable influence over management.
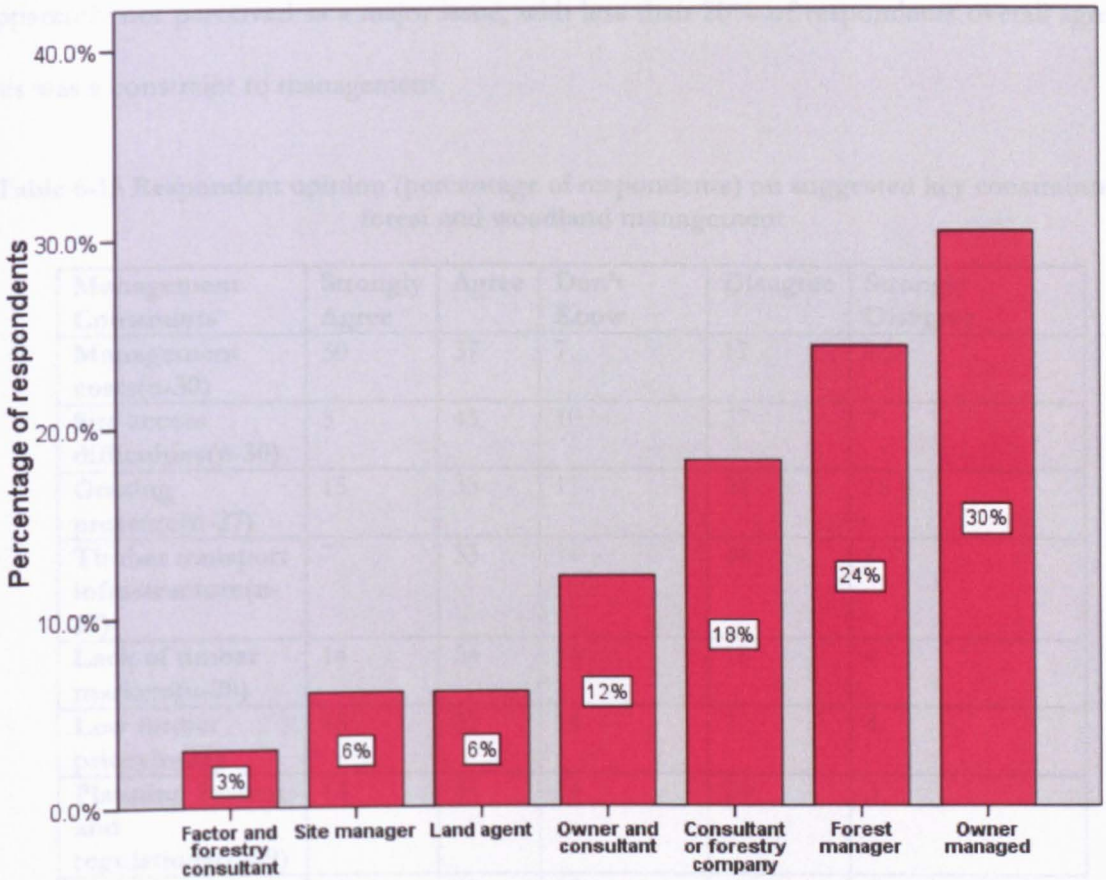
Figure 6-11 How forests and woodlands are managed (n=33)

6.2.11 Constraints on management

Table 6:15 shows respondent opinions on a number of suggested constraints on forest management. Some respondents did not tick all constraint boxes. Figure 6:12 shows a graphical representation of Table 6:15. When agreed and strongly agreed responses are combined, the key constraints can be seen as low timber prices, rapidly changing policies, and a lack of markets for timber products. Respondents appear divided on whether site access and timber transport are key constraints, with these constraints appearing to be site-specific rather than generic. The lack of timber markets appears (Table 6:15) as a more generic issue, although 21% of respondents disagreed that this was a constraint, which highlights the fact that not all sites in the region have poor internal accessibility or poor access to markets and that these constraints vary regionally. A large majority of respondents also agreed that changing policies acted as a constraint to management. Public pressure, however, was

apparently not perceived as a major issue, with less than 20% of respondents overall agreeing

this was a constraint to management.

Table 6-15 Respondent opinion (percentage of respondents) on suggested key constraints on forest and woodland management

Management Constraints	Strongly Agree	Agree	Don't Know	Disagree	Strongly Disagree
Management costs(n-30)	30	37	7	17	10
Site access difficulties(n-30)	3	43	10	37	7
Grazing pressure(n-27)	15	33	11	22	18.5
Timber transport infrastructure(n-27)	7	33	11	44	4
Lack of timber markets(n-28)	14	54	11	18	4
Low timber prices(n-28)	43	32	14	7	4
Planning System and regulations(n-29)	14	45	14	24	3
Inadequate incentives(n-28)	18	43	25	11	4
Rapidly changing policies(n-26)	31	42	19	4	4
Public pressure(n-27)	4	15	22	48	11

In response to questions ... about ... 70% of respondents had agreed ... on their landholding, 30% did not. Across the 33 respondents, only ... a few who derived some form of income from forest and woodlands. The level of ... introduced grazing to ... However, 15 of the ... that they had ... that they managed ... the ... on the part of landowners to become involved ... in the forest.

6.2.13 Policy options ...

Table 6-16 ... the most ... popular option for supporting forest management in the ... regulations. The development of a related grant scheme and a regional ... market ranked as the ... most popular options, with 84% of respondents agreeing with both options. The development of a Cairngorms timber brand and a Cairngorms forestry forum were the least popular of the suggested options, with only 19% and 38% of respondents agreeing with these options respectively. This lack of interest in a forestry forum appears as inconsistent with the interest shown in collaborative forest management in Section 6.2.12. This may be linked with a view that a forest would also benefit ... of the landowning interests (as opposed to public interest in collaboration) ...

Figure 6-12 Respondent opinion on suggested key constraints on forest management

6.2.12 Public participation and integrated management

Respondents were also questioned on communication and co-operation between landowners and on involving the public in management. Twenty three of the 33 respondents stated that they would be interested in co-operating further with other landowners in the region in the interests of taking a broader approach to forest management, while ten stated they would have no interest in further co-operation. Respondents were also asked whether or not they involved local community members in the process of setting their management objectives: 24% stated that they currently involved local communities in this process, while 73% said they did not. Five of the nine landholdings which involved local communities in management were

amongst the largest landholdings in the sample group (2 of the five were NGOs), with the remaining four all being over 5000 hectares in size.

In relation to farm-forestry integration, 70% of respondents had agricultural tenants on their landholding, 30% did not. Across the 33 respondents, only 4 had farm tenants who derived some form of income from forest and woodland-related activities (generally farm woodland grazing schemes). However, 15 of the 33 respondents stated that there was a strong likelihood that they would transfer more of their agricultural land to forest management-related activities in the future.

6.2.13 Policy opportunities

Table 6:16 and Figure 6:13 show respondent opinion on some suggested future policy options for supporting forest management in the Cairngorms. The development of a targeted grant scheme and a regional woodfuel market ranked as the most popular options, with 84% of respondents agreeing with both options. The development of a Cairngorms timber brand and a Cairngorms forestry forum were the least popular of the suggested options, with only 19% and 38% of respondents agreeing with these options respectively. This lack of interest in a forestry forum appears as inconsistent with the interest shown in collaborative forest management in Section 6.2.12. This may be linked with a view that a forum would also involve a range of non-landowning interests (as opposed to purely landowner collaboration) and simply represent an increase in regional bureaucracy. The level of respondents ticking the 'don't know' boxes was considerably higher than for the constraints table (Section 6.2.11), which may reflect a lack of willingness on the part of landowners to become involved in advising how policy should develop.

Percentage of respondents

100.00

80.00

60.00

40.00

20.00

0.00

■ Combined Agreed
■ Combined Disagreed

44 28 | 84 10 | 38 25 | 72 12 | 63 9 | 19 38 | 50 28 | 53 16 | 84 6

Commercial recreation | Develop woodfuel market | Forestry forum | Free mapping resource | Landowner collaboration | Local timber brand | Management advice centre | Marketing co-operatives | Targeted grant scheme
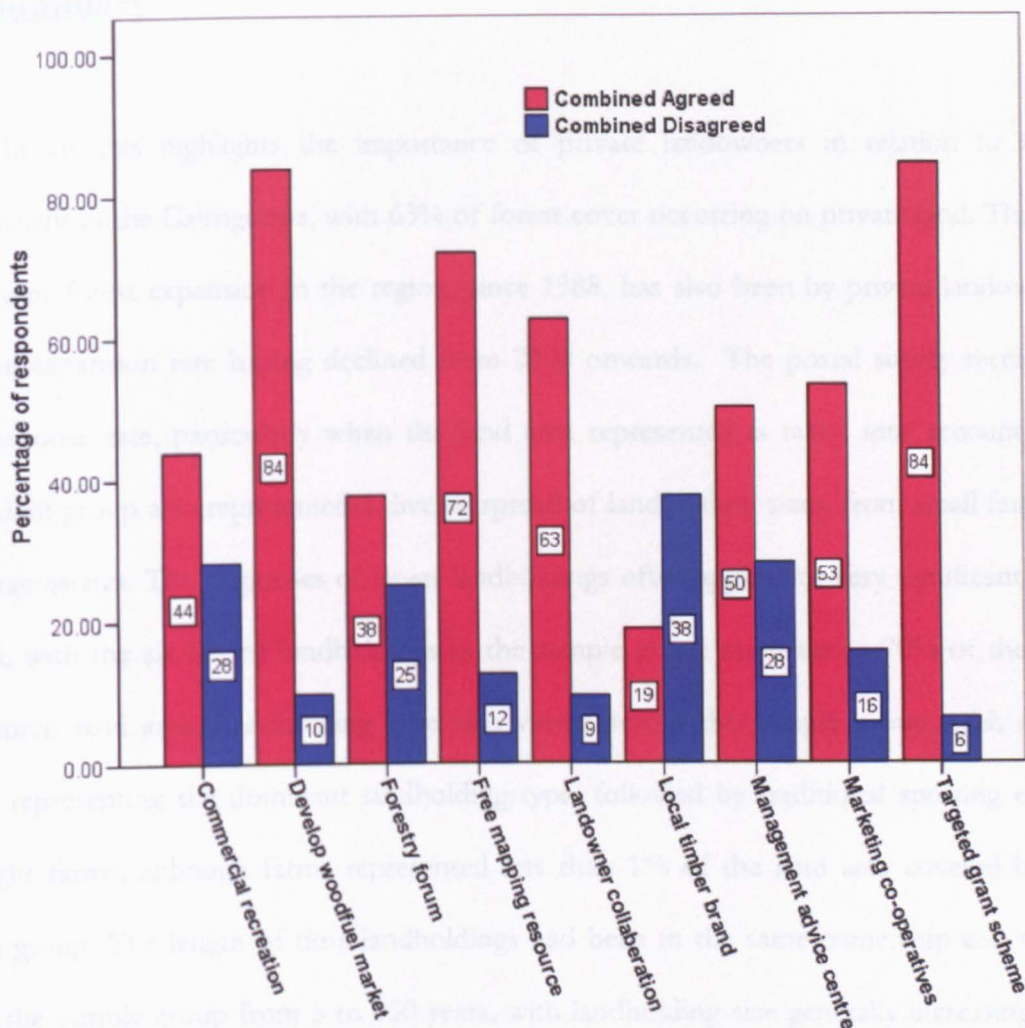
Figure 6-13 Respondent opinion on suggested policy development opportunities (n=33)

Table 6-16 Respondent opinion (percentage of respondents) on suggested future policy development options relating to forest management

Policy Opportunities	Landowner Opinion				
	Strongly Agree	Agree	Don't Know	Disagree	Strongly Disagree
Cairngorms forest stakeholder forum	6	31	38	22	3
More marketing co-operative	6	47	31	13	3
Develop woodfuel market	29	55	7	10	0
More collaborative management between landowners	6	56	28	6	3
A Cairngorms timber brand	0	19	44	38	0
Development of commercial recreation	13	31	28	22	6
Management advice centre	6	44	22	25	3
A free map resource	19	53	16	13	0
Targeted grant scheme	34	50	9	6	0

6.3 <u>Summary</u>

The GIS analysis highlights the importance of private landowners in relation to forest management in the Cairngorms, with 63% of forest cover occurring on private land. The vast majority of forest expansion in the region, since 1988, has also been by private landowners, with the expansion rate having declined from 2000 onwards. The postal survey received a high response rate, particularly when the land area represented is taken into account. The respondent group also represented a diverse spread of landholding sizes, from small farms to very large estates. The responses of larger landholdings often applied to very significant areas of land, with the six largest landholdings in the sample group constituting 70% of the total represented land area. Landholding type also varied across the sample group, with mixed estates representing the dominant landholding type, followed by traditional sporting estates and eight farms, although farms represented less than 1% of the land area covered by the sample group. The length of time landholdings had been in the same ownership also varied within the sample group from 5 to 650 years, with landholding size generally increasing with length of ownership.

A range of activities were occurring on landholdings, both commercially and on a non-commercial basis. Tourism development and non-agricultural property lets (often holiday cottages and tourism-related businesses) were common and often seen by those engaging in them as the main earner on their landholdings. Recreation was also a common activity; however, like fuelwood collection, it occurred more commonly on a non-commercial basis. Forest management and timber production were also common, however, the income areas directly associated with these activities - environmental and forest subsidies, timber sales and fuel sales - were ranked lower by respondents than most other income sources. This suggested that forest management was not engaged in solely for financial reasons, a view supported by the fact that almost all respondents stated that their forests and woodlands were of great

personal importance to them, despite only 37% of respondents viewing them as a source of income.

Forest management objectives varied, although biodiversity and conservation remained a consistently strong objective across the sample group. When the percentage of the forest area represented by respondents was taken into account (as opposed to percentage of respondents), objectives relating to social benefits increased considerably, suggesting that larger landholdings are more likely to have forest management objectives relating to public benefits. Taking primary objectives alone, the level of multi-objective forest management was not particularly high, with 33% of respondents having 3 or more objectives. However, when both primary and secondary objectives are considered, the level of multi-objective management is much higher, with 68% of surveyed properties having 4 or more forest management objectives.

The key drivers of forest management could also be seen as varying across the sample group. The personal preferences of owners could be seen as a particularly strong influence, as could the opinions of forest managers on the eight sites with forest managers. The next most important drivers were ranked as economic concerns and the views of contracted forest consultants or land agents (only a driver on those properties which contracted consultants or agents), which both received the same level of ranking. Contracted agents and consultants could therefore be seen as having a considerable influence on forest management, which is significant given that 39% of respondents contracted agents or consultants in some capacity in relation to their forest management. Involvement of the general public in management was a distinctly uncommon objective and was also ranked as a relatively unimportant driver of forest management.

Given the lack of interest in public participation as an objective and the view among respondents that the general public were not a key driver of management, it is perhaps not

surprising that public pressure was also not seen as a major constraint, or that 73% of respondents did not feel they involved local communities in their forest management. Site accessibility and timber transport infrastructure were seen as constraints, although respondents were somewhat divided in this regard, with almost half seeing them as a constraint and a similar proportion not seeing them as one. This is perhaps due to the variability in terrain and accessibility across the region. The availability of timber markets was, however, seen as a constraint by 69% of respondents, which could indicate that market availability was more of a generic issue related to the genuine absence of adequate markets, rather than resulting directly from poor site access and transport networks. Rapidly changing policies were also perceived by most respondents as a constraint on forest management.

Respondents appeared less decisive in relation to potential future opportunities for policy development, with more respondents ticking the 'don't know' boxes for this question than for any others. However, the vast majority of respondents were strongly in favour of both further development of the woodfuel market and the creation of a targeted (forest expansion) grant scheme. The majority (63%) of respondents were also in favour of greater collaboration between landowners on matters relating to forest management, perhaps reflecting the fact that 67% of respondents agreed that their forest/woodland resource was part of a larger forest network. However, only a minority of respondents agreed with the idea of setting up a Cairngorms regional forestry forum, possibly due to such forums being seen as representing a range of interests, rather than being a form of purely landowner collaboration.

7 A FOREST MANAGEMENT TYPOLOGY FOR THE CAIRNGORMS REGION

This chapter presents a forest management typology for the Cairngorms region, summarized in Table 7:1. Each site has been assigned to a management 'type' within the typology. Three primary themes of management were identified across the sample group: a) multifunctional forest management b) restricted functionality forestry and c) dual function (conservation and access) forest management. These themes have been sub-divided, as shown in Table 7.1 and explained below.

Table 7-1 Forest management typology for the forests and woodland of the Cairngorms region

THEMES OF MANAGEMENT	SUB-THEMES	OWNERSHIP
1. Sustainable multifunctional forestry	A. High conservation/ biodiversity and high public benefit (direct)	Private (3) FCS (3) NGO (1)
	B. Traditional silviculture – indirect public benefit	Private (4) FCS (1)
2. Restricted functionality forestry	A. Large-scale moderate functionality	Private (2)
	B. Small-scale low functionality	Private (2)
3. Dual function (access and conservation) forest management	A. Fixed	NGO (2) SNH (2)
	B. Flexible	Community (2)

Tables are used to show objectives and management practices for sites within each typology sub-theme (Tables 7-2, 7-3, 7-4, 7-5). A number of codes are used within these tables which are consistent across all tables. These are:

- P=primary objective, S=secondary objective, n/a=not applicable (used in the farm-forestry integration category for sites with no farming activities or farmland),

- L=low emphasis, M=medium emphasis, H=high emphasis,

Y=yes, N=no,

- mix=mixture, (n)=emphasis on <u>native</u> species in management, (e)=emphasis on <u>exotic/non-native</u> species in management, (r)=emphasis on <u>regeneration</u> (p)=emphasis on <u>planting</u> in management,

- (c)=emphasis on <u>culling</u> to reduce deer impacts in the forest environment, C=deer controlled fully by culling, (f)=emphasis on <u>fencing</u> to control deer numbers in the forest environment (overall approach can involve a mix or fencing and culling but the emphasis within this approach can be on one or the other).

7.1   <u>Theme 1: Sustainable multifunctional forestry</u>

Sites represented by this theme exhibited multiple objectives (at least two and usually three or more primary objectives). Landscape, biodiversity and conservation and timber production always featured and there was either regular thinning, or large-scale thinning was planned in the near future:

thinning will be a big part of what we're doing for timber production, for biodiversity and in terms of the running of a sustainable resource, part of the thinning is deciding what specific objectives for any stand can and should be in the future, the main thrust now, maybe forever more, will be thinning. [p2]

Sites in this group produced timber (e.g. sawlogs, pallet, small roundwood) regularly and most had an annual output of timber products – which varied (across sites) from 5,000-25,000 tonnes. The approach to re-stocking was generally a mix of regeneration and planting, often with an emphasis on one or the other. Deer control involved a hybrid approach, utilising both culling of deer and fencing. The emphasis on culling versus fencing varied between sites. This theme typified 11 of the reviewed sites: six private, one NGO estate, and all FCS sites. All six

private estates and the NGO estate had been in relatively long-term ownership (100years+) and had in-situ forest managers (part-time or full-time). FCS sites were part of larger forest districts which were managed from central district management offices.

For private estates in this theme, conservation and biodiversity objectives were generally seen as being driven by a combination of owner (personal) objectives and government policy (especially designations). The overriding driving force presented by respondents from all ownership types in this theme was a sense or responsibility (often seen as owner-driven) to manage the land sustainably. This view tended to emphasize the importance of sustainability in all its forms (economic, environmental, and social), although the social aspect of sustainability was least frequently mentioned by private initiatives and was more commonly referred to in relation to FCS sites. The quotes shown in Quote Box 7:1 below are representative of this theme. It was further divided further into two sub-themes shown below.

In relation to economic sustainability....

it has to be viable, we've got this resource that 250,000 are walking through every year it has to be able to pay its way, we can't just survive on subsidies from agencies, it's got to pay its way [p2]

we've got to look at the bottom line, we're living here and making a living from the land if it's a net liability, financial liability, then we have to look very carefully at it, we'll only really look at it if it's of financial gain to us [p3]

we're just a big private owner of land and we're running a business and with any business unless there's financial stability everything else goes out of the window [p7]

we've got to make money, you know, it doesn't matter how nice we want the woods to be, we can't do it if we're not making money....that underpins everything really it doesn't really matter where the income's coming from, if it's wholly grant aid or wholly timber sales, as long as the figures add up I think private owners will continue to do it you know [p4]

environmental sustainability.....

but long term objectives and, this will never change, is that we do things sustainably, we do things that are, you know, sustainable financially, as well as environmentally sustainable [p4]

the natural factors will be the biggest single driver simply because if you try and run to market, you're not going to, you're chasing a ghost, so you've really got to say, up here, well we can treat this as a supermarket, we can push things forward a couple of years, we can hold things back a couple of years, but basically we've got to go with what nature's doing. We can't plan and organise things without regard to that [NGO1]

and social sustainability.......

so if we get the local community council to endorse our business endeavours then there's very much greater chance of getting success, whereas 30 years ago if you wanted to put up a house, a sawmill, a cattle shed you went up and did it, now you've got to get planning, you've got to go through all the rigmarole and therefore we need people on our side in order to do it [p3]

there is then community desire, which is translated into policy [for management] and we're looking at that in line with the community policy that they actually have [FCS respondent speaking in relation to Glenmore and Inshriach]

sometimes we will take members of the public around to explain certain management issues, in order to enhance their understanding of why we're doing things and how they're being done [p1]

7.1.1 Sub-theme 1A: Sustainable multifunctional forestry – high conservation/biodiversity and high public benefit

This sub-theme represents sites exhibiting the broadest range of objectives and highest level of public benefits. These factors, combined with an emphasis on all facets of sustainable management, gave these sites the highest level of multifunctionality within the sample group. Three private, three FCS and one NGO estate were represented within this sub-theme. A defining characteristic which separated these sites from those of sub-theme 1B was the presence of objectives relating to 'direct' public benefit: recreation/access; education/interpretation; and participation (see Table 7:2). Conservation and biodiversity are also of importance, evidenced in most cases by a preference for regeneration over planting when re-stocking, and for native over non-native species. Recreation levels on these sites were high relative to the sample group as a whole and almost all sites had (heavily designated) forest areas of high conservation value and/or were engaging in measures to conserve/enhance biodiversity. Most sites in this group did not place a strong emphasis on future forest expansion, although the private estates were all expanding their forest area to some extent. However, most stated that any future expansion would most likely be by regeneration and for biodiversity, rather than commercial forestry reasons. Timber production was seen as crucial to future forest management and to the general future economic stability of the forest resource on all sites within this sub-theme.

The FCS sites in this sub-theme all ranked public participation in management as a primary objective, although the actual level of public involvement, while higher than on private/NGO sites, was low relative to that of community-managed sites. All sites within this group emphasized long-term planning (20 years plus), although only one of the three private estates had developed a FCS-aided LTFP. However, internal long-term planning was evident on the other sites. The context for all three private estates and the one NGO estate was that of a

mixed estate, although farm-forestry integration was only strongly evident on the NGO site. The importance of forestry, relative to other land uses, was considered as variable by the non-FCS sites, dependent mainly on timber prices and the viability of sporting activities at any one time. NGO1 actually used a majority of non-native species; however, management also included three secondary public benefit-related objectives, and an emphasis was placed on regeneration over planting when re-stocking, resulting in NGO1 being placed in this sub-theme.

Table 7-2 Management objectives and criteria for sites in sub-theme 1A

SITE	P1	P2	P6	FCS1A	FCS1B	FCS2A	NGO1
Management Objectives							
Recreation/Access	P	P	P/S	P	P	P	S
Education/Interpretation	S	S	S	P	P	P	S
Participation	S	S	-	P	P	P	S
Timber	P	P	P	P	P	P	P
Farm-forestry integration	S	S	-	n/a	n/a	n/a	P
Sporting	-	P	S	-	-	-	P
Biodiversity/Conservation	P	P	P	P	P	P	P
Landscape	P	P	P	P	P	P	P
Research	-	-	-	P	S	-	S
Forest expansion	M	H	M	L	-	L	L
Management Approaches							
Public involvement	L	L	L	L-M	L-M	L-M	L-M
Rangers/Interpretation	Y	Y	Y	Y	Y	Y	Y
Thinning regularity	H	M-H*	H	M	H	M	H
Natives or exotics emphasis	Mix (n)	Mix(n)	Mix(n)	Mix(n)	Mix(n)	Mix	Mix(e)
Regen/planting emphasis	Mix (p)	Regen	Mix(r)	Mix(r)	Mix	Mix	Mix(r)
Deer: Cull/Fence/Hybrid	Hy	Hy(f)	Hy(f)	Hy(c)	Hy(c)	Hy	Hy
Long-term planning	H	H	H	H	H	H	H
Forest Plan (LTFP)	-	Y	-	Y	Y	Y	Y**

*P2 was not actively thinning at time of survey (late 2005) and had not thinned in a number of years, however future management plans include an extensive long-term thinning and harvesting program.
**NGO1 did have a FCS-approved LTFP, however it was not one of the more recent funded FCS LTFPs.
Coding: P=primary objective, S=secondary objective, n/a=not applicable L=low, M=medium, H=high, Y=yes, N=no, mix=mixture, (n)=emphasis on native species, (e)=emphasis on non-native species, (r)=emphasis on regeneration (p)=emphasis on planting, (c)=emphasis on culling to control deer, C=deer controlled fully by culling (f)=emphasis on fencing to control deer

Sub-theme 1B: Sustainable multifunctional forestry - traditional silviculture – indirect public benefit forestry

Table 7:3 shows the objectives and approaches to management of the four private sites and 1 FCS site in this sub-theme. They placed an emphasis on timber production, while objectives relating to direct public benefit (recreation etc.) were generally absent or of lesser importance than for sites in sub-theme 1A. Biodiversity and conservation were also of high importance; although sites within this sub-theme had forest areas of very high conservation value, generally they were smaller and had lower levels of designation than those in sub-theme 1A. Thus, management tended to be less driven by conservation policy than for sites in sub-theme 1a. Generally, these sites placed a greater emphasis on planting over regeneration when re-stocking, with a greater emphasis on non-native tree species than sites in sub-theme 1A, although all sites had some native species. Certain sites within this group (p5, p7) did exhibit relatively high levels of public recreation although this was not a primary management objective. Certain sites also ranked landscape as a primary objective, which resulted in high public benefit. However, the overall emphasis on these sites was more related to what was sometimes termed 'traditional silviculture':

we're basically using good old fashioned silviculture and trying where possible to fell a mean annual increment, so we're managing the woodlands in accordance with silviculture, not in accordance to market demands [p4]

Table 7-3 Management objectives and criteria for sites in sub-theme 1B

SITE	P3	P4	P5	P7	FCS2B
Management Objectives					
Recreation/Access	-	-	S	S	S
Education/Interpretation	-	-	S	-	-
Participation	-	-	-	-	-
Timber	P	P	P	P	P
Farm-forestry integration	S	S	-	S	-
Sporting	S	S	-	S	-
Biodiversity/Conservation	P/S	P	P	P	P
Landscape	S	S	P	P	P
Research	-	-	-	-	-
Forest/Woodland expansion	L	-	L	L	-
Management Approaches					
Public involvement	L	L	L	L	L
Rangers/Interpretation on-site	-	Y*	-	-	-
Thinning regularity	M-H	H	H	H	H
Natives or exotics emphasis	Mix (n)	Mix	Mix (e)	Mix	Mix (e)
Regeneration or planting emphasis	Mix	Mix (p)	Mix (p)	Mix (r)	P
Deer Control: Cull/Fence/Hybrid	Hy (f)	Hy (c)	Hy	Hy	Hy
Emphasis on long term planning	H	H	H	M	H
Long Term Forest Plan (LTFP)	Y	Y	Y (2)	-	Y

Coding: P=primary objective, S=secondary objective, n/a=not applicable L=low, M=medium, H=high, Y=yes, N=no, mix=mixture, (n)=emphasis on native species, (e)=emphasis on non-native species, (r)=emphasis on regeneration (p)=emphasis on planting, (c)=emphasis on culling to control deer, C=deer controlled fully by culling (f)=emphasis on fencing to control deer

While continuous cover forestry (CCF) practices, such as regeneration and small coupe felling, were evident on these sites, clear felling (in the range of 5-20ha) was more common than for sites in sub-theme 1A. The land use context for the private estates in this group varied, with two private estates having a high number of farm tenancies and all four having a strong sporting context. Tourism developments were also of high importance on p3 and p5. Public involvement was not an objective, and significant forest expansion was not being considered at any of these sites, with the size of the forest resource on the FCS site actually being decreased.

7.2 **Theme 2: Restricted functionality forestry**

Table 7:4 shows the objectives and management activities for this theme, on four private estates. These exhibited less diverse forest management than theme 1 sites, usually with only one primary objective. Timber production was a secondary objective on all four sites, but was usually stated as such because it had been the original reason for planting, rather than because it was ongoing. Timber production was not generally seen as a serious viable income source by these estates, at least not currently. The main objective was conservation and biodiversity, with the key drivers being owner preferences and the availability of grants for biodiversity initiatives. Levels of recreation within these forests varied, but were generally lower than for sites in theme 1 and generally not managed for.

Participation was not an objective, and evidence of farm-forestry integration was very limited. Regeneration was generally emphasized over planting when re-stocking due to grant availability, and thinning was being carried out less frequently than theme 1 sites, although p10 was beginning to thin more regularly. These forest sites had suffered (as timber resources) from a lack of thinning and management in the past, so that structural and species diversity tended to be much lower than on theme 1 sites. However, the two sites with larger forests (p10 and p11) both had recently developed LTFPs and potential for diversification of objectives was recognised. All four sites had a very strong sporting land use context (not always commercial). Tenanted farming was of importance on two sites, although the evidence of farm-forestry integration was low. None of the estates within this group appeared to have diversified heavily, although holiday cottage development was evident on at least two of the four. From a functionality and scale perspective, the sites were further sub-divided, with these sub-divisions shown below:

7.2.1 Large-scale moderate functionality resource [p10/p11]

Both sites were limited in functionality relative to theme 1 sites, but, being more species-diverse and larger than the 2b sites, they were capable of delivering more functions/objectives. They both had native woodland areas of high conservation value. Both sites offered high potential for forest expansion and respondents showed interest in this beyond that of most sites, although expansion would most likely be for biodiversity rather than commercial objectives. The main constraint on expansion was seen as the corresponding loss of sporting land.

7.2.2 Small-scale low functionality resource [P8/p9]

These sites had the smallest forest resources within the study and exhibited low functionality, with one main objective: biodiversity and conservation. Planting had originally been for timber production (and to obtain tax incentives/grants); however, timber prices and grants were driving a switch to biodiversity-oriented management, specifically the conversion of the resource to a more 'natural' woodland. Long-term planning was not evident and thinning/new planting had not occurred in recent years, resulting in low forest structural diversity.

Low timber prices and poor market availability combined with a poorly diversified forest structure had also driven these sites towards grant-aided biodiversity initiatives and in general, due to what could be seen as their inherent lack of financial independence within estate forest management, it was apparent that these sites were more responsive to, and dependent upon, incentives for forest management.

Table 7-4 Management objectives and criteria for sites in theme 2

SITE	Small-scale		Large-scale	
	P8	P9	P10	P11
Management Objectives				
Recreation/Access	S	-	S	S
Education/Interpretation	-	S(f)	-	-
Participation	-	-	-	-
Timber	S	S	S	S
Farm-forestry integration	-	-	-	S
Sporting	-	S	S	S
Biodiversity/Conservation	P	P/S	P	P
Landscape	S	S	S	P/S
Research	-	-	-	-
Forest/Woodland expansion	L-M	-	M	M
Management Approaches				
Public involvement	L	L	L	L
Rangers/Interpretation on-site	-	-	-	-
Thinning regularity	L	L	M	L
Natives or exotics emphasis	Mix	Mix	Mix (n)	Mix (n)
Regeneration or planting emphasis	R (f)	Mix (r)	Mix (r)	R
Deer Control: Cull/Fence/Hybrid	Hy (f)	Hy (f)	Hy (f)	C
Emphasis long term planning	L	L	M-H	M-H
Long Term Forest Plan (LTFP)	-	-	Y	Y

Coding: P=primary objective, S=secondary objective, n/a=not applicable L=low, M=medium, H=high, Y=yes, N=no, mix=mixture, (n)=emphasis on native species, (e)=emphasis on non-native species, (r)=emphasis on regeneration (p)=emphasis on planting, (c)=emphasis on culling to control deer, C=deer controlled fully by culling (f)=emphasis on fencing to control deer

7.3 Theme 3: Dual function forest management (non-multifunctional high public benefit)

This theme represents management focussed on habitat conservation and improvement, as well as enhancing access and recreational or educational facilities for forest users. Forestry in the traditional sense (where timber production is an objective and management driver) was not practiced on these sites, although the two sites in sub-theme 3B did have future small-scale timber production as a secondary objective. Sporting uses of the forest were absent, with the exception of NGO2, which carried out commercial sporting activities on-site - including within the forest area. Two sub-themes were evident within this group based on: a) the level of community involvement in management; and b) the level of flexibility with regard to the future management diversification.

7.3.1   Sub-theme 3A: Fixed dual-function forest management (high public benefit)

This theme was represented by four sites: SNH 1/2 and NGO 2/3 (see Table 7:5). The term fixed dual function emphasizes that the current dual objectives (conservation and access) were perceived as unlikely to change or diversify. The primary objective was conservation and biodiversity enhancement, with the emphasis being on natural processes and the development of habitats and landscapes of natural character.   The importance of the development of functioning ecosystems and ecotones was emphasized and forest management was seen only as a component of this wider landscape approach. The concept of restoration ecology was key; however, respondents argued that this did not represent a 'turning the clock back' approach, but rather a restoration of natural ecological functioning and an emphasis on ecological principles:

we're restoring a new landscape, we're not restoring an old landscape, 'cause then people say are you going back to the ice age, the 1600s, 1750, and I think all you're doing is creating a new future landscape, based on the principles that you're trying to let nature have the maximum freedom and minimize intervention to decide the species and the competition [NGO2]

A cornerstone of this approach was the reduction of deer across the entire site to allow for natural ecological functioning, and encourage forest regeneration. Deer were managed by intensive culling, with a general presumption against the use of fencing. Fences were evident on some sites, however, due to the potential impacts of deer on regenerating woodland in certain vulnerable areas. Certain sites also had fencing on their borders which was under neighbour control.

Timber was not an objective on any of the four sites, although NGO2 stated that small-scale woodfuel production could be a future consideration in line with the removal of non-native plantations. The lack of timber-related objectives was primarily related to the emphasis on

natural processes and a desire to create deadwood on-site for ecological benefits, with timber removal seen as potentially leading to a loss of deadwood. Thinning as a management activity was considered only in terms of how it could contribute to on-site deadwood. Respondents at sites within this sub-theme were the most interested in future forest expansion, seen as a likely outcome of current deer population reductions. Planting was generally not considered, with natural regeneration always being emphasized, although it was acknowledged at certain sites that planting of native broadleaves may occur in the future to enrich biodiversity.

Recreation and access (complemented by interpretation and education) was the second key objective on these sites, and visitor numbers were generally relatively high. However, while access and recreation was of key importance, such objectives were secondary to ecological concerns. The desire to act as a demonstration of good management practice (particularly in relation to the benefits of deer population reductions for forest regeneration) was also evident within the management of all four sites. NGO2 in particular was engaging in commercial sporting to acquire income and to demonstrate that such an operation could occur on a site with a lower deer population than generally thought. Respondents at other sites also all perceived their management as acting as a demonstration of the benefits of deer population reductions for forest regeneration. The four sites can be split into two groups in terms of drivers, with two being government-owned and driven mainly by National Nature Reserve (NNR) policy, and two being NGO-owned and driven by both national policy and the requirements of their members (a community of interest) and the resulting internal organisational policy. Deriving a financial return from site activities was generally of much lower concern among this group relative to other sites in the whole sample group, mainly as strong outside sources of funding were available.

7.3.2 Sub-theme 3B: Flexible dual function forest management

This theme was represented by two community-managed initiatives. C2 was owned outright by the local community, while c1 was managed by a community organisation which had

certain rights of tenure. These two sites were the only ones within the sample group with a high level of local community involvement in management. The key objectives for these sites were, like sub-theme 3A, recreation and access (including interpretation and education) and conservation and biodiversity. However, respondents for these sites also showed a strong interest in small-scale timber production including localised timber processing – although this was not occurring at the time of interview.

Table 7-5 Management objectives and criteria for sites in theme 3

SUB-THEMES	3A -Fixed Dual Function management				3B - Flexible Dual Function	
	Community of Interest		National Interest		Local Community	
SITES	NGO2	NGO3	SNH2	SNH1	C1	C2
Management Objectives						
Recreation/Access	P	P	P	P	P	P
Education/Interpretation	S	P	P	P	-	P
Participation	S	-	S	S	P	P
Timber	-	-	-	-	S (f)	S
Farm-forestry integration	n/a	n/a	n/a	n/a	n/a	n/a
Sporting	P	-	-	-	-	-
Biodiversity/Conservation	P(k)	P (k)	P (k)	P (k)	P	P
Landscape	P	P	S	S	P	S
Research	S	P	S	S	-	-
Forest/Woodland expansion	H	H	H	H	M-H	L
Management Approaches						
Public involvement	L	L	L	L	H	H
Rangers/Interpretation on-site	Y	Y	-	Y	-	-
Thinning regularity	L*	L*	L*	L*	L-M	L-M
Natives or exotics emphasis	N	N	N	N	Mix (n)	Mix (n)
Regeneration or planting emphasis	R	R	R	R	Mix (r)	R
Deer Control: Cull/Fence/Hybrid	C	C	C	C	Hy (c)	Hy (c)
Emphasis on long term planning	H	H	H**	H**	M	M
Long Term Forest Plan (LTFP)	-	-	-	-	-	-

*In these four cases thinning is stated as being low as it does not occur on these sites for commercial (silvicultural) reasons. However future woodland management on some or possibly all of these sites could incorporate thinning of stands to increase the amount of deadwood in the woodland environment, with trees being 'topped' and the deadwood being left in-situ.
**SNH respondents stated in these cases that long-term planning was a key concern. However current long-term management plans were not in place at either site due to changes in internal SNH policy resulting in delays in plan development.
Coding: P=primary objective, S=secondary objective, n/a=not applicable L=low, M=medium, H=high, Y=yes, N=no, mix=mixture, (n)=emphasis on native species, (e)=emphasis on non-native species, (r)=emphasis on regeneration (p)=emphasis on planting, (c)=emphasis on culling to control deer, C=deer controlled fully by culling (f)=emphasis on fencing to control deer

In general, the key objectives for c1 and for certain areas of the c2 site were biodiversity and conservation. However, a more flexible approach was evident overall, relative to sub-theme

3A sites. Both sites also stated that thinning (for timber production-related reasons) was a future objective, with regeneration emphasized as the favoured method for any future re-stocking or forest expansion. The degree of planned expansion was relatively high for c1, while potential expansion plans for c2 were constrained due to a lack of available ground. The emphasis on long-term planning was moderate, partly due to the recentness of the purchase in the case of c1 and partly to a lack of outright ownership of any woodland in the case of c2 – which implied the lack of any rights to extract and sell timber. This also affected the potential for the development of a sustainable income from forest management, which was seen as an issue on both these sites, with both sites admitting a high degree of reliance on public funding.

7.4 Summary

It is apparent from the typology that a number of distinctly different approaches to forest management are evident in the Cairngorms: sustainable multifunctional management delivering on a range of objectives; low or moderate functionality forestry where management objectives are mainly related to biodiversity and driven primarily by available grants; and dual function forest management where objectives are focused on conservation/biodiversity and delivering enhanced recreation and interpretation. The level of multifunctionality is clearly variable across the 22 sites. However, biodiversity and conservation has remained a strong objective across almost all of the sites, a factor driven by government policy (particularly designations), the availability of grants for biodiversity-related initiatives and the personal preferences of landowners.

The multifunctionality of forest management does not appear to be clearly linked with ownership, with NGO, private and state-owned (FCS) landholdings all occurring within the sustainable multifunctional management theme, and state-owned (SNH), NGO and community-owned forests all occurring within the dual function theme. No privately-owned

forests occur within the dual function theme, however, four do occur within the low-moderate functionality theme, where objectives are primarily related to biodiversity and conservation. What is also apparent is that private estate forests can sometimes be somewhat under-managed (see theme 2), which is usually associated with a lack of profitability from forestry generally and the economic dominance of other land uses. Forest management objectives related to direct public benefit (recreation, interpretation, education and participation) are also less common on private estates than on public, NGO and community-owned and -managed forests. Within theme 1 sites, the emphasis on management for social benefits varies strongly between 1A and 1B sites, with a stronger emphasis on social benefits apparent on sites with higher visitor numbers and tourism-related businesses, more designations and a weaker sporting context. Public participation within management, is not, however, an important objective on either private or NGO sites and, while it is an objective on FCS sites, it is only on community-owned/managed sites that public involvement in management decision making is strongly emphasized. A fundamental difference between the various landowners was that respondents from private and FCS sites placed much greater emphasis on economic sustainability in forest management, and particularly income from timber sales, than NGO, community and SNH-owned initiatives. Forest managers from private estates, in particular, tended to view their management as being more sustainable and financially independent than other landowners, which were sometimes seen as being highly dependent on external funding to manage their forests.

A link is apparent between the multifunctionality of management and forest structural and species diversity. Theme 1 sites all emphasized the importance of thinning, and these sites generally exhibited higher species and structural diversity than sites within the low-moderate multifunctionality theme, where lower species and structural diversity were associated with a lack of past management and a strong emphasis on sporting land uses. The level of past thinning of the forest was key, with a lack of (silviculturally-oriented) thinning over the long-term seen as leading to a gradual loss of forest functionality.

Interest in forest expansion was variable across the 22 sites, with objectives for expansion relating to commercial forestry particularly low or absent on most sites. The majority of interest in forest expansion was evident among NGO (specifically conservation focussed NGOs) landowners, and also on some of the theme 2 sites. This interest on the part of these private estates was largely due to the availability of grants for biodiversity-related initiatives and the presence of existing areas of forest of high conservation value on these sites, with most current or future forest expansion initiatives being focused on habitat creation and biodiversity benefits. Theme 1 sites generally showed only low interest in forest expansion, with this often being associated with a lack of available space or the importance of bordering land uses either personally (to the landowner) or in economic terms.

Key management drivers varied across the typology, with theme 1A sites driven primarily by owner preferences, government policy (particularly designations), economic concerns, and the presence of existing forest areas of high conservation value. Theme 1B sites appeared as less driven by policy, with fewer designations on these sites and an even stronger overall emphasis on timber production. Across all theme 1 sites, a key driver was that management be sustainable and financially independent, in that the income from forest management activities should equal or (preferably) outweigh expenditure within forest management. Theme 2 sites could be seen as generally less capable of deriving an income from marketing of forestry products and, as a result, were strongly driven by the availability of grant aid. Forest management on theme 2 sites also sometimes appeared as being under greater pressures from the economic (and personal) values placed on surrounding sporting land uses than theme 1 sites. Theme 3 (dual function) sites were less concerned with generating economic return, with the key drivers on these sites being internal organisational policy and government policy (particularly regulations and the requirements of designations such as NNRs).

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8 RECOGNITION OF KEY CONSTRAINTS AND OPPORTUNITIES FOR MULTIFUNCTIONAL FOREST MANAGEMENT – A THEMATIC ANALYSIS

This chapter presents the key themes of constraint and opportunity for multifunctional forest management in the Cairngorms, based on analysis of the interviews. These results should not be considered as a comprehensive review of constraints and opportunities for multifunctional forestry, but as a review focused on constraints and opportunities of importance to forest managers and landowners. Key constraints and opportunities for multifunctional forest management are further developed in Chapter 9, taking recent research and literature into account. There are six themes in total, with each theme having a section on constraints followed by a corresponding section on opportunities. The key themes which emerged from the data analysis and which are presented in this chapter are shown in Table 8.1, along with their main sub-themes. Theme six also has a number of secondary sub-themes, not displayed in this table.

Table 8-1 Main themes and sub-themes apparent from the interview analysis

MAIN THEMES	CONSTRAINTS AND OPPORTUNITIES	SUB-THEMES
1. Fragmentation, conflict and integration at the estate level	**Constraints:** Land-use conflict and fragmented management	1A. Conflict between forestry and sporting land uses
		1B. Conflict and trade-off between timber and conservation/biodiversity
		1C. Conflict and trade-off between recreation and conservation/biodiversity
		1D. Forestry and tenant farmers - a tradition of separation
	Opportunities: Estate management integration	1A. Integrate, communicate, optimize
		1B. A future for deer and forests – together ?
		1C. Farming and forestry – Integration, co-operation and sustainability
		1D. Responsible access and visitor zoning
2. Fragmentary management, conflict, integration and landowner co-operation	**Constraints:** Cross-border conflict and the complexities of forest policy regionalization	2A. Cross-border conflict – Sporting versus management for natural processes
		2B. The complexities of FHNs and barriers to policy regionalization – what scale multifunctionality ?
	Opportunities: Landowner cooperation and potential for policy regionalization	2A. The power of partnership and co-operation
		2B. Forest policy regionalization as an opportunity
3. Forestry markets	**Constraints:** Timber market scale and accessibility	3A. Low prices make forestry non-competitive
		3B. Globalization and market saturation
		3C. Timber marketability as a product of poor access
		3D. Price, market accessibility and availability as drivers of management quality
	Opportunities: Market diversification and localization	3A. Timber market diversification and localization
		3B. Woodfuel – the pros and cons from and owner/manager perspective
		3C. Long-term commitment to the timber market
		3D. Diversification into non-timber based incomes
4. Bureaucracy	**Constraints:** Bureaucratic complexity as the suppressor of multifunctional forestry and productive land use	4A. Bureaucracy as a barrier to productive, progressive forest management and productive land use generally
		4B. The National Park: one bureaucratic tier too many
		4C. Organisational and policy level conflict
		4D. Access legislation as a barrier to recreation and non-timber forest product market development
	Opportunities: Integrated policy delivery, communication and pragmatism	4A. Joined up thinking and a pragmatic approach
5. Public pressure and public support	**Constraints:** Public pressure and bottom up bureaucracy	5A. Who's going to participate anyway ?
	Opportunities: Gaining public support; developing social sustainability	5A. Public engagement for public support
6. Unpredictability and long-term forest resilience	**Constraints:** Unpredictability and inconsistency in social-ecological systems	6A. The unpredictable nature of natural systems
		6B. Political unpredictability and inconsistency
		6C. Inconsistency in management and ownership
	Opportunities: Increased resilience and a long-term view	6A. Flexible long-term spatial planning and management
		6B. Developing a resilient and flexible resource

8.1 Theme 1: Fragmentation, conflict and integration at the estate level

This theme is concerned with the constraints and opportunities relating to spatial conflicts between forests and other land uses and the integration of forest management with wider estate management. Integration with other land uses and management for mixed objectives are basic tenets of multifunctional forestry and, in this context, the themes of conflict presented here can be seen as representing constraints on multifunctional forest management.

8.1.1 Theme 1 constraints: Land-use conflict and fragmented management

8.1.1.1 Sub-theme 1A: Conflict between forest management and sporting land uses

Many respondents did not see these two land uses as being in conflict per se, but rather that sporting (grouse shooting and deer stalking) was more profitable and therefore often the optimal land use choice. Some respondents [p1, p4, p6, p9] stated categorically that woodland expansion was a low priority on their estate due to the high value of moorland areas from a sporting perspective – in both economic and personal terms.

If they [the estate] *have one good grouse year in four, I can't compete with that, no matter what grant.....we've got individual sporting tenants, who pay a lot of money a year......for me to pinch some of the hunting ground I have to really justify it...what I can make out of a grant in 10 years, they make in a year* [p10]

This constraint on forest expansion was sometimes seen as constraining the sustainability of forest management generally as, without room for expansion, forest structure was seen as difficult to alter and diversify [p10].

A key point of conflict between forestry and sporting related to the current emphasis in policy (see Chapter 3) on native woodland regeneration in the Cairngorms, in parallel with the removal of fences (to minimise landscape impacts and rare birds colliding with fences) and the reduction of deer numbers. Many felt this approach was in fact proceeding at the expense of the sporting industry and deer populations [p1, p8, p7, p9]. A large number of respondents were strongly opposed to removing fences on their estates, perceiving fences as allowing forestry and sporting to co-exist, rather than as barriers to estate integration:

a deer fence is a filter, some move but a fence means two land uses can go side by side....the barrier is there to reduce conflict, on one side we will keep them at this level and on the other side at a different level [FCS2]

P6 and a/c1 also argued that, for a viable sporting operation, an estate required more than 10 deer per km^2, a density considered too high for woodland regeneration to occur without fencing. A/c1 noted that sporting could occur on sites with much lower deer densities, but this would need to be at a much lower intensity:

It's possible to have sporting on estates with low deer numbers, but that sporting will be very minor and subsidiary because you don't have enough deer.....and you may need to shoot at dawn and dusk...out of season, shooting in the woodlands....it will change the operation [a/c 1]

Regenerating or planting native woodlands was often only seen as compatible with sporting land uses on estates where fencing could be used. Estates in NSA areas were seen as restricted in this regard as the use of fencing was strictly regulated due to potential landscape impacts. P1 and p8 also pointed out that deer culling alone was often insufficient to allow regeneration regardless of intensity, as deer often congregated in certain areas and even very low numbers of deer could inflict considerable damage on an unfenced regenerating woodland.

Many respondents were actually supportive of native woodland regeneration (and were engaged in it themselves) and felt it was often both an owner- and policy-driven estate objective. However, it was the more specific policy-driven objectives within the process (particularly the removal of fences and heavy sustained deer culling), which were often seen as resulting in forest-sporting conflicts. Respondents noted, in this regard, that areas of apparent conflict on their estates were often, in reality, areas where owner objectives were not in sync with government objectives relating to deer and the use of fences, rather than a reflection of any internal or cross-border conflict. However, a degree of genuine internal conflict was evident on certain estates. P4 and p5, in particular, noted that sporting clients privately tipping keepers (which they had no issue with) meant that gamekeepers had good reason to wish to maintain high deer numbers, and this was seen as leading to occasional conflicts between forest and game management.

8.1.1.2 Sub-theme 1B: Conflict and trade-off between timber and conservation/biodiversity

Conservation and biodiversity, as objectives, were driven by a combination of factors, including owner preferences, available incentives, and conservation designations. Having both timber and conservation as objectives was often seen as implying that timber production was likely to be constrained, and it was generally felt that low-impact silvicultural systems like CCF, while of benefit for a range of objectives, represented a compromise in terms of timber production. As p5 stated:

[we are] *maintaining a high level of larch run on a low-impact silvicultural system in two key areas….and that is both for landscape and conservation reasons.......that is a major compromise where if timber production was the only issue we'd be planting spruce* [p5]

In this case, the compromise was owner-, rather than policy-driven. However, on some sites, conservation designations were seen as overly restricting timber production objectives.

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Thinning restrictions within NNRs, in particular, were seen by some as potentially leading to both a decrease in timber quality and to negative rather than positive effects on biodiversity. The importance of biodiversity and conservation was recognised by all interviewees; however, a complete cessation of thinning was rarely seen as beneficial, particularly from a multifunctionality perspective, as it would lead to an overall decline in forest functionality and value:

SNH are trying not just to halt clearfelling but also thinning [within the NNR]....*we still think thinning is important because it accelerates the stand development to the stage where you get understory and it becomes good habitat for things like caper...it's also a very long-term investment and we don't see any reason why we should prejudice the timber value in the forest so by thinning we're carrying out the normal silvicultural work so if circumstances change in 20,30 years time and it's needed as a resource of timber the quality will be there* [p1]

Compromise across all objectives was therefore often seen as necessary by private estate respondents to ensure delivery of the optimal range of forest functions - even within areas of high conservation importance. A key reason for SNH opposing thinning in NNRs was the belief that the removal of timber would lead to a decline in the amount of deadwood on site – seen as important for biodiversity. The potential for increased use of CCF systems in high-value conservation areas was recognised by some private respondents, as was the importance of deadwood; however, the fundamental point was that current management should not prejudice the future functionality of the forest resource, particularly as future societal demands were unpredictable. FCS1 also noted that deadwood creation was not simply a product of stopping silviculturally-oriented thinning:

you can't have big deadwood unless you have big trees, you've got to manage the stand before you can get to big deadwood......I mean people are bandying around big volumes of deadwood but if the actual standing volume is relatively small you're not going to get the big deadwood [FCS1]

Conflicts and trade-offs between recreation and conservation were most commonly recognised by NGO respondents, although both FCS and private respondents also alluded to this issue. As p8 pointed out, visitor management often presented a quandary for managers:

It's a bit of a Catch 22 really as it's attractive because it's remote but to increase tourism you need more infrastructure and developments need to be very well planned. Car parks will fill, but then do you make them bigger ? Also more recreation will mean caper will suffer and there will be an increased fire risk [p8]

Generally, respondents recognised that visitor pressure was on the increase and the National Park designation was likely to increase not only the earning potential from tourism but also, potentially, the impacts of tourism and recreation on forest environments. Most respondents recognised that the need for active visitor management was likely to increase. An issue seen as being of particular importance (usually by NGO respondents) was large-scale high-impact recreational events (such as charity races). Their timing was seen as crucial to minimize impacts on breeding forest wildlife [NGO2, NGO3].

A further issue seen as resulting from increased recreation in forests was forest fires, which were seen as potentially leading to severe impacts on forest resources, particularly in terms of biodiversity, timber quality and newly regenerated forest areas. P4, for example, had had three fires in the last 4 years, while another forest (c1) had been drastically burnt and reduced in area by a relatively recent fire, with growth being set back some 30 years. P1, p2, a/c1 and p4 all argued that the impacts of fire were a key issue. However, some felt, that on their landholding, fire was not an issue as they had little recreation on-site [p9]. Respondents spoke about fire both as a 'natural' constraint (see theme 6) and a visitor management issue. However, through discussion, it became apparent that most perceived fires to be a result of visitor carelessness rather than as a direct result of natural factors. NGO2 and NGO3 also noted how even small

campfires represented a threat, both in relation to the fire potentially spreading, but also to deadwood, with campers often gathering and burning this.

A further potential area of minor recreation-conservation conflict raised by respondents was that of deer being important from a woodland recreation perspective. C1 for example, noted that, although woodland regeneration and deer population reductions were very important within their management, deer were also important from a recreational perspective:

we're currently trying to strike a balance between keeping numbers down and having some deer here so people can see them, deer are part of the recreation value of the woodland, we don't want to get rid of them entirely, but to get grants you need to ensure that regeneration is taking place [c1]

8.1.1.4 Sub-theme 1D: Forestry and tenant farmers – a tradition of separation

Respondents often considered farm-forestry integration as weak on their landholdings (or those they worked on). This was linked with what was perceived as a traditional separation of these land uses, with forest management often referred to as 'the laird's thing' while farming was considered to be the responsibility of tenants. Farm tenancies were often seen as 'no go areas' for forest managers, with some stating that tenanted land was not even a consideration within forest management. P1 argued that the lack of tenant farmer involvement in forestry/woodland initiatives was partly a result of rights of tenure, with any trees planted legally remaining the property of the landowner. This was the view of most interviewees, although strong non-ownership related benefits of trees to tenants were recognised, such as livestock shelter, and some estates had planted trees on tenancies for these reasons. Most respondents were not actively encouraging tenants to engage in forestry/woodland initiatives and their tenants were (according to respondents) showing very little interest in these sorts of activities.

Some respondents also argued that the low interest in forest management among tenants was influenced by tenants being more attuned to an annual income, as opposed to the long-term investment-oriented nature of forest management. This income timescales issue was seen as fundamental, as was the idea that establishing trees would lock up the land and restrict future earnings:

[tenants establishing trees] *would be driven by grants and an income over a 15 year period...rather than an interest in the trees....they're a long term crop, most tenants see themselves as running agricultural businesses instead of taking use of the land and that restricts grant money for them, there's no income coming from that land* [if under forest cover] *and that restricts opportunities for another generation coming in behind* [p5]

Many also felt that a lack of integration at the skills base level acted as a constraint on farm-forest integration, with this being linked to the historical dominance of the state in forestry in Scotland:

I grew up in a hill-farming area, my background was forestry, I didn't know that much about agriculture, people we knew in agriculture knew damn all about forestry, so there aren't these integrated skills. I think it's because predominantly forestry in the UK has been so dominated by the state in terms of landholding [SNH2]

The high average age of tenants and the lack of family to carry on the tenancy was also seen as influencing the lack of interest in forest management [p1]. The highly mechanized nature of UK forestry was also seen by some as creating potential difficulties for small-scale operators (e.g. farm tenants) in terms of generating sufficient economies of scale, particularly for timber production [p5].

The farm tenancy system could, in itself, also be argued as a constraint on integrated multifunctional forestry. Respondents often stated, for example, that a key difficulty in

potentially developing an integrated estate management plan would be accounting for the objectives of farm tenancies, which numbered in the hundreds on some estates. On estates engaging in farming directly (no tenancies), the two land uses did appear as more integrated – with trees having been established for livestock shelter, woodland grazing having been established (this had also occurred on some tenanted estates), and tree planting/regeneration being considered in areas traditionally used for agriculture [p3, NGO1].

NGO and governmental landowners were rarely involved in any attempts to integrate the two land uses (apart from NGO1) as they had little interest in agriculture and almost no agricultural land uses on-site. These respondents recognised that focusing on one land use (in this case either conservation or forestry alone) made it difficult to integrate with other land uses. This placed a question mark over the future integration of farming and forestry with so much of the national forest estate owned by the FCS, an organisation focused mainly on forest management.

8.1.2   Theme 1 opportunities: Estate management integration

8.1.2.1 Sub-theme 1A: Integrate, Communicate - optimize

Many (mainly private) respondents argued that multifunctional forest management was more sustainable than single or dual objective management. NGO1, p2 and p8 argued in particular that, due to the marginal nature and poor accessibility of many forests in the region, a multifunctional approach was a necessity, with single/dual function management seen as potentially underutilizing an already limited resource. Multifunctional integrated forest management was seen as providing opportunities for optimizing land use: *integrating really means optimizing the land use, such that everyone benefits, rather than looking to maximize one sector at the expense of others* [NGO1]. A key opportunity for delivering 'optimal' forest management was often seen to be further communication between the different land use/management components of a

landholding, which could lead to stronger understanding and the delivery of greater benefit overall, particularly between farm tenants, gamekeepers and foresters (see Quote Box 8:1 below) [a/c2, a/c2, p10, p3, NGO1]. Clear communication was being achieved (on some landholdings) through regular formal and informal meetings, including weekly meetings with key personnel and less regular (monthly/yearly) meetings with a broader representation. A greater level of crossover between different land management contingents was also seen as potentially useful, with respondents suggesting that attendance by foresters and gamekeepers at each other's seminars and meetings could improve understanding between the two groups.

Quote Box 8:1 The importance of communication to achieve optimal management integration between land uses

> we would look at it and work out between forestry, estate management and the tenant farmers, where the optimization for income lies, and then draw up a management plan......[for example]...if timber access in a plantation is non-viable then we can hand it over to a farmer and he can get native woodland grants and I don't have to worry about it [NGO 1]
>
> an example can be the shape of a cattle pasture, if the cattle pasture is shaped such that it also acts as shelter to the animals, it becomes a much more valuable asset to the farmer and with cattle management it also then suits the forester as well because there is then a need for less land to be taken out of forestry to make the pasture, and what's more you get a better edge, you get potentially less wind effect, because...you've changed the shape of the pasture, such that the animals are no longer exposed to wind. The animals are no longer looking to get through the fences, so you can actually look at what is potentially a conflict situation and turn it into a positive situation for both the forester and the farmer [NGO 1]
>
> we've got a trust who owns a bit, there's a single ownership who owns a bit and we've got a forestry management [component] and...a limited partnership which is the farm, and what we have to do is look at each of these grants and say one, is it worth it, and if it's worth it what is the most beneficial part of our organization to do it, who will get the best grant ? [p3]

8.1.2.2 Sub-theme 1B: A future for deer and forests – together ?

Most respondents recognized that deer populations were being reduced and that, in many areas, deer would face further future reductions. Most also agreed that deer were, and would remain in the future, a commercial resource due to income from stalking activities and, to a lesser extent, venison sales. Even on private estates with strong conservation objectives, deer

were still often seen as a resource: *we are very conscious of deer as a resource, not as a threat, so we manage them so that we can maintain income from stalking and from venison sales and also so that we can achieve as much regeneration as possible* [p2]. It was also recognized that the current rate of deer reductions across the region implied that open hill deer stalking would be negatively affected (in terms of stag numbers) in the future. SNH2 argued that a key opportunity to take advantage of lower (but potentially healthier) deer populations in the future was the development of a woodland stalking market:

there is a huge untapped market for woodland stalking, all this nonsense about you know the people want to get out on the open hill where they can see big numbers of deer and all this tally hoo, to use a Scandinavian example, the deer stalking that takes place in Scandinavia isn't running out and about on the open hill it's crawling about in the woodland with big deer at low densities [SNH2]

However, many private estate respondents were sceptical of woodland stalking as a serious market, although the potential of such an approach to integrate sporting and forest management (and allow for fence removal) objectives was recognized. A/c1 admitted that a market for woodland stalking did exist, however, as he stated: [woodland stalking is] *a very different thing to going to the hill in October, that's very formal, you meet and you go out, hill stalking is a much smarter form of stalking, a lot of people who do forest stalking would not do hill stalking and vice versa* [a/c 1].

Many respondents (including governmental and NGO respondents) recognized that deer fences often represented an opportunity to allow for forest regeneration, timber production and sporting to occur within one landholding without conflict, rather than acting as a constraint on integration. FCS1 also noted that different sites required different approaches and a general presumption against fencing in the Cairngorms was highly impractical:

each site has to be dealt with in its own way and if you've got woodland grouse......say in Strathmashie where woodland grouse are hardly an issue or elsewhere in the forest district deer fences are on the agenda, so it's just horses for courses, fencing for forests depending what's in them, we can't prejudge them and sometimes you're working towards what your neighbours' priorities are as well [FCS1]

Some respondents also argued that assessing deer density alone was an inaccurate and misleading method for assessing potential or actual damage to the forest environment by deer. Habitat condition monitoring was widely recognized as a much more reliable and effective way of determining the overall impacts of deer on a site's vegetation. In this regard, some (private estates in particular) argued for a greater level of support for habitat monitoring within forest management [p10, SNH2, NGO2].

8.1.2.3 Sub-theme 1C: Farming and forestry – integration, cooperation and sustainability

As well as the many constraints on farm-forestry integration noted previously, a number of opportunities were also apparent. In particular, a minority of tenants were receiving grants to graze woodland areas. NGO1 had even developed contracts to transfer the rights to trees on tenancies to the tenant in certain cases, with tenants receiving grants for establishment of native woodland. The high average age of tenant farmers was also sometimes seen as a positive rather than negative factor for farm-forest integration. As SNH2 argued, for example, with many tenants coming to the end of their viable agricultural existence, private estates may begin to take tenancies back in hand rather than re-let – particularly given the increased rights of tenants resulting from recent land reform legislation. This potential re-acquisition of tenancies was seen as leading to increased possibilities for forest regeneration and tree planting by landowners in conjunction with agricultural land use, particularly given the inclusion of forestry grants within the RDC system (see Section 3.2.5.1).

A second potential opportunity raised by respondents was the potential for co-operative approaches on the part of tenants:

to get farmers more engaged in forestry you need to start bigger than the farm unit...... I'm not necessarily talking about physical integration of woodland holdings but you need to......you know instead of planting 50 acres of trees you need to plant 500ha of trees over 10 farms in order to recover some of those economies of scale [SNH 2]

The potential for such cooperative approaches was, however, seen as being strongly related to having the landowner's support. NGO1 also argued that involving tenant farmers in forest management represented an opportunity to encourage them to develop a more sustainable long-term approach:

The farmers have seen that there is a positive benefit to having woodland grazing....previously they would buy the grazing rights and then graze that, without any real thought to its long-term sustainability. Nowadays, because they are now getting involved in the management of their woodland grazing, they can see that to sustain that for the long term they need to sometimes not graze it as hard to allow the natural regeneration and to manage the natural regeneration as it comes through [NGO1]

Respondents from estates currently engaged in agriculture (tenanted or non-tenanted) were non-committal in relation to whether or not they were likely to engage in planting or regeneration on better quality/agricultural land in the future, although at least three respondents admitted that, given the changes to the CAP and the implementation of LMCs, planting trees on land previously used for agricultural purposes could be an increasingly viable opportunity in the future.

A key opportunity seen as offering potential to lessen the likelihood of larger-scale fires and the frequency of (potentially deadwood depleting) campfires was the development of greater visitor awareness in relation to fire risk and forest management generally [p1, p2, NGO1]. A number of estates had rangers on staff (see Chapter 7) to facilitate this awareness, and some used signage to discourage campfires and encourage more responsible access – in relation to litter, disturbance of wildlife, limiting impacts to key habitats, and avoidance of forestry (timber felling) operations. C1 also argued that further development of visitor awareness to lessen the risk of fire, and recreational conflicts and impacts generally, could be facilitated by the national park authority at the regional level. P10 also highlighted the usefulness of the Hillphones service, a national hotline for hillwalkers to check where and when stalking and shooting activities were occurring on private estates, to avoid potential conflict situations.

The concept of recreational zoning, or developing interpretative facilities strategically to encourage visitors in certain areas of an estate and limit visitor numbers in others, was rarely referred to in detail by respondents, despite many recognizing that visitor numbers were steadily increasing. C1 and NGO3 did note, however, that they were consciously not promoting recreation in key areas, to limit impacts on sensitive wildlife and habitats. NGO3, in particular, noted how interpretative facilities could be used to focus visitor pressure on key locations, thereby minimizing impacts in other more sensitive locations.

8.2 Theme 2: Fragmentary management, spatial conflict, integration and co-operative management between landholdings

This theme is concerned with fragmentary management and conflict between landholdings and the potential for both greater landowner cooperation in the region (relating to forest management) and forest policy regionalization. This is relevant, as a modern interpretation of

multifunctional management (see Chapter 2 Section 2.1.6) implies that cross-border collaborative management should increase forest multifunctionality at the landscape level. Specifically, the views of respondents on both the Cairngorms Forest and Woodland Framework (CFWF) and the Cairngorms Forest Habitat Network (FHN) (both of which could be viewed as examples of a regional approach to forest policy and management) are also included within this theme.

8.2.1 Theme 2 constraints: Cross-border conflict and the complexities of forest policy regionalization

8.2.1.1 Sub-theme 2A: Cross-border conflict – sporting versus management for natural processes

Some respondents argued that full integration of deer stalking with forest management (seen as implying the removal of fences and the lowering of deer populations to a level where woodland regeneration was occurring naturally) would be impossible, both at the estate level and regionally, without a considerable decline in sporting revenue [a/c1, p1, p4], as a/c1 stated:

if you don't go down the fencing route you combine two [sporting and forest management] *into basically one thing, deer management becomes part of your woodland operation and therefore interests of deer become almost subsidiary to the interests of woodland, it's possible to have both but you can't have the deer in numbers that you really need to run a sporting operation* [a/c1]

Full integration was often felt to be unnecessary by private respondents, and maintaining the use of fences in certain situations was seen as leading to an overall reduction in conflicts between landholdings. Some also argued that sporting represented a more viable industry than forestry on higher-altitude estates, as growth rates on such estates were slower, which affected the viability of commercial forestry [p8]. P10 also argued that sporting was a more socially

important industry on certain estates, as sporting clients usually contributed heavily to the local economy:

sporting is worth more [than forestry], *not just to the estate but to the local community, it also has a major impact on the village, because when they come here they shoot, they have to stay somewhere, they have to buy their fuel somewhere, they might have to buy another coat, so it all brings income to the village* [p10]

P5 (a forest manager and landowner) argued that sporting objectives of estates often tended to conflict with local community aspirations to a much greater degree than those of forestry:

where it comes to community ownership or community aspiration, it tends to, well my view is that sporting interests tend to be in conflict with many community aspirations......maybe again because they're more difficult to live [have] *side by side* [p5]

Some respondents (mostly non-private) also argued that maintaining 'artificially' high deer numbers for stalking purposes was unsustainable and, as deer populations were linked more with catchment systems than estates (ecologically speaking), control should be at across ownership boundaries. This was sometimes seen as necessitating the removal of fences, which were seen as: disrupting normal deer dispersal patterns; a threat to birds such as capercaillie through the risk of fence strikes; and potentially impacting negatively upon landscape aesthetics. Some private estate respondents opposed these arguments. P8 noted, for example, that despite having a thriving capercaillie population on site, there was only one record of a capercaillie fence strike in three years, which was non-fatal. The conservation-oriented approaches evident on SNH and most NGO sites also necessitated heavy deer culls which sporting estates sometimes viewed as threatening deer numbers on their land, arguing that deer from their estates were likely to migrate to 'emptied' conservation estates. P8 also noted that, as very small numbers of deer can inflict heavy damage on regenerating trees, even intensive culling may not necessarily allow uninhibited regeneration.

Respondents from sporting estates sometimes conceded that a reduction in deer numbers in certain locations was required. However, the scale of the reductions advocated by SNH and others was often seen as excessive, in terms of both deer numbers and timescales involved. Some also argued that fencing to allow for regeneration represented a short-term impact for significant long-term benefits, with opposition to fencing sometimes being seen as negating the value of deer themselves as an ecosystem component. A/c2 viewed opposition to fencing as being akin to NIMBYism and argued for a longer-term view:

the people opposing fencing are not going to be around to see the benefits, so it's almost NIMBYism and they see the solution to deer fencing as killing deer, well no it's not, the deer have a place in the environment and if we want to manage trees and keep the deer going and keep the biodiversity for the estate then you may need grazing from the deer….well then fencing is a viable solution……..In the big scheme of things, a 30 year fence, you know, it will probably be down by the time I'm dead

As some noted, however, the removal of fences following woodland establishment does not imply woodland regeneration can continue to occur naturally unless deer numbers are maintained below damaging levels in perpetuity [SNH2, NGO2].

8.2.1.2 Sub-theme 2B: The complexities of forest habitat networks and barriers to policy regionalisation – what scale multifunctionality ?

This sub-theme presents the constraints on further FHN development and policy regionalisation for the forests of the Cairngorms. Regionalisation was defined as the enhanced recognition of the forests of the region as a distinct unit and the development and implementation of regionally-specific policies. Regionalisation is explored further as a potential opportunity in theme 4.

One issue raised in relation to policy regionalisation was that, from a forest perspective, it was difficult to define a distinct Cairngorms forest region. Some felt, for example, that Strathspey and Deeside were both distinct forest regions, with the forests of Atholl, Angus and Glenlivet also seen as compositionally distinct from these two core forests. These differences were seen as making further policy regionalisation difficult and contentious. If grants were to be awarded, for example, based on an applicant's location in relation to a predefined 'forest region', the justification for defining the region would need to be clear [NGO2]. C2 also argued that the recognition of forest 'regions' would be more usefully based on distinctive biological units, such as catchments, rather than 'subjective lines on maps' (often considered to be the case with the CFWF and NP). FCS1 also cautioned that further forest policy regionalisation for the Cairngorms should proceed with caution, to ensure adequate recognition of the very diverse range of forest and woodland types present in the region.

A key point highlighted by some respondents was the question of what the driving objective behind further policy regionalisation would be, and how the concept of multifunctional management would be applied at the regional level. It was argued, for example, that the scale at which multifunctional forest management was to be applied was currently unclear in policy:

it depends what scale you're looking at multi-functions, are you doing it across a compartment, across......a working circle, or are you doing it across a whole forest, or are you doing it, kind of, across a whole forest habitats network. I think, I don't know that a National Park, or the forest industry, or society, has actually decided what scale it wants multifunctional forestry at [FCS1]

In this context, the objectives of certain conservation landowners, and specifically the cessation of silviculturally-oriented thinning, were sometimes questioned by private estate respondents, who felt that such 'narrow' approaches meant the forest was being 'under-utilised' and the potential future functionality of the resource compromised. Optimal land use,

in this regard, was seen by some respondents as necessitating a degree of compromise. As one respondent stated:

Scotland is too small a country, Britain is too small an island to deliver on one objective, it needs to be multiple objectives, we need to try and get the most out of our limited resource and that means delivering on many fronts and alright it's not gonna deliver every single one of them perfectly, it's gonna be compromised, but we have a responsibility to deliver as much as we can [p2]

FCS1 also pointed out that the scale of application of multifunctional management in the region needed to be considered in relation to the timber processing industry and the requirement for sustainable productive land use within the region generally:

I think that's possibly an important thing, in terms of what proportion of the increment [the proportion of timber which can be sustainably harvested] *is actually being harvested and if a proportion of the increment is not being harvested why ? Is it because it's designations, is it because the owners just don't care, is it because of the infrastructure or is it because the planning policies of the national park, in terms of forest management, are actually restricting that, despite that they have an obligation to kind of support.....the use of raw materials in the national park. So at the moment things are still evolving from that point of view* [FCS1]

Some also argued however, that taken as a whole the Cairngorms FHN exhibited considerable multifunctionality [FCS1]. A key issue in relation to the application of a multifunctional approach to forest management was whether or not such an approach, when applied either regionally or at the estate level, necessitates deep land-use integration and the removal of fences at these scales. No clear consensus was apparent on the use of fencing or on whether or not fencing either facilitated (the view of many private respondents) or acted as a barrier to integration. As FCS1 argued in Section 8.1.2.2, each situation could be seen as case-specific with regard to whether or not fencing could and should be used, implying that fence removal at the regional level would be difficult to implement.

In relation to the CFWF, respondents were not overly critical of the overall concept, although it was noted that modelling potential forest expansion based solely on environmental factors was a somewhat narrow approach, as it ignored the complex realities of land management, such as certain areas identified as suitable for expansion [in the CFWF] being under long-term tenancy agreements. FCS1 also criticized the overly environmental focus of the CFWF:

it [the CFWF] doesn't necessarily take into part.....all the social issues in terms of financial cost to market, what are the markets that's available, or the availability of roads or infrastructure for management, or the need to have more intensive management in certain areas.....than other areas......it's not a balanced sustainable document, because it doesn't have all three legs of the stool, it's essentially a largely environmental, there could have been a lot of productivity [FCS1]

FCS1 further pointed out that the CFWF, while appearing to be in tune with current societal demands, may not actually be adequately accounting for future changes in this regard:

the framework meets current demands quite well in terms of what society wants, but it actually doesn't necessarily say well, what forest resource will we have for future needs ? If you take the view that in 50 years time wood might be the major energy source in this area and are the ways we're managing our forests at present actually going to deliver that ? [FCS1]

A/c3 and p1 also argued that the biggest failing of the CFWF was the continued lack of a delivery mechanism, such as a targeted grant scheme.

Further development of the Cairngorms FHN was better received than what was sometimes seen as the more vague idea of regionalisation. Respondents were broadly supportive of any measures to enhance and develop the FHN. A minority noted that natural topographic barriers `separated their forest 'patch' from any other forests and thus it was impossible for the forests on their land to be connected with the FHN [NGO1, p8]. Farm tenancies were

also highlighted as potential barriers to FHN expansion on some estates. NGO2 also noted that the conservation importance of moorland and other habitats would make it difficult (legislatively) to regenerate or plant in certain areas identified as potentially contributing to the FHN. FCS1 also noted that the model used to develop maps of potential planting and regeneration areas for the FHN incorporated an element of subjectivity: *the FNH model is only as good as the information you put into the model in terms of the species requirements, if the species requirements are not correct than the model won't be correct* [FCS1]. A small number of respondents also argued that FHN development could also have negative consequences, such as assisting the spread of the (now confined) Grey Squirrel population across the region [NGO2, NGO1].

8.2.2 Theme 2 opportunities: Increased cooperation between landholdings and the potential for a regional approach to forest policy development

8.2.2.1 Theme 2A: The power of partnership and cooperation

The benefits of cooperative management between landowners for forest management were referred to by a number of respondents, with the main areas of current cooperation seen as regional deer management facilitated by DMGs, the development of fire fighting groups, and collaborative management for capercallie conservation. Generally, respondents felt that joint landowner initiatives were useful, not least because they provided an opportunity to meet neighbours and discuss management issues generally. It was clear that a 'sense of community' between estates was important to many respondents, with fire groups in particular spoken of with a degree of pride in terms of how estates could work together:

there was an incident [fire] *on Mar Lodge estate a couple of weeks ago and you know Mar Lodge put out a call for help, and you know by the time they'd got everyone mobilized there were 6 ATVs and a fire-fogging machine on the way to the incident all from neighbouring estates* [p1]

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The value of considering the effect of management on areas outside their own borders was also recognized by most respondents, with deer and fire management being the main areas of importance in this regard. However, only some agreed that there was a need for more landowner cooperation, with many feeling current levels were sufficient.

A key opportunity for all landowners, but raised mainly by community and FCS respondents, was the potential for greater access to funding for forest management and expansion through partnership arrangements between the wider landowning community and community management initiatives. Partnership in this respect was seen as mutually beneficial to both the communities and private estates involved:

There's a lot in it for private estates as community groups can get hold of grants and then maintain the tracks which they [the private estate] *can then use for stalking access. They could not have got those grants* [c2]

Apart from a small number of examples [p10, FCS1, c2], the potential for community group-landowner partnerships appeared to be relatively untapped, with most being on FCS land. FCS1 noted that this was most likely an issue of control:

we've had hundreds of thousands of pounds going to projects in Forestry Commission land that has been sourced by the communities and then worked on our land and I don't think that's been as actively done in private sector forests, because private sector forests tend to be more sort of tied, we're not going to get investors if we have to sort of lose control to the communities [FCS1]

A further area recognized by governmental respondents, in particular, as having considerable potential to enhance recreational facilities at the landscape level (and hence regional forest multifunctionality), was the further development of 'thematic links' between different landholdings. The development of consistent interpretation across different estates was seen

as a key area in this respect. The lack of 'joined up' delivery of recreational facilities such as core footpaths and bothies was criticized in this respect, with some respondents feeling that a more consistent and centrally managed approach to the delivery of these recreational facilities was necessary.

8.2.2.2 Theme 2B: Forest policy regionalization and targeted grant schemes

Despite the obstacles discussed previously, many respondents were supportive of further policy development at the regional level. Policy regionalization was seen as an opportunity to clarify regional priorities for landscape change in an area where policy priorities for both forest expansion and moorland conservation often seemed unclear and even conflicting [SNH2]. Despite some criticisms, the development of the CFWF was also often seen as positive by all types of landowners. However, some argued that the framework required a more balanced approach, highlighting the opportunity for the development of maps of forests showing infrastructure and market accessibility, thereby recognizing the relative commercial viability of different forests. It was suggested that the region be zoned according to a range of factors including commercial viability (based on distance to markets), accessibility and management requirements. P4 also noted the opportunity for using yield class maps as a basis for zonation, dividing forest areas into commercial and non-commercial zones based on (among other factors) yield class values.

Following a 'zoning up' of the region based on the recognition of priorities for different areas – incorporating both public benefit interests and commercial viability - targeted grant schemes could then be developed to deliver regional policy objectives. A targeted regional approach to grants was seen by some as representing the best way to implement the CFWF and support forest expansion in target areas. The concept of distributing grants by assessing applications against pre-determined preferential expansion zones was generally well received. A/c3 and p4

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also argued that potential existed for developing targeted grants relating to the removal or conversion of non-viable or marginal plantations, with the level of grant potentially being linked to the level of inaccessibility:

say if the CNPA decide in the Cairngorms we have a high elevation lodgepole pine issue and we want it to revert to moorland , so if it's an issue how do we deal with it, strategic funding to obtain access to these plantations ? [a/c 3]

FHN development was also seen as requiring forest expansion in key areas and improved management and condition in others, rather than simply regional forest expansion. To deliver such specific objectives, national grant schemes, or even regional supplements, were often seen as insufficient. However, as FCS1 warned, a targeted grant scheme approach could prove contentious given the high conservation value of certain moorland areas and that such an approach would involve an element of subjective judgment by those deciding upon the location of the 'preferential expansion zones'. NGO2 also warned against the potential divisiveness of such an approach:

then it becomes quite divisive in terms of landowners that you know, why are you giving money for woodlands there and not for here......I think it [a targeted grant scheme] *would be a reasonable thing to do but then you disadvantage some landowners against others, so politically quite a difficult thing to do* [NGO2]

A targeted grant scheme approach was also recognized as potentially helping to combat issues of poor market accessibility and high haulage costs, with grants potentially being targeted at felling and extracting timber from remote locations for long-term habitat and biodiversity benefits, as discussed within the opportunities in the following section (theme 3). NGO3, a/c3, p4 and c2 all argued, in this regard, that the current structuring of the grant system (standard costs approach) made little allowance for remote and inaccessible sites, where costs were usually higher than 'standard'.

8.3 Theme 3: Forestry markets

This theme is concerned with constraints and opportunities relating to the marketing of forest products. The focus is primarily on the issues surrounding the marketing of timber products and the effects of timber markets on forest management, although the issue of marketing non-timber forest products is also explored.

8.3.1 Theme 3 constraints: Timber market scale and accessibility

8.3.1.1 Sub-theme 3A: Low prices make forestry a non-competitive land use

Some respondents expressed concerns that, while public benefit forestry was on the increase, the practice of silviculture appeared to be in decline in Scotland. This was seen as being linked to market constraints: *the market is the engine of silviculture, if the market is not strong enough many people will not consider doing it* [FCS1]. Some respondents, especially those with smaller forests, but even some from estates with large resources and a tradition of timber production, noted that low prices were definitely influencing the level of landowner interest in forestry as a land use. Productive (timber-oriented) forestry, in particular, was sometimes seen as being out-competed by sporting, agriculture, and tourism development [p1, p5, p8, p10, p4]. Two respondents had ceased timber production due to low prices, and were awaiting more favourable market conditions to return to it - although they were maintaining necessary management to ensure the future value of their forest resource [p3 and p10].

The availability of low-priced timber imports, and the global scale of timber markets, were seen as key in determining low timber prices in Scotland. P3, for example, noted that it was cheaper to import Estonian fence posts and re-sell them, than to produce his own. High fuel costs in the UK, compared to the rest of Europe, were seen as further constraining an already competitive market. The competitiveness of global timber markets was also seen as having led to a requirement for economies of scale in the UK if forest managers were to deliver a viable product. This requirement, combined with high labour costs (and a greater reluctance among rural residents to work in the primary sector) and advances in mechanization, was seen as having led to an increase in the use of short-term highly mechanized forestry contractors and an associated decline in the numbers of people employed in productive forestry in Scotland [NGO1, SNH2, c1]. Some argued that the use of contractors also represented a barrier to integrated estate management, as it resulted in forest management being increasingly divorced from internal estate management.

Some respondents also felt that the FCS was responsible for further saturating an already weak timber market with cheap products. P3, for example, argued that, by selling timber at reduced rates to meet revenue targets set by the Scottish Government, FCS was affecting price and market availability for private foresters:

by selling cheap to Norboard or....the sawmills, and they've got 50% of the timber, they lower the timber price so people like ourselves walk away from it......they now lose hundreds of millions a year, we could do it for a tenth of that, but what they've done is by providing it for free they've effectively knocked out our market, just the same as if I produce livestock and beef and the government decides to produce beef and sell it at half price I have to walk out of business, and that's what's happened in forestry, the Forestry Commission is forcing us out of business [p3]

Some further argued that delivering sustainable forestry (particularly in economic terms) through the public sector was a flawed approach, as public sector organisations were inefficient in business, as the necessity to maintain a sustainable income was missing:

the private sector does what it can afford, it's more sustainable, the real fundamental difference is that in the public sector the attitude has to be that you spend as much as you possibly can so that your budget doesn't get cut the following year...private sector is the complete opposite [p8]

FCS2 argued, however, that a key reason for the FCS to continue producing and selling timber in a weak market was to guarantee continuity of supply and demand and ensure the long-term survival of a timber market in the UK for both private and public forest owners.

8.3.1.3 Sub-theme 3C: Timber price and marketability as a product of poor access

The accessibility of forests, in terms of both internal access roads and distance to markets, was a major factor in determining their commercial viability from a timber perspective:

the value of timber to a forester is in a direct relationship to where it is. So if you're close to the market it's worth a lot of money, if it's a long way from the market it's not worth a lot of money, if it's miles up a track, it's not worth anything from a commercial basis. Now I would suggest that there are thousands and thousands of acres of what's termed commercial forestry in Scotland, that is not commercial, simply because of its location [p4]

The constraints on access varied across estates; some respondents stated that the closeness of sawmills and processors meant access was less of an issue [p7, p1, p2] and others (particularly higher-altitude, more remote estates) describing internal access, market availability (distance to markets) and haulage costs as the main constraints they faced in producing timber [p5, p8, p6,

p10]. The perceived outcome of such constraints was that it is becoming increasingly difficult to make timber production economically viable. As FCS2 noted: *Scotland has lowest return to growers but also the highest prices going into the sawmill, highest diesel costs influence this.* High haulage costs were seen as particularly disheartening, as they were seen as having the potential to negate the original quality of the timber:

a local producer working in Strathspey is never gonna be able to influence the market, it doesn't matter how good their timber is, they'll still only get sweeties of an increase per tonne and the increase in the haulage costs the mills are gonna be saying well OK you've got cracking sticks but there in Strathspey, by the time I shift them the haulage costs are such that I'm going to offer you less rather than more [SNH 2]

8.3.1.4 Sub-theme 3D: Price, market accessibility and availability as drivers of management quality

A number of respondents pointed out that necessary silvicultural management, and particularly undertaking small-scale thinning operations and harvesting small roundwood (the main product of mid-rotation thinnings), was economically inefficient, due to market distance and price. Some respondents dealt with this by ensuring harvesting operations included pallet wood and sawlogs, as well as small roundwood where possible, as markets for these products were closer, prices higher, and losses from small roundwood harvesting could be offset. The lack of available markets for small roundwood was repeatedly raised as a constraint [p1, p3, p4, p5, NGO1] and occasionally as a reason to cease all but the most necessary thinnings [p3]. Respondents often stated that the level of thinning, particularly on private estates, was in decline, with this usually being blamed on market constraints, with market availability and price for Scots pine seen as particularly poor relative to timber from spruce harvests [p6, p8]. The thinning of younger pine stands was also seen as being very costly, due to the high proportion of small roundwood in the harvest end product:

I would like to thin more, particularly in the young pine stands, you probably end up losing five or six pounds a ton up here on your first thinning in 30 year old Scots pine......it is an issue, I remember when I was younger these operations used to be able to wash their face [p6]

Lodgepole pine stands were also seen as difficult to manage cost-effectively, given that these stands are often relatively inaccessible, as well as the lack of a market for lodgepole thinnings:

I have contacts in the timber industry and they were saying first thinning for lodgepole pine particularly, and this came from a very big production company, we can't do anything with them the timber is no use to us we can't sell it, nobody wants it, it's a complete waste of a resource as far as we're concerned, so most of it I think, in relation to thinning, it is driven by market forces [SNH2]

A/c1 also argued that the availability of generous grants for (primarily non-commercial) native woodland establishment, combined with the discouragement of planting faster growing spruce in the region, was turning landowners away from timber-oriented management. P7 and SNH2 also argued that market constraints were affecting rotation length and tree age and diameter at harvest (see Quote box 8.2). The demands of the market, in this regard, could be seen as having potentially significant impacts on both a site's ecology (with more frequent harvests and less large trees) and timber quality. However, FCS2 refuted the idea that estates were having difficulty selling large diameter timber, arguing that most estates had little timber over 40cm in diameter anyway.

While some respondents admitted reducing the level of active management in their commercial forests, most also argued that, through maintaining a minimum level of thinning, the future potential timber value of their resource was not being significantly affected. P7 and p1 also argued that they would never cease thinning (although they would reduce thinning levels) for economic reasons, as thinning was vital to ensuring future timber value and forest functionality. FCS respondents also saw access as a constraint on some of their sites, and

thinning had been curtailed on at least some FCS landholdings in the region. FCS respondents noted, however, that maintaining active management was probably easier for them as they could generate economies of scale more easily than private estates, as well as having existing long-term supply contracts. On most NGO and SNH landholdings, thinning for silvicultural reasons was not carried out. This was primarily for conservation reasons - specifically the creation of deadwood.

Quote Box 8:2 The effects of market constraints on forest management - tree size and rotation length

[names a sawmill] can't shift Lodgepole pine, no market, also doesn't want big timber, margins are so tight that what we've [quoting a conversation with the mill manager] had to do is optimize the equipment that we've put into the mill and he said I've got a specification for logs and if logs come in bigger than that they're a liability, there isn't really enough to justify running that equipment and because of the distribution of big timber around the UK any single mill that says right I'm gonna specialize in handling big sticks he said they have enormous problems with overheads because the transport distances are absolutely huge [SNH2]

times are changing very dramatically in forestry and I'll tell you why, I have great difficulty in selling timber over 40cm diameter......the nearest mill I can sell it too is at [names a mill] .....which means to be selling on private estates, not so much the Commission, but private estates, you tend to get a larger proportion of big trees on private estates than you would in a Forestry Commission, because in forestry that's how we're taught, now we've had to learn to reduce our crop rotations, quite dramatically, when we're going to do thinnings, we take the bigger trees out...if they're gonna reach 40 within the next 5 years, take 'em out now you need the wee'er ones, which is contrary to everything we've been told [p7]

The importance of market constraints was evidenced by many respondents pointing out that the original objective for tree planting on their sites had been timber production; while some argued that, on their sites, timber production had traditionally represented the foundation upon which all other forest functions were delivered. Timber production, and specifically regular thinning, was seen in this regard as a facilitator of sustainable multifunctional forestry, as it allowed private forest owners to generate an income and thereby manage the forest (and all its functions) in perpetuity [p1, p2, p4, p7, NGO1]:

the idea is to move in the long term, to a steady, sustainable yield of timber, of reasonable quality......without it there's no way that forestry can deliver any of the other objectives.....you've got to justify a return from the woodlands and also it's a way of delivering a lot of other objectives at the same time [NGO1]

Market-based constraints can therefore be seen as representing potential threats not only to timber production, but to multifunctional forest management.

8.3.2 Theme 3 opportunities: Market diversification and localization

8.3.2.1 Sub-theme 3A: Timber market diversification and localization

Many respondents saw the development of smaller-scale processing facilities and timber marketing options closer to the point of harvest as a key opportunity to combat market constraints [p1, p4, p5, p6, p10]. P5 noted that, as haulage costs were high, local processing and marketing added significant value to timber products. P6, for example, had established a relationship with a local furniture manufacturer who was purchasing approximately two tons of timber per annum following some basic processing by a local sawmill. This accounted for a very small amount of the estate's production; however, the rate of return was significantly higher than from larger sawmills due to reduced haulage and the purchaser being willing to pay a premium for high-quality, local timber. P2 also noted the potential of a down-scaled more localized approach to timber production:

our estate tracks are not designed for modern forestry forty four ton timber lorries, so we may look at smaller scale, less intensive thinning, felling, haulage, rather than......working a site intensively with a harvester and a forwarder which will move a hundred tons a day, we might look at smaller scale machinery so we have a reduced requirement for large roads.........part of what we're trying to do is encourage niche markets locally to try and sell our timber locally to cut down on transport and take lorries off roads, we might even look at our own sawmill woodfuel ventures [p2]

Some respondents supported the idea of developing their own processing facilities [p1, p2, p4, p10] to add value to timber products on-site, although most also noted the difficulties in sustaining on-site processing due to low prices, high running costs, and restrictive health and safety regulations.

Two areas seen as having particular potential for market development and localized consumption were timber framing for houses and the local (regional) furniture products market [SNH2, a/c1, a/c4, c2, p6]. As a/c4 noted, a high proportion of houses in Scotland are self-builds, which increases the market potential for high-quality bespoke timber. Timber housing was also seen as environmentally beneficial and was recognized as an underexploited market in the region and Scotland as a whole [a/c1, p2, FCS2, c1]. In terms of expanding potential demand from existing and future local furniture makers, c2 argued that the supply chain for pine timber for furniture would also need to be enhanced within the region – noting in particular the lack of adequate kiln drying facilities for pine timber. A key point raised by a/c4, however, was that marketing timber regionally, using the Cairngorms as the region, would conflict with two current timber marketing regions; the Highlands and the Northeast of Scotland, which divided the Cairngorms in two (a/c4).

8.3.2.2 Sub-theme 3B: Woodfuel – the pros and cons from a manager/landowner perspective

A key opportunity to market timber locally and reduce haulage was seen as woodfuel market expansion and the promotion of woodfuel heating systems in the region [p2, p3, p4, p6, p8]. Some issues or constraints were also raised in relation to woodfuel; however, as woodfuel was generally recognised as an overall opportunity, these issues are presented here within the opportunities section to ensure a consistent and cohesive discussion. Perhaps the key opportunity recognised, was that high woodfuel demand was seen as providing a potential outlet for small roundwood - a product which was seen as difficult to market cost-effectively

[p6, FCS2, C2]. More generally, this was seen as potentially providing an outlet for timber from low-value, low-diversity forests, increasing the potential viability of harvesting certain resources, particularly dense monocultural plantations with poor access, leading to potential biodiversity benefits from plantation removal [NGO2]. P1 and p5 did point out, however, that while requirements for woodfuel heating systems varied, most people heating their homes with log burners required hardwood logs, rather than softwood pine species – the predominant forest type in the Cairngorms.

The rising cost of existing fuels such as oil was seen, however, as a major opportunity to promote and support the installation of woodfuel heating systems, both regionally and nationally, thereby creating a long-term demand for woodfuel [NGO1]. The Scottish Government were sometimes criticized, in this regard, for having placed an overemphasis on wind- and water-based renewable energy and having subsequently neglected the potential of woodfuel as a renewable energy source, which was seen as having negatively affected woodfuel market development. A significant increase in woodfuel demand was seen as fundamental to ensuring the future success of the woodfuel market. As p1, p6 and p7 pointed out, over 100,000 tonnes of timber suitable for woodfuel was being produced every year in the Cairngorms, whereas regional demand for woodfuel was much lower than this.

Respondents representing larger forest resources were also sometimes sceptical that woodfuel demand and price would ever be high enough to seriously affect them. As p5 pointed out, however, installing woodfuel heating systems on estates and using the estate's own woodfuel could allow significant savings on expenditure. NGO1 also argued that, due to the infancy of the woodfuel market, managers must be prepared to accept an initial loss to ensure fuel (e.g. oil) costs were being undercut enough to encourage interest in woodfuel heating systems. Once the market has developed, prices could be gradually raised to a sustainable level. Furthermore, as NGO1 pointed out, the specifications for woodfuel production were seen as

less demanding than timber for other markets (even small roundwood), and was therefore cheaper to produce.

8.3.2.3 Sub-theme 3C: Long-term commitment to the timber market

An opportunity raised by FCS respondents in relation to private owners and market constraints was that of the private sector potentially developing a more unified and committed approach to the marketing of their own timber. As FCS2 stated:

biggest problem for private sector is they are not organized, private sector dip in and out of market and they can get good prices doing this but it means the customer doesn't see them as a reliable resource,. If they keep dipping in and out there won't be a market. You can see it happen because when the price drops people who work on private estates come looking for work with us. If the FC weren't there they wouldn't have a market. If private estates want to have a greater consistency of price then they need to commit to the market when it's good and bad. It's important as private sector should be dominating the market over the next two decades

FCS respondents also pointed out that, as Scotland was about to become a net exporter of timber, the effects of globalization on prices were only likely to increase in the future. These respondents argued that, for the private sector to be able to influence the market and obtain consistent prices and ensure long-term market demand at an international level, they would need to be cohesively organized and committed to consistently supplying markets even during periods of low prices.

8.3.2.4 Sub-theme 3D: Diversification into non-timber based income sources

In relation to future diversification opportunities for forest management, few private estate respondents saw development of recreational facilities as a potential opportunity (although p2 had already diversified heavily into recreational opportunities), particularly from a forest

management perspective. FCS1 argued, however, that it was possible for private landowners to make a viable return from forest-related recreational development, such as a mountain biking course and bike rental facilities. P10 was also engaged in developing walking route leaflets with a community organisation to sell on-site, as well as having set up a paying car-parking facility at a central walk starting point (with a public toilet at the car park site).

At a more general level, a number of estates were engaged in tourism facility development, specifically the development of holiday cottages; many felt this was now the key income source on their estates [p1, p2, p3, p5, p11]. While holiday cottage, and tourism development in general, was seen as more of a whole estate activity, FCS1 and p2 argued that the development of structurally diverse and species-rich forest environments (as opposed to monocultural plantations) could have a direct and crucial impact on visitor numbers on-site, with native woodlands in particular seen as highly compatible with developments such as campsites and holiday cottages.

A number of respondents also noted how the development of native woodlands and the acceptance of grants for various biodiversity-related initiatives could also generate a certain amount of income (or at least turnover) for (the) forestry (department). P10 for example, was planning to submit a minimum of three small-scale native woodland grant schemes per year to ensure a degree of turnover within the forestry department of the estate. P1, p3, p7, p10 also all quoted examples of making a direct profit through the grant system (usually in relation to fence marking for capercaillie, of native woodland establishment prior to the standard costs approach of the SFGS) by applying for a grant and then initiating the granted operation at a cost below that of the grant levels. This was sometimes seen as a very useful way to generate extra income in a depressed timber market, with some respondents quoting direct profits in the tens of thousands of pounds as being made from granted operations.

8.4 Theme 4: Bureaucracy

This theme is concerned with complexities in management resulting from multiple organisations/stakeholders regulating and using forests and the associated array of policy mechanisms. This theme from separate to the issue of political inconsistency (see theme 6, Section 8.6.1.2) as it is concerned with the complexity of current policy systems, while the inconsistency issue relates to the insecurity resulting from rapid changes in both policies and socio-political trends. The key opportunities seen as having the potential to address constraints perceived as being related to bureaucracy are also discussed.

8.4.1 Theme 4 constraints: Bureaucratic complexity as the suppressor of multifunctional forestry and productive land use

8.4.1.1 Sub-theme 4A: Bureaucratic complexity as a barrier to productive and progressive forest management and productive land use generally

A minority of private, some NGO and most governmental respondents were not overly critical of bureaucratic mechanisms. However, many private respondents felt they represented a major constraint, arguing that current levels of legislation were impractical and unnecessary, and acted as a barrier to progressive management by taking up so much time:

if I sat down and listed all the legal bumf that I have to comply with before I go anywhere near the woods, we'd probably only send the foresters out to the woods on a Tuesday afternoon in November, there's so many restrictions in timing, in guidelines and all that sort of stuff, it's making it increasingly difficult to plan and implement any kind of operation really, I suspect that's European led, if we could pull all that down that will be fantastic, it would free us up to do a lot more constructive things with our management [p4]

P3 also argued that increasing bureaucracy in recent decades had led to a rapid disintegration of rights of tenure:

it's only two or three hundred years ago that the local laird not only made all the decisions and could do anything, he even ran the local courts, was it [inaudible] *who lived in Ruthven barracks who passed a thing saying that all females between something like 6 and 60 had to work naked in the fields in the summer for his gratification, where as now I can't even put up a shed without planning permission* [p3]

This loss of property rights was argued by some as having restricted productive land use, making it more difficult to maintain economic sustainability within forest management:

we used to drive tractors and these things willy-nilly, that's all been changed now, things like you can't harvest around the badger setts, can't harvest in the old forest because it's the capercaillie nesting season, there are a lot more restrictions on what you can and can't do and it becomes all the more difficult to find a way through it and still remain solvent [p1]

P3 further argued that this apparent discouragement of productive (and innovative) land use could be linked to both regulation and grant systems, with managers often more engaged with complex grant applications than generating competitive products:

our forester now admits that 80-90% of his time now is collecting subsidies and filling in forms and only less than 10% of his time is now actually producing a viable product.........10 years ago we were producing timber now our forestry is collecting grants for putting up fences with one grant to mark them with a second grant to remove them with a third grant it's just, you know, we're not producing we're just, we're kidding ourselves [p3]

P4, a/c3 and c2 also argued that the forestry grant system (as opposed to the pre-1988 tax incentives system) constituted a blanket approach; despite a diverse range of available grants, respondents noted that there was a limit to what could be applied for within the system. P4 argued, in this regard, that the grant system ran the risk of discouraging innovation in Scottish forest management; due to an over-reliance on grant aid on the part of forest owners:

I'm just a little bit worried that foresters, as silviculturists, are going to be trapped in a situation where we can't try out these things, we can't develop them because the owners are not that keen because it costs them money and they don't know what the result will be and because it's not on a number in the grant scheme then we can't do it, so trying out new ideas and development of silvicultural techniques, might be strangled a little bit by the grant scheme [p4]

In relation to the regulatory framework, respondents did highlight some specific constraints relating to designations, such as: NSAs restricting clearfell size and the use of fences [p4, p11], SSSIs restricting harvesting [p3] and the halting of thinning in NNRs, which was seen as prejudicing the future value of the resource [p1]. In general, however, the amount and complexity of legislation and support mechanisms were criticized. Some also argued that high-quality management was not adequately rewarded within the policy system [a/c2, a/c3, p5], with managers undertaking native woodland restoration facing a similar bureaucratic burden to those establishing non-native plantations in 'sensitive' areas. A/c3 and a/c3 illustrated how this imbalance had the potential to impact negatively on what they perceived as distinctly positive management. Referring to an estate they had been managing in the Cairngorms, these respondents explained how the owners had wanted to establish a large woodland regeneration block in conjunction with the recognition of potential new FHN 'corridor areas' on their land within the CFWF. However, due to bureaucratic constraints, this had been severely delayed and only progressed at significant cost to the owner (see Quote Box 8:5).

Quote Box 8:3 The negative effects of bureaucracy on environmentally positive management in the Cairngorms

> when the Framework came out the estate looked at that and said what a good idea, we could do strategic blocks of forestry so that we could create this linkage from Spey through to Dee just like they've asked us to.... and from starting that process to actually getting a signed up grant took seven years. To create native woodland as specified under the framework using local stock and everything and it still took, with all the negotiations, trying to deal with environmental regulations for the SACs, looking at the impacts on other nature conservation issues, most owners would have turned around and said stuff it [a/c 3]
>
> to put up forestry blocks it took eight years and probably cost the owner in excess of £30,000 to go through the consultation process, now why.....should the owner be paying £30,000 because some bureaucrat says you've got to go down this route to achieve my aims...the owners should be encouraged to do it ! [a/c 2]

The time and expense involved in dealing with regulations and grant schemes were therefore sometimes seen as discouraging landowners from investing in any form of forest-related initiative:

if we're finding that the bottom line has eroded because it's all been creamed off to consultants and people running around with yet more reports etc. then we just walk away from it, unless as happens in a lot of forestry here, the grants may not have gone down but the regulations have gone up and it very quickly just gets to the point where you just walk away from it. So that's why we're concentrating on tourism now, more guaranteed income [p3]

The high levels of bureaucracy apparent in the Cairngorms were usually attributed to governance in the region being spread over too many levels:

fourteen years ago we had the bi-council and we had the Westminister parliament, now we have the community council, the NP, the regional council, the Scottish parliament, the Westminister parliament and the European parliament, there's six tiers of representational bureaucracy, all gotta be paid for, all making, well at least three of them making legislation, all wanting to be in control of our assets, where does it stop ? [p3]

A/c2 noted that such complex multi-level governance meant that engaging in development (forestry-related or otherwise) necessitated the involvement of so many organisations and people that the process was slowed considerably.

control is too divided, the CNP was sold to us as a one stop shop, it isn't, give you an example, we had a planning application the other day, so where does the loop go, we submit the planning application to the Moray Council 'cause it's in their area, was called in by the CNP, who sent it back to the Moray Council roads department, who then answered questions to the NP and referred it back to them on another matter who then had to call in somebody else, come on you're pulling my chain. I don't have time to deal with that, I have the ability to go out and make a decision on that estate on behalf of the owner, but who makes a decision on behalf of the planners? [a/c2]

P3, p5 and p10 also argued that the complex nature of legislation and grants for forest management, and for land use generally, had in fact led to the development of a secondary bureaucracy of land agents and forestry consultants, an issue further explored in theme 6:

the best farmer is not the farmer who produces the best cows or sheep it's the one who collects the subsidies and as it gets more complicated you then end up with accountants because your tax thing's so complicated, you have a land agent because your agricultural payment's so complicated, you have a forest consultant because your forestry's so complicated. The government bureaucracy is creating their own bureaucracy [p3]

8.4.1.2 Sub-theme 4B: The National Park – one tier of bureaucracy too many ?

Respondents from private estates were generally unsupportive of the new Cairngorms National Park, with most feeling that the designation had been unnecessary and would only bring increased 'red tape' for land owners and managers [p3,p4,p7,p8,a/c2,a/c4]. It was agreed, however, that the establishment of the park implied greater tourism potential in the

future, and, as p7 noted, that it was also likely to increase property values, which from an owner perspective was obviously positive. Most of those questioned on the issue felt there was little need for the park authority to become involved in regulation and control of forest management in the region; FCS and SNH were seen as the obvious authorities to continue in this role. At the time of interview, none felt that the park authority had affected their management. The response to the idea that the park authority could act as an integrated funding and regulatory body for all land uses was usually negative, with respondents concerned that this could create an unwieldy 'mega-bureaucracy' and decrease public sector transparency as well as restricting productive land use even further.

NGO respondents were also concerned that the park authority appeared to be championing recreation without due regard for the conservation of natural heritage. This was balanced by an FCS respondent arguing that recognition of the importance of the productive element of forest management by the park authority would be crucial to ensuring the future economic sustainability of forest management in the region:

a lot of the park area is productive land use, you know, places like Rothiemurchus, Glenmore, Inshriach, people like them, but they do need managed, and if you make it purely conservation oriented where's the money going to come from to manage it ? From the public sector ? You then get more vulnerable to sort of political ups and downs so, if you become more and more dependent on the public purse you're then more exposed. If you continue that productive element which has a market, which is a private sector market, that puts private, basically private income, back into the park, then you know it seems to me a much more balanced approach and the more the park goes towards being publicly funded the less sustainable it is as a park [FCS2]

8.4.1.3 Sub-theme 4C: Organisational and policy level conflict

Linked with the ideas of oppressive bureaucracy and complex multi-level governance was the argument that many policies, as well as organisations, often appeared as being in conflict with each other:

we're meant to be trying to do one thing from an agency and another agency is saying do something different, there needs to be far more joined up thinking when it comes to regulation and simplification of regulations, rather than running around five or six different agencies [NGO1]

SNH were, without doubt, the main target of criticism in this regard:

SNH don't know the meaning of joined up management, they've got all these policies and none of them interlink with each other, a lot of these policies that they have are internal staff led, rather than being you know, for the good of the countryside, there's too much personality in SNH, there's no consistency in interpretation of the policy, so one area officer can have a completely different idea about things than another area officer [p4]

Some also argued that organisations were obviously unaware of the current levels of bureaucracy land managers face, as the level of policy development and 'red tape' was consistently increasing. NGO1 and p3 also noted that it was often difficult to find out who is actually responsible for specific issues due to the overall complexity of the organisations concerned.

Furthermore, a/c2 argued that much of the apparent conflict within or between estates (see themes 1 and 2) was in fact a product of bureaucracy and of micro-management on the part of governmental agencies. Micro-management was described, in this regard, as the process

whereby land managers were encouraged or forced to manage for conflicting objectives in the same location, purely as a result of the policies of regulatory organisations. A/c2 highlighted an example of how 'micro-management' was affecting native woodland expansion on an estate he was managing:

there was calcareous grassland in an SSSI and they [SNH] *wanted one area overgrazed and deer numbers reduced over* [the] *whole estate, and boosted on the 40 acres of grassland, and if it was to be grazed it should be fenced, and we would have lost 400 acres of regeneration,* [due to the position of the grassland] *the FCS and SNH micro-manage too much, this creates a lot of overlapping bureaucratic objectives* [a/c2]

The key argument in relation to this apparent 'micro-management' was that the range and complexity of many environmental policies mean that they overlap with each other, which sometimes led to management for conflicting objectives [often through designations] being enforced or encouraged at micro-scales across a landholding. Conflicting land-use policies were seen, in this regard, as a barrier to holistic, integrated estate management. Some argued that this was worsened by a distinct lack of realism among some of those involved in the delivery of government policies. As a/c3 noted, multifunctional forestry was essentially about optimal compromise, and this often seemed to be in direct conflict with government policies, which often appeared as sectoral, poorly integrated, and lacking in pragmatism:

I really don't know why I am a professional forest manager, because clearly everyone else can do it better than I can, they all tell me they can.....and I'm here and really all I'm trying to do is weave a path through this for my owner and yet I'm being told well you haven't taken account of this, well I have because this is the compromise. That's what we're all about, we're all about compromise, because we're trying to take the caper and the red squirrel and the landscape aspect and meld it all into something that works and we've been doing that for a long time you know, we've been doing that for a long, long time as forestry managers and if you look back at some of the estate landscapes you've got, particularly in Perthshire or.....they all came about from good

sound forestry management and the habitat benefits that they've got there now came about from estate foresters that knew what they were doing [a/c 3]

Sub-theme 4D: Access legislation as a barrier to recreation and non-timber forest product market development

As noted in Section 8.3.2.4, private estate respondents often did not feel that the development of recreation was a viable diversification option, from either a forestry or whole estate perspective. Three respondents [p3, p4, p8] argued that a key reason for this lack of interest in recreational development was that recent land reform legislation had created a barrier to landowners deriving an income from recreation-related initiatives on their land, as p3 put it:

our biggest problem is we were mainly recreation [in terms of estate income] *up until the land reform, because we had a right to control it and we had horse riding and mountain biking and stuff and after land reform we have no right to manage and control it so now we've changed from mountain biking and things like this to things like quad biking* [p3]

Respondents were also generally highly sceptical of any future income being raised through harvesting non-timber forest products such as wild mushrooms or berries. P1, p3, p6 and p7 all noted that, due to the general scale of their operations, small-scale initiatives such as mushroom picking tended to be inefficient or not viable. The key constraint on NTFP development, however, was seen as the inability to control the general public in relation to picking these products (also seen as a result of access legislation). P1 characterised the general response on this issue:

you've got 30-40,000 visitors a year, as soon as the berries are ripe they're getting picked by all your visitors, it's [also] *very labour intensive, I've spoken to people that have gathered berries in Scandinavia and the crop there is more reliable and you don't get good years and bad years so it's a bit of an industry there but then*

you've got a fairly sparsely populated country with a lot of forest and here we've got a densely populated country with 40,000 visitors a year [p1]

8.4.2 Theme 4 opportunities: Managing bureaucracy – integrated policy delivery, communication and a pragmatic approach

8.4.2.1 Sub-theme 4A: Joined up thinking and a pragmatic approach

An opportunity suggested by some respondents as having the potential to combat bureaucracy-related constraints was enhanced communication between key organizations and more 'joined up' [as opposed to overlapping] policy development and delivery:

You're dealing with the DC for deer control, FC for plantation management and SNH for conservation management, it'd be good to have more integration of those three........I think it's almost a case of I suppose of the bodies sitting around a table with a landowner and agreeing what the objectives are [NGO2]

Few appeared to argue for 'deep' organizational integration (i.e. disbanding regulatory and support bodies and re-organizing them into a larger integrated organization), as this would be both highly expensive and potentially result in even greater complexity [a/c1, NGO2]. However, respondents argued strongly for greater pragmatism in policy implementation on the part of the relevant organizations (SNH, FCS, DCS and the SE):

the SFS says all the right things but I think politicians don't understand how much it will cost. So don't spread it too thin, should take one section of the strategy at a time, need to be more realistic about what can be achieved [a/c3]

if you get good folk applying the bureaucracy in an intelligent way and you have a good relationship with them it's not a burden, if you get a pain in the arse who just plays by the rules without bending the rules while maintaining what's important then it's a pain [FCS2]

Some also noted that bureaucratic constraints could be lessened through the fostering of trust and the development of long-term relationships between managers/owners and those implementing policy:

you can minimise bureaucracy through positive engagement with people, so that when things do go pear-shaped they're working with you, rather than coming out to you and hitting you with lots of bureaucracy, so we have a pro-active approach to these things a lot more done through relationships then sending paper back and forth [FCS2]

As SNH2 noted, one way in which trust was fostered was through direct stakeholder engagement in the policy process. For example, landowners were seen as often using consultants to engage with policy bodies, creating a barrier to the development of relationships between organizational representatives and landowners, as well as leading to a lack of awareness among landowners of policy developments. The importance of the development of partnerships between landowners engaging in forest management and forest managers themselves, both regionally and nationally, was also recognized as potentially leading to the development of a stronger 'voice' in political terms. As FCS2 stated:

effective lobbying has to be done through local politicians and forest owners lobbying them but also through being organized as forester groups and through user group lobbying groups......5% of SE budget is environmental and 5% of that is forestry. If we tweaked it by 1% even that would make a massive difference because we are so tiny compared to agriculture from a funding perspective [FCS2]

Effective lobbying of government was seen, in this regard, as potentially leading to increased funding availability, as well as to a relaxing of the regulations surrounding forest management and potentially resolving the issue of inconsistent policy development and delivery (see theme 6).

8.5 Theme 5: Public pressure and public support

This theme relates to the issue of public pressure on forest management, as well as to perceived constraints resulting from increased emphasis in policies on public consultation and participation. The advantages of taking a pro-active approach to public engagement and participatory management in dealing with such pressures are also discussed.

8.5.1 Theme 5 constraints: Public pressure and bottom up bureaucracy

In general, public pressure and consultation requirements were not seen as a major constraint, but rather as an extra management issue to deal with. The term public participation is open to interpretation in terms of what constitutes genuine participatory management. Strong public participation, whereby local communities have a clear influence over management, was only evident on community and some FCS-owned landholdings. Many private estate respondents were only involved in consultation or participation where regulation necessitated it:

[consultation/participation] *only done because we had to for long-term forest plan and it didn't change anything, just people with fancy ideas coming along and trying to re-invent the wheel* [p11]

Many of those questioned on the issue appeared to view increased consultation of the local public as a necessary burden; however, the idea that the public could participate in management (and genuinely influence its direction) was rejected by many. As p7 stated: *no I*

don't tend to involve local people in that [forest management], I think I'm the one for that job. Some argued that they were under no obligation to involve local communities in forest management in a meaningful way unless they received some sort of financial remuneration:

we tend to go down there [the community council] *on the defensive and community council members are all very strong-minded, they tend to operate under the assumption that estates are always accountable, but we don't take any conservation or recreation grants* [p11]

Fine to have input, but if someone has input they have to pay for the privilege, not just a percentage of the costs. If people want public involvement then they must buy into it, if it's a national objective then there must be national financing [a/c2].

NGO respondents felt that they were under a greater burden than private estates to consult the public, although there were no community woodland initiatives at any of the NGO sites equivalent to those of FCS- or the community-managed initiatives.

Some respondents pointed out that pressure on management from local communities had increased in recent years, with this being attributed to higher numbers of people migrating from urban to rural environments [p1, p2, p3]. P1 argued that this urban-rural migration was leading to higher numbers of people in rural areas with very different views on land management to longer-term residents, creating potential for conflict and a greater necessity for manager-community communication:

Urban people moved to the area have strange attitudes which always need things explained to them which is very time-consuming [p1]

NGO1 also pointed out that increased numbers of people from urban areas (with urban values) were now also visiting rural areas, which increased the potential for conflict between forest management and the public. NGO2 and p11 both highlighted, for example, how the common public perception of a Scots pine forest was one of sparsely scattered and old 'granny pines'. This was seen by some as having resulted in a widespread mis-conception of what constituted a healthy functioning native pine forest. NGO2 and p11 were both in the process of regenerating large areas of native pinewood; both expressed concerns as to how the public would react to the resulting landscape change on their landholdings, from one of scattered granny pines, to a potentially denser more closed forest landscape.

8.5.1.1 Sub-theme 5A: Who's going to participate anyway ?

A key constraint on participation in management recognized by respondents was that the general public were not as interested in 'participating' as policy documents assumed. P4, for example, noted that, despite advertising an open meeting during the development of a LTFP, there was very low interest from stakeholders, including the local community. NGO3 and c1 also pointed out that local people often know very little about forest management and, as such, are reluctant to engage with those who do, or to become involved in any sort of forest management initiative. C1 also noted that: *there is a lot of apathy in communities these days so hard to get people involved or even to vote on community matters.* P1 further argued that, while many locals often refrained from any form of participation in management (e.g. public meetings), an oddball minority were often highly vocal and disruptive, which often led to the views of less vocal community members being unheard. NGO2 also noted that, in relation to their estate, actually identifying and assessing the views of their stakeholders was difficult, given that many recreational users of their estate lived outwith its borders.

8.5.2 Theme 5 opportunities: Gaining public support – developing social sustainability

8.5.2.1 Public engagement for public support

Despite the resistance to public participation in management apparent from the constraints discussed previously, many also recognized that allowing local communities to comment on management had considerable potential benefits in terms of lessening public pressure on management [p1, p2, p5, NGO1, FCS 1/2]. P5 noted, for example, that public pressure usually arose from people feeling uncomfortable or wary of an estate's management – often as a result of a lack of awareness of the estate's objectives and practices. Giving the public an opportunity to engage with the estate and develop a greater understanding of the intricacies of forest management was often seen as a key way to lessen pressure and gain support from local communities.

The main mechanism whereby estate managers were currently interacting with local communities in the region appeared to be through community councils. Some estates had staff members on their local community council, for example, or at least regularly liaised with them [p1, p3, p10]. As p1 pointed out, recent policy developments [including land reform legislation] had essentially empowered communities, so that keeping people on board through developing awareness and consulting people was essential to ensure management was socially sustainable (see Quote Box 8:4).

Quote Box 8:4 The importance of local community consultation in forest management in gaining public support

> we can't get permission, we keep on getting blocked, but suddenly community councils are flavour of the month, so if we get the local community council to endorse our business endeavours then there's very much greater chance of getting success [p3]
>
> management of the forest here wouldn't be viable without grant support and grants come from the tax payers I mean these are the people who are funding it, if some politician gets up on his hind legs and says why are we supporting all these rich landowners that can well afford to do this by themselves blah blah cut grants blah then we're in deep trouble, you know we've got to keep these people on board [p1]
>
> A key lesson we're learning on the public side is that you have to tell people about what you're doing because unless you do that you're not going to have that public support [FCS2]

NGO1 argued that, while the effects of community engagement may not seem apparent to many forest managers, this was because the outcome of such processes was difficult to measure. NGO1 argued, in this regard, that the aim of public engagement should be to minimize the potential for future management-community conflict through pre-empting future conflicts and resolving them early on. The effects were therefore likely to be long-term and subtle, in that the absence of conflict itself (something which appeared to be occurring on some estates anyway) was the outcome of successful public engagement.

A further area which was strongly related to issue of participation and garnering public support was that of community woodlands i.e., where local communities partly or wholly manage a section of forest either through direct purchase or agreement with the landowner. The response to the concept of community woodlands was mixed, with some arguing that few current community woodland initiatives were sustainable in the long term as they survived wholly on public funding. However, some [p5, p8 p10] were supportive of community woodlands, stating that there was potential for community woodland development on their estates (although this was usually seen as necessitating a purchase of land by the community).

8.6 Theme 6: Unpredictability and long-term forest resource resilience

This is perhaps one of the broadest and most crucial of all the six themes. From a constraints perspective, it is concerned with unpredictability and inconsistency relating to natural, political, and even management systems. Many respondents stressed the need for a longer-term perspective and the development of resilient well-managed resource to combat the unpredictability of natural systems; inconsistencies in policies, management and ownership situations; and issues of market availability.

8.6.1 Theme 6 Constraints: Unpredictability and inconsistency in social-ecological systems

8.6.1.1 Sub-theme 6A The unpredictable nature of natural systems

Respondents repeatedly referred to the importance of recognizing the potential influence of natural factors in terms of achieving long-term objectives:

natural factors will be the biggest single driver simply because if you try and run to the market, you're not going to, you're chasing a ghost, so you've really got to say, up here, well we can treat this as a supermarket, we can push things forward a couple of years, we can hold things back a couple of years, but basically we've got to go with what nature's doing, we can't plan and organize things without regard to that [NGO1]

Soil type, drainage, exposure, and climate in particular, were referred to as constraining the type of silviculture (in terms of species choice and stand structure) which could be practiced on a site. As p1 noted, such factors directly influenced stand stability and were seen as a constraint within management:

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stand stability basically sort of determines, if it's Sitka spruce on a wet site then we probably can't do any sort of clever silviculture so clearfell, if it's Scots Pine, Larch etc. on drier sites then we will use some form of continuous cover [p1]

The key issue raised in relation to natural factors, however, was their unpredictability. NGO1 pointed out, for example, that because their forest was rather exposed, wind blow impacts required that long-term felling and re-stocking plans be frequently reviewed. The impacts of wind were also seen as being potentially exacerbated by climate change, due to the possibility of increased numbers of extreme weather events. Climate change was repeatedly raised as being of concern and particularly difficult to manage for, due to the unpredictable nature of its potential impacts:

we don't know which way the climate's going, if we get much colder in 50 years time there might not be a tree left on the estate because you know, we're into a mini ice age and the trees just can't grow you know, or we could be growing pine up here [at higher elevations], *because in April instead of sort of shivering in fleeces we're walking around in shorts* [NGO1]

if climate change means that the life cycle of an invertebrate, say a moth caterpillar, changes and its emergence time changes and if Capercaillie hatching is traditionally linked to that hatching of invertebrate food, if there's a mismatch and a mis-synchronisation of those two, then it makes it completely stuff the whole year's caper productivity. So there are things like that, the kind of subtle changes, not the obvious changes of the melting of the snow on the high tops [NGO3]

As SNH2 pointed out, less snow and temperature increases could allow regeneration at higher altitudes; however, forest expansion at higher elevations could also mean the loss of relatively rare sub-alpine habitats. A/c3 also argued that a decrease in summer precipitation could negatively impact on spruce plantations.

Some argued that the current emphasis in policy on promoting CCF systems (see Section 2.2.1), combined with climate change, could increase unpredictability even further, particularly in terms of growth rates and timber quality. P10, p1, p4, p6 and a/c3 all argued that using natural regeneration as the main method of re-stocking was unreliable:

it's a lot of risk I suppose in natural regen, you don't know if it's going to regen or not, or it might regen 10,000 trees per hectare or something. So we tend to replant, we know what we've got, we know what we've got to manage and we're getting the species that we want [p4]

While some [p1, p2 p10] felt that natural regeneration had a definite place in Scottish forestry, particularly in locations where timber was a secondary objective, it was also recognized as a much slower way of establishing trees. This slow establishment speed, when combined with the unpredictable outcome in terms of timber quality, was seen as potentially affecting (timber) market supply and therefore income from forestry [p1, p4, p6, p10, a/c3]:

Doing that [restocking by regeneration] at high elevations on non-timber crops is not an issue, but doing it on a wider area on productive ground where re-stocking is in marginal situations [where species may not be as well suited to site] you can end up with very poor quality crops. [a/c3]

Re-stocking quality has improved with [as a result of the] *SFGS, but people are now gonna go for less intensive re-stocking and an increasing reliance on CCF systems which can work well in UK, but also can fail spectacularly and this could have a significant impact on the market in terms of timber supply in the medium to long term* [a/c 3]

FCS2 also agreed that re-stocking by natural regeneration led to more unpredictable results, noting that utilising a CCF approach currently meant a greater income from the grant system and that, with a good level of forestry skills, viable timber production was possible under suitable conditions. A further issue with CCF raised by respondents was the potential impacts of various 'pest' species. Red deer were usually seen as the key species in terms of impacts on

regeneration, although deer were never directly referred to as pests, due to their biodiversity and commercial sporting values. Rabbits and hares were seen as pests, however, with NGO1 arguing that, in sufficient numbers, these species had just as high a capacity to inhibit regeneration as red deer.

A further issue sometimes raised as a natural constraint was forest fires. Discussion showed, however, that most felt fire was actually a visitor management issue, with fires usually resulting from visitor carelessness rather than natural factors. Fire has been discussed in theme 1 within recreation-forest conflicts. Forest fires were seen as highly unpredictable, however, in terms of both where and when they were likely to occur and where they would spread to once in progress. Once lit, the progress of a fire was also seen as being linked to a range of natural factors i.e. rainfall, soil moisture, tree species, and forest structure.

8.6.1.2 Sub-theme 6B: Political unpredictability and inconsistency

This sub-theme is centred on the argument that inconsistent policy direction and implementation negatively affect forest management and expansion. Management support (grant) systems were particularly highlighted as inconsistent, which, when combined with a high perceived frequency of change in the regulatory framework, was seen as leading to feelings of insecurity and a declining interest in forestry/forest expansion among landowners. A repeatedly raised issue was that forest management was a slow, long-term system (with an average rotation taking 30-60 years or more) while national politics (seen as the fundamental influence on forest policy) was a rapidly changing short-term system. This apparent 'mis-match' was seen as leading to a lack of consistent support and the development of even greater uncertainty for long-term forest management.

Many respondents [a/c3, p1, p2, p3, p4, p7, p8 NGO1] argued that regulatory and support mechanisms for forest management changed rapidly, which led to increased insecurity in long-term planning:

I've been involved in forestry for 25 years and it's completely changed in 25 years, you know when I was a young forester it was all about growing Sitka and now that's about the last thing it's about, you know. I mean there's been a complete turnaround [p4]

Government agencies were particularly criticized for lacking consistent long-term aims, which was seen as a result of the unpredictability of politics generally. P1 noted, for example, how his attempts to develop a LTFP were being stalled due to delays in the development of a management plan by SNH for the NNR on his site. While much of the widespread change in policy direction in recent decades was seen as positive, it was also perceived as having created a culture of uncertainty among managers and landowners in terms of future policy developments:

you just wonder what's coming next, you've got this Water Framework which is still unexplained to me......what effect does that have on say things like, I mean if the river Dee does become an SPA and somebody says well you can only fell so much of the catchment in any one year, well you tell us which estate? I've got my plans formulated which revolve around the financial requirements of the estate and the balance of the age classes and a whole lot of other things, so I may have a period within which for the next 5 years I'm gonna sell more but what happens if someone from the Water Board comes along and says oh no Deeside's exceeded its' quota of selling we can't have it, how do we solve that ? [p1]

Potential regulatory changes were therefore often seen as a threat to productive forestry, with such uncertainty also perceived as a discouragement to investment in forestry/forest expansion generally:

we're running very hard for what we're getting with absolutely no security that forestry, tomorrow the government could say oh you know it looks nice, you planted a nice wood can't fell it, compensation ? that's your problem mate, so I mean we really are at a point where very few people will invest in forestry in the Highlands as a commercial investment [p3]

Some respondents (a/c3, p5) noted that, with the development of the Scottish Forestry Strategy, policy appeared to be developing more consistently. However, constant policy reviews and changes to implementation systems remained an issue:

Policies may be reasonably consistent but uncertainty is raised by the review process and people are always sitting back and waiting on grant schemes. The more folk sit back and think about it the less gets done [a/c3]

Private and NGO respondents also argued that poor management of grant scheme funds in recent years, and the subsequent premature closure of the SFGS, had reflected badly on the SE and FCS and led to further feelings of insecurity among forest owners and managers [a/c1/2, NGO1/3, p1, p3]. One respondent from a community-managed initiative also stated that, as government funding was always linked to political aims and politics was constantly changing, it was an inherently insecure and inconsistent policy mechanism [c1].

6B (ii) Politics versus long-term forest planning – a temporal mis-match ?

A key argument raised within the political inconsistency sub-theme was that forest management (a long-term system requiring high consistency) was ill-suited to being affected or

controlled by national government, which was seen as a shorter-term and more inconsistent system:

we always used to say when we plant a tree, when we plant forestry, we're looking at an investment of 80 years, they [the government] *change their policy every 18 months, their forest policy, how can you manage an 80 year investment if you change your policy every 18 months, you can't, crazy !* [p3]

This key issue appeared as one of a conflict of 'temporal viewpoints', with foresters arguing that taking a long-term view often necessitated compromising certain objectives in the short-term, whereas agencies (particularly SNH) were often seen as being uncompromising and restricted to a more short-term view:

....it's a very simplistic thing to say well if you fell that now it will have an adverse impact on squirrel, well it may do, but it'll have less of an impact if you do that now than if you do nothing over the next 20 years, and that's what is difficult to try and get across, you're looking at this now, but the forester is looking at this to a large extent over a much, much longer time period and that's one of the things it is very difficult for foresters to relate to, we're looking and saying ok it's the Battle of the Somme, it does look disgusting for the next two or three years but then you get another crop in there [a/c3]

In practice, such apparently inconsistent policy direction and implementation sometimes appeared to be influencing the temporal viewpoint of foresters themselves and even acting against long-term planning measures. P1, p4, p7 and p8, for example, all stated that there was little point in formulating long-term plans, as the support systems upon which they would be based were inherently unreliable.

instead of foresters having a good kind of natural feel for what they wanted to do and thinking well yeah the outputs from this is at least 30 years away so I'll think long term you got into issues of balance sheets and jiggling grants and challenge funds and all those kind of things [p4]

NGO1 argued that as many modern long-term forest plans are primarily based on the grant system, they are, in effect, dependent on an unreliable, overly short-term system:

politicians interfere and they say, you know, five years is quite long enough for a scheme to run and in forestry terms......five years is absolutely nothing and that's the biggest single problem with regulation and funding, that the funding is always geared towards meeting a political objective, once they think that political objective has been met or is downgraded the funding can stop, it can change and you're left halfway through, or you've just started a project and quite suddenly the money's not there, you draw up a long-term plan and they then change the grant structure, they change the way the management grant's being paid and suddenly what was supposed to be a viable sustainable plan isn't anymore, five years' hard work disappears [NGO1]

FCS2 argued that a key weakness of the private forestry sector was that they were poorly organised and, as such, an ineffective lobby group (relative to the agricultural sector). FCS2 also pointed out that the low political strength of the private sector further increased uncertainty from both a political and an economic perspective.

8.6.1.3 Sub-theme 6C: Inconsistency in management and ownership

Sub-theme 6C (i) Past management inconsistency – market influence on management

As a/c3 noted, a lack of past management, and particularly thinning, has restricted management options and potential multifunctionality for many forest resources:

[past management] *limits what you can actually do with it now and in the future. If you've got something that is three quarters of the way through a rotation, spruce for example, and you want to do a natural regeneration system on it, well it simply isn't possible to thin it to a stand that makes it stable, to get it to a size*

that allows you to get the coning and the crown depth that you want because you've gone past that stage, past management has had a very, very significant impact on what you can do with that to meet your objectives and what you can do with it to meet the objectives of the SFS, CCF is a prime example, without stability, thinning and crown development it can't happen, we can try it but often it doesn't work and we need to maintain clearfell as an option [a/c3]

Poor or inconsistent past management was often related to the heavy fellings associated with the heavy market demands of the two world wars and a lack of planting and active management following these felling periods. P10 pointed out, for example, how the forest resource he managed had low structural diversity, with a predominance of younger trees, which was related to both war-time fellings and landowner's stronger interest in sporting land uses than forestry. P2, p6 and NGO1 also noted how a lack of thinning in the past in their forests (due to a weak timber market) meant that thinning now led to increased windblow risk — as many crops had gone beyond the optimum age for a first thinning:

when the crops where coming up to first thin, the market for small roundwood was a contracting one and for economic reasons they [forest management] *held back. If they had thinned, if they'd had regular and subsequent thinnings, A we'd be getting a bigger return from our timber and B we wouldn't have the same windblow problems, because the timber would have become wind firmer* [NGO1]

As p7, p4 and NGO1 argued, placing short-term market demands ahead of long-term silvicultural requirements was a fundamentally flawed approach capable of severely degrading the long-term sustainability of the resource. It was also pointed out that, as much of the establishment of forest plantations in Scotland had been to benefit from tax incentives, owners had often failed to consider access, resulting in many large plantations being simply too inaccessible to act as commercial timber resources [p4, p5].

Estate ownership can often change rapidly, and some respondents felt this could influence forest management consistency, particularly on estates which lacked a written long-term forest plan. Longer-term 'traditional' owners were sometimes seen as having a stronger sense of stewardship towards the land and a greater interest in sustainability than short-term owners, as they had often managed the land for centuries and derived an income from it, and their management was likely to directly affect future generations of their own family. As one long-term landowner stated:

if I make a mistake I live with it all my life and my children do, so one we've got an empathy with the land and secondly we've got forward vision, there are estates that do get bought and sold every few years, those that are there in the longer term do have an empathy with it and they need to make a living [p3]

Shorter-term landowners, and particularly those whose estate purchase were primarily for personal recreation and investment reasons (as opposed to productive land use), were seen as sometimes having less involvement in estate management and less empathy with the land and understanding of sustainable management generally. A/c3 and p3 argued that long-term owners were in decline, with estates appearing to be exchanging hands more frequently, a this being linked with a perceived erosion of landowner rights (see theme 4) and associated difficulties in making a sustainable income from the land. NGO1 also pointed out the effects of frequent estate sales are not limited to the estate being sold:

that is the single biggest problem for continuity [estate sales] *you can draw up a long-term plan, but it would only take the neighbouring estate to change their policies and that could have an impact in the medium to long term and I think that is where the discontinuity you can get comes in* [NGO1]

Sub-theme 6C (iii) The rise of the agent — land agents and consultants and management consistency

A further issue connected with ownership inconsistency and bureaucracy (see theme 4) was the widespread use of forest management consultants and land agents to manage estate forests. The use of agents and consultants on short-term contracts was criticized by some on the grounds that it had the potential to negatively affect management continuity. This sub-theme was complex and conflicting views were apparent. Respondents agreed, however, that the increased use of contracted land management in recent decades was a result of the increased complexity of government bureaucracy and the changes in the economics of productive land use over the same period:

from the mid-nineteen eighties onwards working in land management became much more complicated, policy for agricultural management became awfully complicated with a wealth of subsidies and systems, cattle passports and all this kind of thing, so you're sitting their thinking well I've got a big estate to run do I really have the time to amass the specialist skills to do that, same with the forestry systems [SNH2]

Some respondents felt that a dependence on contracted management was leading to a 'divorcing' of management decisions from landowners, with agents or management consultants seen as a barrier between owners and their forests [p5, p2]. As noted in theme 4, landowners often showed a low awareness of policy developments; this was seen as resulting from their use of agents or forest consultants to deal with the complexities of policy incentives and regulations.

Some respondents did argue that the use of contracted forest management had considerable benefits and that no distinct connection between poor continuity and contracted management could be made [NGO2, p11, a/c1/2/3]. NGO1 and p11 argued, in this regard, that changes in landownership were the fundamental issue, rather than the system of management. However, some also argued that the use of contracted management (as opposed to

owner/long-term in-situ management) did lead to greater inconsistency in forest management [p1, p2, p5, SNH2]

everyone comes in with a different set of ideas and you end up simply chopping and changing and never getting anywhere, you're better going in slightly the wrong direction but consistently 'cause after a while if you realize you're in slightly the wrong direction you can do something about it, you know what to do about it where if you see it bouncing all over the place you never know what mistakes you've made or who's made them [p1]

P2 argued that having a full or part-time forest manager leads to greater management continuity, as well as giving stakeholders an automatic figurehead to approach on forest-related matters. SNH2 further argued that long-term managers often developed a strong sense of ownership and stewardship, as well as developing relationships with local people and estate staff. P4 and p7 also argued that the specific use of contracted land agents, as opposed to professional foresters, to manage forest resources was misguided; *as land agents know diddly squat about forestry* [p4]. However, as SNH2 noted, the argument was complex, as many land agency firms had forestry consultants working for them, and a single operating land agent could draw on the much broader resources of the company he or she worked for in relation to specific land management issues. NGO2 also argued that many professional foresters were trained in commercial (timber-oriented) forestry, whereas some agents were more familiar with broader management issues such as deer control, recreation, or conservation-oriented woodland establishment and as such were more suited to the type of forest management/establishment occurring on many estates in the Cairngorms region.

8.6.2   Theme 6 opportunities: Increased resilience and a long-term view

8.6.2.1 Sub-theme 6A: Flexible long-term spatial planning and management

Many, but not all, respondents agreed a key opportunity for combating the unpredictability discussed previously was to enhance long-term planning measures in relation to forest management. P2, p5 and NGO1 argued, in this regard, that the key to successful long-term planning was not to focus on overly specific management targets but, rather, to define strategic estate aims for forest management which are not solely market- or policy-driven and which account for the economic, environmental and social facets of sustainable management. P2 and NGO1 also argued that maintaining a strong element of flexibility in terms of specific year-by-year management (without compromising long-term aims) was crucial to allow for unpredictable elements and help develop more adaptable management. As p1 and p2 argued, a key function of the long-term approach was the maintenance and enhancement of future options, rather than limiting these, with regular thinning regimes in particular seen as key to ensuring a structurally diverse future forest resource, thereby strengthening the ability of forest managers to adapt to short-term socio-political and market demands.

[we need to] *spread our age classes more so we don't have a glut or famine in the future, this means long-term spatial planning and seasonal timing of operations to fit with recreation and wildlife, our current imbalance of age classes drives us a lot in this regard* [p1]

Thinking long-term was therefore seen as leading to greater sustainability, as it allowed potential problems to be identified before they occur (e.g. windthrow, conflict with stakeholders, market fluctuations), thereby allowing management to develop a forest resource which minimizes these potential problems. P7, for example, was engaged in large-scale deer population reduction, as both he and the estate owner felt that, in the future, deer reductions were likely to be legally enforced, whereas reducing them now was voluntary and could take

advantage of available deer control grants. FCS1 also noted how long-term planning allowed for a more integrated approach, as the cross-over areas between objectives could be recognized and management activities developed to achieve multiple benefits in parallel:

if you want to do something now then you may need to spend money, but if you can be patient and wait five years and say the next time we thin we'll take out those non-natives then it can be done at nil costs rather than making a profit [FCS1]

NGO1 also argued that long-term plans were a medium which could be used to clearly highlight the potential benefits of spending money on thinning programs to owners and financial planners. In a long-term planning context, thinning could be justified more as an investment than as an expense. NGO1 also pointed out that, if a written long-term forest plan was in place on an estate, changes in ownership or management personnel were likely to have little impact on forest management continuity as the plan would be the overriding guide to management.

Sub-theme 6A (i) Long Term Forest Plans (LTFPs)

As discussed in section 3.3.3.4, FCS are currently promoting the development of grant-aided LTFPs for privately-owned forests in Scotland. Some respondents [p1, p4, p7, a/c1, NGO1], while often supportive of the idea of long-term planning, were distinctly critical of the current FCS-supported LTFP system. Despite such widespread criticism, 11 of the reviewed properties had FCS-supported LTFPs in place (or being developed), while all five FCS properties had equivalent Forest Design Plans (FDPs). LTFPS are discussed here from an opportunistic perspective, with respondent criticisms of the current system and opportunities for improvement (as apparent from interviewee responses) incorporated within the discussion.

A major criticism of the LTFP process was that it constituted a fragmented approach, with p1, p4 and NGO1 all pointing out that LTFPs focused on felling and re-stocking plans, while excluding key components of forest management such as deer control. NGO2 and p1, argued in this regard, that a key opportunity for improving the process lay in broadening the LTFP system to include a range of other management activities such as deer control and forest expansion (new planting). A perhaps more fundamental criticism of the LTFP process was that these plans were seen as being strongly dependent upon the forestry grants system. As this was seen as unreliable (see section 8.6.1.2), this could make the LTFP system potentially insecure [p7, NGO1]. As a/c3 argued, however, if SE funding of the Scottish forestry sector was more secure as a whole, than the LTFP system could actually allow for enhanced financial security for managers, in that grant incomes could be predicted in the long term. As well as this, as LTFP development involved obtaining FCS approval for all proposed felling and re-stocking operations in advance, bureaucracy was actually considerably lessened in the long term:

if you have identified that stand in your plan as a phase one felling area then when the opportunity arises you can take it so much more quickly because it's been planned for and it's been approved for felling etc....or you can lose your window of opportunity [a/c3]

LTFPs were therefore seen as representing an opportunity to increase the adaptability of management and specifically increase the ability of forest managers to respond to market demands in a planned, controlled way. Certain respondents [p6, p7, a/c1] also argued that the frequent changes in policy mechanisms, combined with the unpredictability arising from natural factors (as highlighted in the constraints section of this theme) meant some respondents felt that a LTFP, incorporating stand-specific management, would be too difficult to adhere to, and would need significant re-writing every few years. However, as a/c3 pointed out, felling and re-stocking measures proposed in LTFPs can be easily altered as plans can be revised and developed every few years to account for change, with this process seen as

considerably easier than initial plan development. The importance of maintaining plan flexibility through careful wording was also emphasized, with a/c3 noting that it is acceptable to put aspirational activities into plans. If the market situation changed, such aspirational activities could become viable (or less unattractive); however, the option is maintained, by listing the activity as one to be carried out if conditions suit [FCS2, a/c3].

A/c3 and p5 both also recognized, a key attribute of the LTFP process is a requirement to focus management on the long-term future of the forest and property in question, thereby identifying potential conflicts at an early stage to ensure early resolution or complete conflict avoidance. Many of the benefits of the LTFP system were therefore only apparent from a longer-term perspective and often relatively subtle, in that a key outcome was often conflict avoidance, a benefit that can be difficult to measure in a tangible way. Some respondents also pointed out that the potential for conflict in forest management was often greatly increased within heavily designated areas such as the Cairngorms, which greatly increased the complexity and cost of LTFP development due to the extra consultation and complex management agreements required. LTFP development grants were criticized, in this regard, for failing to differentiate between LTFPs within and outside heavily-designated areas. A/c3 argued for a greater recognition, in the future, of the significantly higher cost of developing a LTFP in heavily designated locations.

Sub-theme 6A (ii) Whole estate management plans

Government and NGO-owned sites all had detailed management plans (including specific future objectives and a spatial planning element) for their entire sites. It should be noted, however, that on FCS sites these essentially represented LTFPs, as these sites were predominantly forested and, on NGO sites, they usually represented detailed conservation management plans. NGO1 was the exception in this regard, as this site had an integrated land-use management plan. Some private estates [p1, p2, p3 p4 and possibly others] did have brief

business plans which stated the primary objectives of estate management and key focus areas. However, detailed and specific overall management plans (including spatial planning and detailed long-term objectives) appeared to be absent on all private estates. A/c2 argued that the main reason for this was that long-term goals were in the mind of the landowner and:

putting your plans on paper is dangerous, why ? so people can beat you with a stick if your plan doesn't agree with their objectives, have your vision and work towards it – needs to be realistic and altruistic in terms of the betterment of the estate [a/c 2]

Some respondents [p4, p5] agreed, however, that developing whole estate plans could be of benefit from an integration and transparency perspective. Yet p5 noted that overly complex plans would simply be too costly and generally viewed as unnecessary by most owners and estate managers. NGO2 argued, however, that developing a detailed site management plan assisted in focusing management and directing management in the long-term. NGO2 also strongly recommended the use of 'key performance indicators' to measure progress towards objectives over time against agreed targets.

8.6.2.2 Sub-theme 6B: Developing a resilient flexible resource

The value of a long-term planning approach to develop a more resilient and adaptable forest resource has been outlined in the preceding sub-theme. A fundamental aspect of this approach was often stated to be the development of a species-rich and structurally diverse forest resource where species were well matched to site. FCS2 noted, for example, that a diversity of species within a forest, including broadleaved species and riparian woodlands, increased the resistance of the resource to forest fires (due to the creation of natural fire breaks). It was also pointed out that a structurally diverse resource with a range of age classes

in relatively close proximity also increased the resilience of the resource to windthrow [FCS2, NGO1, p1].

FCS2, A/c3 and NGO1 argued that, due to globalization and rapidly changing markets, as well as fluctuating social and environmental conditions (especially climate), the requirement to develop a flexible and resilient forest resource was increasing. Key in this regard was the maintenance of future options; these respondents highlighted the importance of using both native and non-native species in ensuring the development of a forest resource capable of adapting and responding to such unpredictability. FCS2 pointed out there was an undeserved undercurrent against exotic species in Scotland, particularly in sensitive locations like the Cairngorms. As NGO1 argued:

we are too species-poor with regard to pure natives to do it and I think we have to accept from a sustainable point of view, from a biodiversity point of view, and from a animal, sustaining some of the animal populations, there is a need for us to accept that what is classed as a native woodland can contain percentages of spruce, larch and fir, and especially the European species, rather than the American imports as it were. We know from the fossil records that these species were here before the last Ice Age drove them out. So if you like, in some ways you can say they're a re-introduction rather than just a straightforward alien species and some of our wildlife, because they are linked to their continental cousins, we know when it's a mixture, they actually do better in that situation, so I think we do need to look at that as an issue and that I think is an opportunity to say well ok we've introduced these things, but does that matter in the very long term, when we're looking at the overall biodiversity picture, and of course climate change [NGO1]

8.7 Summary of key themes

8.7.1 Fragmentation, conflict and integration at the estate level

Conflicts or 'trade offs' were evident between: forestry and sporting land uses; timber production and conservation/biodiversity; and recreation and conservation/biodiversity. Conflict was often perceived as being related to owner objectives being out of sync with government policy rather than resulting from any internal management issues. The key apparent conflict area related to maintaining high deer numbers for sporting interests in parallel with regenerating native woodland, which requires (at least initially) low deer densities. Strong resistance to policies encouraging the removal of fences in conjunction with woodland regeneration was evident among private landowners, with fences often seen as facilitating mixed land-uses, rather than acting as barriers to integration, although some noted that land-use integration on their land could be improved.

Many felt that having both timber and conservation/biodiversity as objectives meant that timber production would be compromised. Respondents were particularly critical of designations or policies which discouraged forest thinning. The cessation of thinning was seen as leading to a decline in the overall forest functionality, and as such was often criticized on the grounds that future societal demands on forests were unpredictable. Compromise was often seen as necessary across all objectives, to ensure optimal forest multifunctionality overall. Conflicts between recreation and conservation/biodiversity appeared as less prevalent, although visitor numbers were seen as likely to increase in the future, which could increase the associated environmental impacts. Farm-forestry integration was also often considered as weak on the represented landholdings for a variety of reasons including: a traditional separation of these land-uses and a lack of integration at the skills base level; a difference in income timescales in forestry relative to agriculture; and the high age profile of tenant farmers relative to the long-term nature of forestry.

Enhanced communication between staff from different areas of land management was seen as key to minimising conflict and optimising the benefits of management across all groups. It was also argued that an untapped market existed for deer stalking within forests, which had the potential to integrate sporting land-uses with forestry. Opportunities were also raised in relation to farm-forestry integration, including the future development of farm tenant forestry co-operatives. The value of interpretative signage, rangers, and site zoning were also highlighted in relation to recreation related conflicts such as forest fires.

8.7.2 Fragmentary management, conflict and cooperation between landholdings

The key conflict area between landowners related to private estates often requiring (relatively) high deer numbers to support deer stalking activities, while conservation-oriented landholdings (NGO and some government sites) require lower deer numbers, to allow for more 'natural' ecosystem functioning. Conservation-oriented respondents were also critical of the use of fencing, arguing that deer fences negatively affected landscape aesthetics and rare birds, and disrupted natural deer dispersal patterns. These respondents argued for deer control at the catchment, rather than estate level. Many private respondents argued however, that border fences allowed for the peaceful co-existence of forestry and sporting land uses. Fence removal and the widespread reduction of deer populations were often seen as potentially resulting in the loss of a viable and socially beneficial industry (deer stalking).

A number of issues were also apparent in relation to forest policy regionalisation, including that defining a 'Cairngorms region' was difficult from a forestry perspective, particularly as the area exhibited a diverse range of forest types. Existing regional boundaries, such as that of the National Park, were also criticized for being overly subjective and political, rather than based on any physical or biological landscape divisions. The scale at which multifunctional forestry was to be applied was also seen as unclear in policy. The lack of thinning on conservation-

focused estates was sometimes criticized for example, on the basis that such an approach resulted in the under-utilisation of the Cairngorms forest resource as a whole, thereby negatively affecting regional forest multifunctionality (particularly from a timber perspective). Landowner collaboration was recognised as having the potential to combat many of these constraints. Specifically, the potential for access to funding for various forest-related initiatives through partnerships between private landowners and community groups was highlighted. The increased regionalisation of policy mechanisms was also seen as potentially allowing for clarification of regional land-use priorities, while the concept of a regional targeted grant scheme was put forward as a potential delivery mechanism for the CFWF and Cairngorms FHN.

8.7.3 Forestry markets

Poor market accessibility, high haulage and harvesting costs, and the availability of cheap imported timber were seen as representing the primary constraints on Scottish forestry. The low timber prices resulting from these constraints were seen as having led to forestry becoming a less competitive land use and of less interest to landowners from an investment perspective, particularly in terms of timber production. Some criticized FCS on the grounds that they continued to saturate an already weak timber market with low-priced products. Low timber prices were seen as having led to a requirement for economies of scale within UK timber production, resulting in the development of a highly mechanized forestry industry and a decline in the numbers employed in the forestry sector.

Market constraints could also be seen to be affecting the level of active management, and specifically forest thinning, on some estates, due primarily to the lack of markets for certain products of the thinning process (especially small roundwood). The importance of internal or on-site access to forest resources (to extract timber), as an issue, varied widely from site to

site. A fundamental issue was that a decline in timber production was seen as potentially leading to a decline in overall forest multifunctionality, due to the reliance on timber sales to fund active forest management (particularly among private owners) and deliver non-timber forest functions. The opportunities recognized as having the potential to combat these constraints were: increased market diversification, increased localization of timber processing and marketing, and the consideration of smaller-scale harvesting and processing on certain sites to decrease the requirements for large access roads. The expansion of the woodfuel market was also seen as offering particularly high potential for marketing small roundwood. Greater unity within the private forestry sector and a long-term commitment to market supply were also seen as important in creating a private forest sector capable of being more influential in the market place.

8.7.4   Bureaucracy

Policy and planning systems for forestry (and land use generally) were criticized due to their overall complexity, which was seen as leading to a requirement for intensive time-input (and expense) on the part of forest managers, thereby discouraging productive forest management. Private owners, in particular, argued that their rights of tenure have been eroded with increases in bureaucracy in recent years, which made it difficult to engage in productive land use and obtain a living from their land. Furthermore environmentally positive or 'good' forest management was not seen as adequately rewarded within the grant and regulatory system, being subject to the same burden of rules and regulations as less environmentally-oriented management. Policy and planning organisations were also criticized in relation to what was perceived as 'micro-management', whereby conflict occurred within forest/estate management directly as a result of conflict between what were seen as non-integrated land-use policies.

The complexity of policy and planning systems was often attributed to the multiple levels of governance operating in the region, with power seen as being overly divided. A widening of forest management objectives was seen as implying increased legislative requirements, with bureaucracy therefore potentially acting as a constraint on multifunctional management. Forestry was also perceived as being under a greater burden of regulations than other land uses, such as agriculture, and yet, despite this regulatory imbalance, the forestry sector was seen as receiving a much lower proportion of the grant spend than agriculture. Some were also critical of recent land reform legislation, which, through increasing the rights of the public to recreate on privately owned land, decreased opportunities for landowners and forest managers to derive an income from recreation-related initiatives. The key areas seen as offering potential for minimizing the impacts of such complex bureaucracy were greater communication between policy organizations and the development of more integrated land-use policy, as well as a more pragmatic approach to the delivery of policy generally.

8.7.5 Public pressure and public support

Strong public participation within forest management was rare among the sites reviewed for this research, and forest managers and owners generally expressed little interest in involving the general public in management (apart from community-owned/managed initiatives). On these sites which involved the public in management, such involvement was generally low-impact and primarily policy-driven. However, pressure from the general public on forest managers was seen as having increased in recent years, which was associated with an increase in urban-rural migration. This was seen as increasing the potential for public-manager conflict, with urban migrants having different opinions and perceptions of rural living relative to long-established rural residents. A key constraint to participatory management raised by respondents was that rural residents were often somewhat apathetic and showed a low level of interest in engaging with forest managers, whatever the issue. The key opportunity to address

public pressure issues and policy consultation requirements was seen to comprise a transparent approach to forest management and a pro-active approach towards public engagement to ensure greater public awareness of management, thereby ensuring long-term public support for forest management.

8.7.6   Unpredictability and long-term forest resource resilience

The three key areas of constraint on multifunctional forest management within this theme were: the unpredictable nature of 'natural' systems; political unpredictability and inconsistency; and inconsistency in forest management and ownership. Unpredictable natural factors included windthrow; the impacts of 'pest' species, and climate change. The increasing promotion of natural regeneration for re-stocking and forest expansion (as opposed to planting) was also sometimes criticized, as the outcomes of regeneration- based approaches were seen as highly variable and difficult to predict.

The issue of political inconsistency related to a high perceived frequency of change in both grant and regulatory systems for forest management, which was seen as creating feelings of insecurity around forestry among landowners and managers, which in turn affected interest in forestry as a land use (particularly productive forestry). Some argued that inconsistent support and regulation were a product of national politics and forestry being 'mis-matched' as systems, with forest management seen as a long-term system requiring high consistency and politics as a rapidly changing short-term system. Government agencies (particularly SNH) were also criticized for a perceived lack of long-term aims, with respondents often viewing their own viewpoints as being long-term and flexible, while perceiving the viewpoints of agencies as being short-term and uncompromising. Respondents were often sceptical of the value of long-term forest plans, because the grant systems supporting the plans were unreliable. The

weakness of the private forestry sector as a political lobby group was criticized as compounding the issue of inconsistent policy.

Inconsistency issues were also apparent in relation to the ownership and management of forest resources. On certain sites, a lack of past management (often driven by fluctuating market demands), particularly thinning, was seen as having resulted in a poorly diversified forest structure, which restricted future options for forest management. Rapid changes in ownership and inconsistent contractual management was also sometimes associated with forest management inconsistency by respondents. Some respondents also argued that contractual forest management systems had he potential to lead to a divorcing of decisions relating to forest management from the owners of the same resource, as well as a low awareness of policy development among forest owners.

To manage the different types of unpredictability within forest management, a flexible long-term planning approach, with specified strategic long-term management aims, was seen as crucial. A key aspect of such an approach would be that short-term market demands or policy opportunities should not dominate over the long-term requirements of silvicultural systems. An element of flexibility within management plans and frequent plan reviews was seen as necessary to ensure an adaptable approach. A key aspect of such an approach was seen as the planned development of a resilient healthy forest resource (with thinning being a crucial component of management) with a diversity of species (often including non-native species) and age classes to ensure both a high resource resilience to combat unpredictability and strong flexibility of response to policy and market factors.

9 RESULTS SYNTHESIS, DISCUSSION, CONCLUSIONS AND RECOMMENDATIONS

9.1 Forestry in the Cairngorms: Key management drivers and key influences on forest management multifunctionality

9.1.1 The ownership and land-use context for forestry

The GIS and postal survey findings illustrate the importance of private landowners to the future of the Cairngorms forest resource, with the GIS analysis showing that at least 63% of forested land is in private ownership. As the ownership of 13% of the forest area was unknown, the actual figure for private ownership is likely to be closer to 75%, as most land not owned privately was accounted for within the GIS due to the availability of SNH, FCS and NGO ownership data. The level of private forest ownership in the CP area can therefore be considered as significantly higher than the national level of 55-56% (Wightman 2000, Smith 2006), while the level of FCS forest ownership (13%) is significantly lower than the national level of 35%. The GIS results also show that most of the forest expansion in the region over the last 15 years has been on private land. Private owners are therefore the key players in terms of future regional forest expansion, with FCS having significantly decreased their own forest expansion efforts in recent years, as well as committing to decreasing the level of FCS ownership of Scottish forests by 5% by 2050 (SE 2006a). It should be pointed out, however, that future forest expansion or regeneration was also being envisioned at significant scales on the conservation NGO and SNH sites reviewed here.

Landholding size in the region has been shown to be highly variable; however, a large proportion of land (and forests) is owned by a relatively small number of owners. The land-use context for forestry is also variable, with mixed estates being the most common estate type, followed by traditional sporting estates and farms, although, within the survey data, farms represented only a very small minority (1%) of the total represented area. Farm-holdings, which are generally smaller-scale than estates and engaged predominantly in agricultural land uses, therefore appear to have been underrepresented within the survey sample group (particularly in terms of area), and farm tenants were not represented.

As Thomson (2002) notes, 410,000ha of land in the region is classed as agricultural (much of which would be on mixed or sporting estates engaging in agriculture and the rest on purely agricultural landholdings), with this area evenly split between owner-occupiers and farm tenancies. Some 205,000ha of land is therefore under agricultural tenancies, and the views of this group on forest management and expansion are not directly accounted for within this study. As Towers *et al* (2006) note, however, despite accounting for a significant area of Scotland, neither farmers from owner-occupied or tenanted farms appear likely to engage in tree planting or regeneration at significant scales in the near future.

The survey and interviews showed that tourism developments (particularly accommodation) often represented a key income source for landowners. This dependence on tourism-related income is a relatively new and rapidly growing phenomenon and reflects the growing importance of tourism to the economy generally. Employment in distribution and catering in the region, for example, rose from 37 to 50% during the 1980s; and a 1999/2000 survey of the regions landowners showed a 7% increase in tourism and commercial business activities since the previous year (CP 2000). Within the National Park alone, figures from 2003 gave a total visitor figure of 1.4 million and a total visitor spend of £154 million (CNPA 2006c), and at the national level the tourism sector continues to grow annually (Visit Scotland 2007).

The growing emphasis being placed on tourism on private estates is also linked with what Slee (2007) describes as "a discernible diminution in the aggregate economic significance of traditional production-based rural land-uses". Certainly an ongoing (and historical) decline in productive land use was perceived by respondents in this study and, given the designation of the region as a National Park, tourism development is likely to continue to become an even more important income source for many landowners. This research also shows that a number of landowners in the region do not engage in tourism businesses. However, this lack of interest in tourism did not appear to result from these owners preferring 'productive land uses', but rather from their interest in ownership for private recreation, depending on outside sources of income to pay for the estate upkeep, rather than engaging in on-site business activities (Wightman 2000). Tourism development on private estates may favour the (ongoing) development of native woodlands, as opposed to commercial forestry, given the obvious aesthetic appeal of regenerating native woodlands over commercial plantations.

Deer stalking and grouse shooting were common activities within the postal survey sites, and the interviews also reflected this. A 1999-2000 survey of the region's landowners showed continued confidence in the sporting industry (as opposed to a low level of confidence in the future of agriculture) (CP 2000). However, continued pressure from NGOs and regulatory bodies to further reduce deer numbers (see Chapters 4 and 8), and ongoing declines in populations of red grouse across Scotland (Thirgood *et al.* 2000) would seem to imply the future of the sporting industry as a whole is uncertain. This research clearly shows that sporting land uses do appear to be more important, in terms of estate income and personal owner objectives, than forestry activities on the majority of estates in the Cairngorms. However, as the difference is often somewhat marginal (subject to fluctuations in timber markets), any decline in interest in sporting activities on estates could increase interest in both commercial and non-commercial forest management and expansion.

9.1.2   Key drivers of forest management

The opinions of forest managers were a key driver of forest management on sites where they were employed. Economic concerns were also usually of high importance and were usually the primary concern for commercial forest resources, although less than 40% of survey respondents saw their forest resources as sources of income. However, 64% said they engaged in commercial forest management, indicating that while many did not see their forests as sources of income, this did not equate directly with a lack on interest in deriving income from forestry, but was perhaps often more related to market constraints. In general, it was the personal preferences of landowners which appeared most consistently as the key influence on management, with over 90% of survey respondents viewing their forests as being of great personal importance, and interview respondents almost all stating that owner preferences were a major influence on management.

This emphasis on the importance of owner preferences reflects the findings of a survey by Armstrong and Mather (1983), wherein the principal motive for ownership on many Scottish estates was reported to be personal sporting and recreational land uses, with economic concerns often not of great importance. These authors also note that, on estates in long-term ownership (where the land is being passed from generation to generation), the principal motive behind ownership was family continuity which, in estate management, translates to decisions being conservative and responsive to fiscal conditions, but rarely innovative.

However, it is difficult to generalise about private landowners, and a diversity of approaches and drivers was evident among the sites reviewed here. For example, some of the typology sites which had been in very long-term ownership actually exhibited a high level of diversification in estate management - although such diversification was less apparent in forest management. On estates which emphasized sporting land uses, less emphasis was sometimes

placed on economic concerns within forestry - and productive land use generally. The management of other forests within the typology was, however, largely funded from on-site activities and on these sites (some of which had been in very long-term ownership), owners and managers tended to emphasize economic sustainability and timber production (among other objectives).

This compares to the findings of Ziegenspech *et al.* (2004), who showed that among forest owners in the Black Forest, those who had been engaged in income-generating productive land use in the long term (mainly agriculture) were more interested in timber production as a forest management objective. In contrast, landowners working in urban environments and deriving little income from their land were primarily interested in forest management for recreation. As Ziegenspech *et al.* (2004) note, the professional situation of many forest owners in Europe has changed in recent decades, with increasing dependence on outside income sources driving a decline in dependence on rural production (including timber). Owner lifestyle and the underlying motives for ownership are therefore likely to be key drivers of an estate's approach to forest management.

The typology also showed that the management of sites with less commercially viable forests often depended heavily on grants relative to sites with a regular income from timber sales. Due to the high availability of biodiversity and conservation-oriented grants, forest management on such sites was often driven towards these sorts of objectives. Kline *et al.* (2000), in a study of private forest owners in the Pacific Northwest USA, also showed that owners engaging in timber production required higher subsidies to engage in environmentally-oriented management (to leave a non-harvested forest buffer along waterways), than those owners whose primary objective of ownership was personal recreation. The relative importance of economic sustainability in forest management, particularly in relation to timber production, therefore appears to influence the potential effects of incentives on management,

with financially independent timber-producing owners less easily influenced by incentives related to non-timber objectives.

The views of contracted forestry consultants or land agents (where they were used) also appeared to be an important influence on forest management. This influence may also not have been fully accounted for at the regional level, as only a small number of agent/consultant representatives were interviewed. Conservation designations, when present, also influenced management although it was clear that many viewed regulatory mechanisms as simply legal systems which needed to be adhered to rather than an influence on how managers or owners actually think.

Among both private and FCS owners, maintaining overall sustainability was a key driver of forest management. In the case of FCS sites, it could be said that this was essentially a result of government policy; however, on privately-owned sites it is likely that this drive for long-term sustainability was indeed linked with a desire for estate and family continuity. Nevertheless, while both the environmental and economic aspects of sustainability were clearly recognised by private estates, the same could not be said for the social aspect. The views of local communities, for example, were usually not considered as a significant influence by managers from private estates, though they did recognize the growing influence of local community groups.

9.1.3   The influence of landownership on forest management multifunctionality

A direct and consistent link between landownership type and the multifunctionality of forest management was not apparent from this research. Multifunctional SFM was apparent on private, Crown Estate (classed as an NGO for this analysis) and state-owned forest resources, while low-functionality forest management was also evident among private owners, and dual

function management was evident on state and NGO owned resources. Arano and Munn (2006), in a study on the effects of ownership on forest management in the USA, concluded that landowners needed to be classified definitively to provide a clear picture of differences in their behaviour. The same would also appear to apply in the Cairngorms (and Scotland as a whole), in that generalising about different 'types' of landowners, using divisions based on typical tenure systems (private, NGO etc.), is difficult and potentially misleading. Private landowners themselves, for example, have been shown to be highly diverse in terms of both their general estate and forest management objectives, while state owners can be conservation-focused (SNH) or engaged in multifunctional approaches (FCS). The overall motives for estate ownership can also vary considerably and, as stated previously, the land-use context resulting from these owner motivations can be a key influence on forest management.

The length of time a landholding has been in the same ownership (ownership continuity) may also influence forest management. Rapid ownership change, in particular, has been referred to as an issue potentially affecting forest management consistency (Chapter 8). Ownership continuity for private estates in the Deeside area for example, has, in general, been higher than in Strathspey, with over a third of the area in the same ownership for the last 500 years (Callander 1987). In this respect, it has often been estate finances which have dictated woodland management in Deeside, with fellings coinciding with times of financial difficulty on most estates (Callander and Mackenzie 1991). This ownership continuity has also driven a more traditional approach to forest management, which has assured a long-term sympathy towards the planting of Scots Pine in the area, while many of the recent changes of ownership in Strathspey have resulted in numerous plantations of exotic conifers (Callander and Mackenzie 1991). The security of tenure in this respect, in terms of forest management objectives, is often as important as the nature of tenure itself, a point supported by studies of property regimes in Europe (Gluck 2000).

In general, management objectives relating to public benefits did appear more common on NGO-, community- and state-owned sites than on private estates. Public involvement in management was relatively low across all but the community owned/managed sites, however, although public participation was ranked as a primary objective on most FCS sites. Furthermore, the FCS are involved with numerous community woodland initiatives (at varying levels of community involvement and control) in Scotland, none of which were reviewed within this research (FC 2001b). However, incorporating objectives relating to public benefits into forest management does not imply multifunctionality (as defined in Chapter 2), with SNH and conservation NGO sites delivering high public benefits, but not engaging in productive forestry. Certain FCS sites were, however, clearly attempting to deliver objectives relating to timber production and mixed public benefits. While interest in involving the public in management was low among private forest managers/owners, private forest management was often delivering high public benefit, with conservation and biodiversity, for example, the most common primary objective among both survey and interview respondents.

Private estates within the 1A typology category also all had recreation and education/interpretation as forest management objectives (secondary objectives in some cases) and high levels of recreation were apparent on all 1A sites. It would appear, therefore, that the delivery of strong public benefits is possible on private land and in conjunction with timber production. Macmillan (2005) argues, in this regard, that private or NGO landowners may be able to deliver the same public benefits as the FC (particularly given existing incentives and regulations), but at much less cost to the taxpayer, noting that in a 2004 parliamentary debate the net public expenditure cost of state forest management was stated as £38 per hectare compared with £4 per hectare for the private sector. Macmillan (2005) argues that the functioning of the FC is compromised due to being captured by environmental groups, as well as having over-committed the future timber supply from its land to the large-scale processing industry at the expense of local timber industries and rural communities.

The land-use context for forestry on private estates is also relatively mixed and, historically, the interest of private landowners in sporting land uses (along with a lack of interest in commercial silviculture) is often seen as having ensured that forest management on private estates has always maintained a degree of multifunctionality, despite the FC promoting a mono-functional approach to forest management before 1980 (Slee 2007). The current approach of FCS is, of course, very different and aims to deliver a diverse range of forest management objectives. The degree of integration between forestry and other land uses which FCS can achieve may, however, be limited by the fact that the organisation owns predominantly forested land (as opposed to agricultural or sporting land).

Assessing management on NGO sites was complicated by the fact that the Crown Estate (classed here as an NGO), did not fit the normal NGO pattern. The other two NGOs represented within the typology both derived funding from large public memberships and were clearly focused on management for conservation and biodiversity. The Crown estate, however, does not have a public membership, is managed by an independent (non-governmental) board, and pays all profits made from the management of Crown Estate lands directly to the Exchequer - it is a unique form of landownership (www.thecrownestate.co.uk). The management objectives for Crown Estate land are also broader than those of conservation NGOs. Within NGOs generally, land management is also not always solely conservation-oriented, with the Royal Scottish Forestry Society (RSFS) managing their Cashel Forest site for multiple objectives for example (Netty Horn, Site manager, Pers. Comm.). The NGO category of landownership therefore requires clear definition and differentiation if it is to be useful in any future comparative study of landownership.

While the forest management on conservation NGO sites was not typically multifunctional (although one NGO was engaging in sporting land uses in its forest), a high level of public benefits was being delivered on both sites. Furthermore, both sites had large areas of rare woodland habitats and other valuable habitat types. From a regional multifunctionality

perspective, these sites could be seen as constituting key biological reserves of 'non-interference' within a wider multifunctional forest-habitat mosaic landscape. However, the lack of thinning (apart from thinning to create deadwood) on these sites could also be seen as compromising the future functionality of large areas of the region's forest resources. Conservation NGOS have also received criticism on the grounds that their conservation focused management can affect an area's capacity for rural development (Mitchell 1999). Taylor (2007) argues, however, that local economic benefits from conservation NGO ownership are considerable, with the RSPB Abernethy site attracting over 70,000 visitors per annum, with an average local spend of £44 per person for staying visitors and £4 for day-trippers, contributing to a total spend for visitors in 1996 of £5.8 million, with £1.7 million seen as attributable to the presence of the reserve itself.

The community-owned sites within the typology appeared to be aspiring to multifunctional forest management, although this was constrained by a lack of rights to timber and the importance of conservation objectives. Gluck (2002) argues that common property regimes constitute a promising ownership format for the implementation of multipurpose forestry as they are less dependent on state intervention to guarantee the delivery of public goods. However, these property regimes also tend to be slow to adapt to change and are often very dependent on public funding, which can affect an institution's ability to sustain itself over time (Gluck 2002). This would indeed appear to be the case in the Cairngorms, with both of the community sites being open to timber production and the delivery of public goods, despite the lack of any sustainable income and the high reliance on state funding. This reflects the Scottish situation as a whole, with Towers *et al.* (2006) describing the key issue facing community woodlands in Scotland in the future as the need to generate operating capital and decrease reliance on public funding.

9.1.4   The influence of forest species and structural diversity on forest management multifunctionality

A much clearer link was apparent between forest functionality and forest structural and species diversity. The typology and the thematic analysis clearly illustrated that structural diversity was particularly important to multifunctionality, with long-term thinning programs seen as key to developing mixed age classes, diversifying habitats, enhancing biodiversity, and delivering high-quality timber - thereby contributing to economic sustainability within forest management. It was on these grounds that some respondents criticised policies and management regimes (primarily those of conservation NGOs) which discouraged thinning[1] and promoted 'natural processes' approaches (often to encourage deadwood creation), as the cessation of thinning was seen as potentially leading to a decline in forest functionality.

The argument revolved around the idea that the optimal integrated delivery of multiple forest functions requires compromise in relation to the delivery of single objectives or functions. Conservation-focused management systems were regarded as uncompromising in this regard. As Hodge and Peterken (1998) note, however, timber felling and extraction processes have, in the past, severely reduced deadwood volumes in many British forests, which has serious implications for biodiversity and ecosystem health. A complete cessation of silvicultural activities does not appear as necessary to address this trend; Hodge and Peterken (1998) outline management strategies for British forests which allow for timber production and deadwood creation in parallel.

Private estate respondents also argued that the income from silvicultural (timber production) activities allowed for management of the forest environment and all its functions in perpetuity. As Kennedy and Koch (2004) note, both US and European forestry students of the 1950s and

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[1] The 'natural processes' approach adopted on conservation NGO and SNH sites (see Chapter 7) did sometimes incorporate thinning or 'tree topping'. However, this was explicitly for deadwood creation rather than for silvicultural (timber production) reasons.

1960s were commonly taught that, if forests were efficiently managed for sustainable timber production, other forest functions would take care of themselves – this is known as 'wake theory'. This is perhaps reflected somewhat in the attitude of forest managers and owners in the Cairngorms (particularly those from private estates). However, Kennedy and Koch (2004) are strongly critical of 'wake theory', arguing that such an approach leads forest managers to undervalue the importance of dynamic social values in management. Efficient silviculture, while clearly linked with economic sustainability in forest management, cannot necessarily fully account for the potential social benefits of forest management – which requires management which specifically targets a range of objectives and assesses local community and wider social values.

However, species and structural factors remain, at the very least, a fundamental component of a broader approach to forestry which aims to deliver private and public benefits in parallel. As outlined in section 2.2.1, the high structural diversity developed through a CCF approach appears to be particularly compatible with multifunctional forestry. However, regeneration as a primary re-stocking mechanism is seen as slow, unpredictable, and inefficient, implying that CCF can either require compromise in relation to certain forest functions or is incompatible with forest management in some locations. Continued diversity of species and structure appears to remain key to the delivery of multiple functions, however, whether the principles of CCF are adhered to rigidly or not. This is confirmed by authors such as Spies (1998), who notes that forest structure is both a key product and driver of ecosystem processes and biodiversity, and that retaining high forest functionality requires careful consideration of forest structure. Forest stands managed for high species and structural diversity (in European temperate forests) have also been recognised as exhibiting greater resistance to pest species, storm events, high snowfall and drought (Spiecker 2003, Nyland 2003). Spiecker (2003) argues that, as a result, these stands can deliver greater economic and social benefits in a sustainable manner than less diverse stands.

9.1.5 The influence of forest scale on forest management and the potential for forest expansion in the Cairngorms

A link was also apparent between the size (area) of forest resources and functionality within the survey data, and, to a lesser extent, the typology, illustrating that among private owners, larger forests tended to have more management objectives. Schlaepfer *et al.* (2002) suggest that the smaller the scale of forest management, the more likely that land-use specialisation will occur, as it becomes increasingly difficult to extract a full range of goods and services from a diminishing area. As apparent from the constraints analysis, viable timber production at small scales is also difficult due to the current high degree of mechanisation in UK forestry. However, it was management objectives relating to public benefits (excluding biodiversity and conservation) which appeared to be more commonly absent from smaller sites – particularly recreation, interpretation and public involvement.

The fact that such objectives appeared to be more common on larger forest sites may indicate that a broader range of forest management objectives is likely to be considered on sites where forestry is of greater significance as a land use overall, with the findings from the typology supporting this view. Larger forests may not, of course, always mean greater management functionality, with conservation-oriented sites, for example, obviously focused on specific forest functions. Forest management efficiency may also be affected by scale, in that efficiency at larger scales may decrease as organisational complexity increases. Macmillan (2005) for example, criticises the FC (the largest single forest owner in the UK by far) in relation to how bureaucratic and inefficient their management has become during the organisation's development.

Interest in forest expansion was relatively low among most of the sites within the typology, apart from theme 2 sites and the conservation-focussed sites. However, over half of the

survey respondents expressed interest in expanding their forest resource. This imbalance between the typology sites and survey respondents may be related to the fact that most of the sites within the typology represented estates where forestry was a long-established land-use. Respondents for these sites often stated that they had reached the maximum or near-maximum extent of forest cover, due to the value of other estate land-uses, and further expansion on commercial grounds was rarely considered a wise investment given current low timber prices. The postal survey group represented a broader cross section of landowners and included many who did not engage in commercial forest management. The interest in future expansion by these respondents was therefore likely to be predominantly linked with expansion for biodiversity rather than silvicultural reasons. This reflected management drivers on the sites within the typology which expressed interest in forest expansion - habitat development and access to biodiversity-related grants – rather than commercial forestry (timber production) reasons.

The Cairngorms National Park Plan and SFS both have continued forest expansion as an objective, with both promoting multifunctional forestry, further woodland habitat creation, and the further development of productive forestry (CNPA 2007, SE 2006a). It would appear that, in the Cairngorms at least, future expansion is likely to be predominantly for biodiversity and conservation reasons, as opposed to expansion of commercial forestry resources. In fact, interest in expansion in general appears as somewhat low (for a variety of reasons), and encouraging future forest expansion for both commercial and non-commercial reasons may sometimes prove difficult in certain locations (particularly given the perceived multiple values of moorland habitats). Nevertheless, the interest across both interview and survey respondents in the Cairngorms FHN concept, and the strong emphasis on biodiversity as a forest management objective generally suggest that policy support mechanisms for biodiversity-related expansion are likely to continue to be reasonably well received. This would appear to conflict with the views of landowners nationally, with Towers *et al.* (2006) reporting that large private landowners in Scotland are likely to be more interested in forest expansion for high-

quality timber rather than for multifunctional forestry. This perhaps highlights the distinctiveness of the Cairngorms region, as well as emphasizing the fact that the region's landowners (either from policy pressures or personal motives) clearly recognize the importance and value of the region's woodland habitats.

9.2 Key Issues for the future development of multifunctional forestry in the Cairngorms

9.2.1 Land-use conflicts, fragmentary land management and future integration opportunities

Chapter 8 showed that conflicts between forestry and other land uses were apparent within and between estates, with the main issues related to management for sporting land uses requiring high deer numbers and the use of fencing, and management for 'natural processes' and native woodland restoration initiatives requiring low deer numbers and often encouraging the removal of fences. Many viewed such conflicts as often being policy- rather than owner- or staff-driven; however, as respondents were all either owners or site staff, it is possible that the idea of owner- or staff-driven conflict may have been downplayed. However, many did admit that land use integration on and between their properties could be improved, with farm-forestry integration often seen as particularly weak, an issue reflected in the survey data.

9.2.1.1 Deer and forests – an integrated future ?

The 'fencing versus culling' argument, with regard to deer control, is complex and it appears likely that 'best fit' solutions to problems of deer impacts on forestry will vary between sites. As Warren (2002a) points out, deer fences are often ineffective anyway, with any weaknesses

in fences rapidly exploited by deer in search of food and shelter, resulting in deer populations having established themselves in forest plantations throughout Scotland. However, deer fencing continues to be used at large scales on many landholdings in the Cairngorms (SNH 2001b). The continued use of fencing could also be seen as a step backwards, towards the multiple use forestry approaches apparent in the USA in the 1960s, where different forest functions were delivered by 'function segregation', rather than integration (section 2.1.2). In general, the use of fencing appears to be receiving increasing criticism, particularly in relation to native woodlands, not least due to the perceived aesthetic impacts of fences (Mc Morran *et al.* 2007), associations with Capercaillie mortalities (Baines and Summers 1997), and the fact that fences restrict the natural movements of deer (SNH 2001b). Furthermore, as Gill *et al.* (2000) point out, deer fencing is expensive, with fencing costs reducing profits from forestry by as much as 30%.

However, as Warren (2002a) notes, current 'best forestry practice' promotes the use of small area woodland establishment, diversification of forest structure, and mixed species woodlands – all of which exacerbate the risk of deer damage. Forestry practice is therefore not proceeding in a direction which would appear to suit the complete abandonment of deer fencing. Deer impacts and high deer densities continue to impact significantly on woodland establishment and regeneration processes in the Cairngorms and Scotland as a whole (Miller *et al.* 1998, Staines and Balharry 2002). Expansion and enhancement of multifunctional forestry in the Cairngorms will, therefore, clearly require the further control of deer populations in one way or another. What is also clear from the results presented here, however, is that deer continue to be considered by many landowners as assets.

The continuing existence of sporting estates and the requirement (or desire) of their owners for deer densities higher than densities compatible with woodland regeneration therefore remains a major constraint to the future development of integrated multifunctional forestry in the region. It is difficult to identify the 'perfect' deer density for forest establishment and

woodland regeneration, as impacts (regardless of density) vary with season and type of deer. However, Staines *et al.* (1995) suggest that red deer densities of 4-7/100ha are compatible with regeneration in Scots pinewoods. This can be compared with an average density of 11.9 red deer /100ha across all 37 DCS survey areas for Scotland (Hunt, 2003). However, densities across these search areas vary greatly, with 2005 deer counts showing densities of 30.9 red deer/100ha on areas of Balmoral estate, 46.7 on areas of Invercauld, and almost 100 in certain areas within the Cairngorms region (DCS 2005). As pressure increases to further integrate forestry with other land uses and remove fences, conflicts between sporting interests and forestry interests in certain areas of the Cairngorms may therefore intensify before they are resolved. Clearly, a degree of compromise will be necessary if all relevant stakeholders are to be, at least partially, satisfied in the future.

From a deer management perspective, it is apparent from Chapter 8 that, despite deer fencing 'negatives', fences remain an important tool for many owners/managers to allow for mixed land uses on their estates in a conflict-free manner. This raises the question as to whether deer fencing is a genuine barrier to land use integration or, as perceived by many managers and owners, a tool which facilitates multi-purpose land use at the estate (and wider landscape) level. Recent joint agency statements in Scotland (see section 3.2.5.2) in no way attempt to obliterate the use of fencing, preferring to encourage consideration of each case (site) separately and the development of management regimes which attempt to account for both public and private interests. From multiple perspectives, the use of deer fencing therefore often remains a viable and effective opportunity within a multifunctional approach to forest management.

However, the deer fencing issue relates less to forestry as a whole, than to the management and establishment of native woodlands specifically. Given the high proportion of native woodland in the Cairngorms this is an issue of major regional significance. If native woodlands are to be allowed to regenerate over large areas, deer need to be controlled, either

through exclusion using fences or intensive culling both within, and in the vicinity of, native woodlands. Fenced exclosures can allow for the uninhibited development of native woodland (either planted or naturally regenerated) and, despite a preference for intensive culling on the part of SNH, the NTS and the RSPB, organisations such as Trees for Life in Scotland (an organisation which heavily emphasizes a 'natural processes' approach) advocate the use of fencing in native woodland establishment as it limits culling requirements and mitigates the (often uncontrollable) potential impacts from high deer numbers on surrounding estates (Featherstone 1997).

The intensive culling approaches of SNH, the NTS, and the RSPB have resulted in considerable reductions in deer densities in specific areas within the Cairngorms with associated environmental benefits, including increased woodland regeneration levels (Putman 2003, NTS 2002). As Putman (2003) notes, however, in relation to Creag Meagaidh, the percentage of regenerating tree stems recorded as damaged actually increased from 1988 to 2000, despite the declines in overall deer numbers across the site, as deer density does not always correlate strongly with damage levels. Ratcliffe (1998) also points out that, even when deer numbers are reduced to levels low enough to allow woodland regeneration, intensive culling must also continue in the long-term if these deer densities are to be maintained.

The culling approach is therefore both involved and time-consuming. Furthermore, the sites primarily involved in the instigation of culling and fence removal (with the exception of some FCS sites/areas) are those described within this research as dual function management sites. Mixed private estates and the Crown Estate's Glenlivet site were concerned with a wider range of management objectives (within both forest management and wider estate management) and a blanket culling approach was not seen as compatible with multi-objective management. However, continued use of fencing does not solve the key problem – deer populations existing at levels beyond the natural carrying capacity of their immediate environments in many areas in the Cairngorms and Scotland as a whole. Certainly, a number of private estates

continue to be put under pressure by the DCS to reduce their deer densities in an effort to control ongoing environmental impacts associated with high deer numbers (Macmillan 2004).

In the future, an opportunistic and pragmatic compromise is likely to involve the increased use of both fencing and culling in parallel. Ratcliffe (1998) points out that, while the use of large-scale estate or forest perimeter fencing is no longer generally acceptable, fencing continues to play an important role in protecting regenerating woodland areas. Rotating the use of much smaller-scale 'pocket' exclosures, depending on where woodland regeneration is occurring (removing the exclosure following development of saplings to a stage where they are less vulnerable to deer damage), could offer considerable potential in this regard to ensure that young regenerated saplings are protected, at least in the early stages of their development (Jarman 2005). Small-scale exclosures imply limited aesthetic impacts and minimal deer movement and bird impacts.

A key issue for the CNPA to resolve in the future is therefore the extent to which their 'sustainable deer management' approach requires deer densities to be reduced both at the site level and across the region as a whole. It is clear from this research that while deer population reductions are set to continue, full integration of deer and forests (i.e. the complete removal of fences) is unlikely across the entire region and seriously impractical in the medium term, due to current estate objectives and the vulnerability of currently regenerating woodlands. Longer-term sporting-forestry integration prospects could be said to be more positive as deer populations are continually falling, but this may have to remain restricted to key areas such as the Cairngorms NNR, even in the longer term. One solution may be a tradable culling 'obligations' system, whereby the Government sets annual cull figures and administers a permit system which allows landowners to trade culling obligations for profit depending on the level of culling they themselves can or wish to carry out (Macmillan 2004).

A further potential opportunity associated with reduced deer populations was raised by one interview respondent – the expansion of the woodland stalking market. A number of respondents did state that deer stalking already occurred in their woodlands, although few were supportive of a wide-scale switch to woodland stalking in the region, as open hill stalking was seen as more lucrative and the traditional form of stalking in Scotland. SNH (2001b) state, in relation to the Cairngorms however, that open hill stalking is being increasingly supplemented by woodland stalking and the pursuit of other woodland game as well as new initiatives such as expedition-style stalking in the remote mountain core. Mason *et al.* (2004) also note that the trophy size and body weight of stags which have access to forested habitats outweigh those of open hill deer, which further increases the value of woodlands in terms of sporting interests. Macmillan (2004) also reports how recent surveys of hunters in the UK have shown that considerable demand exists for non-traditional stalking packages, such as economy hunting packages and hind stalking for less experienced stalkers. Increased interest in hind stalking could have significant environmental benefits, as this has a more direct impact on deer population expansion than stag stalking.

A more radical measure which could potentially assist in lowering deer populations in Scottish forests is the reintroduction of natural predators for deer. Research by Hetherington and Gorman (2007) has shown that current lynx prey (red, roe, sika and fallow deer) densities in Scotland could support some 400 lynx – which in theory would be the fourth largest lynx population in Europe.

9.2.1.2 The potential for farm-forestry integration

Ross and Smith (2001), in an economic and technical study of the Deeside forest area, concluded that stronger land-use integration between forestry and farming was crucial for the realisation of a greater range of benefits from forest management. The research presented here

confirms that farm-forestry integration (or the lack thereof) is a major issue across the Cairngorms region. This is also confirmed, in relation to Scotland as a whole, by Towers *et al.* (2006), who state that woodland establishment remains an economically unattractive option for farmers despite recent declines in agricultural returns - as timber prices have also declined massively in recent years. Furthermore, there is no tradition of woodland establishment on farms in the UK and, while existing grant structures cover the first 15 years of forest management, a large gap remains between the end of the grant payments and forest maturity. The SFS (SE 2006a) envisions that forestry will be fully integrated with other land uses by 2050; however, it seems unclear how this will be fully achieved, particularly given that the SFS also states that in 2050 30% of Scotland's forests will remain in the hands of the FCS, an organisation which engages in very minimal levels of what could be called agricultural activities on its land.

A further issue which relates to tenanted farms is that trees on tenanted land remain the property of the landowner in most cases (unless alternative contracts have been drawn up) and, on most surveyed landholdings, tenants were only very infrequently involved in any form of forestry or woodland management. This is fundamental, particularly given that some 35% of all farms in Scotland are tenanted (Birnie *et al.* 2002) and, in the Cairngorms region, some 50% of all agricultural land is under farm tenancies (Shucksmith 2002). Towers *et al.* (2006) also argue that strong resistance to tree planting is still apparent among many farmers (owner occupiers), largely due to a lack of tradition of woodland planting on farms in Scotland and a perception that planting trees on agricultural land will result in the 'closing down' of that land.

The high level of mechanisation of forestry in the UK and low profit margins also clearly favour large-scale approaches, which disadvantages small-scale landowners, such as farmers, engaging in productive forestry. The development of genuinely productive forestry at small scales on either tenanted or owner-occupied farms in Scotland is therefore likely to continue to encounter considerable barriers. While the integration of farming and forestry has been

recommended within UK policy for decades (see section 3.2), it is only in recent years that such integration has begun to occur. The further establishment of woodlands on agricultural land represents a major opportunity, from both biodiversity and multifunctional forestry perspectives. As Towers *et al.* (2006) conclude, the largest area of land in Scotland potentially available for new woodland development is on land currently used for agricultural purposes. Warren (2002a) also points out that, since the mid 1980s, the barriers between forestry and farming have slowly started to come down for a variety of reasons, including an oversupply of agricultural products and timber deficits and a growing requirement for farm diversification for economic and environmental reasons.

The majority of farm woodland planting has been for amenity, habitat creation and shelter for livestock (Crabtree *et al.* 1997). Timber production at the farm level faces the issue of scale, although group farmer or crofter cooperatives could allow for the development of large-scale timber production at the farm level, bringing associated economies of scale. The new Rural Development Contract (RDC) system (see section 3.3.2.2) also offers support for specific agroforestry measures (Scottish Government 2007), which involve the direct integration of farming and forestry practices at the stand or field level. A key form of agroforestry which is being increasingly recognised and supported in Scotland is the low-intensity grazing of livestock among widely planted trees; as Mayle (1999) notes, such systems can have significant advantages for biodiversity, such as increased floral diversity and the creation of seedling establishment sites for tree species, as well as providing high-quality forage for grazing animals. As Sibbald (2006) shows, agricultural production can be maintained with the introduction of trees on to pasture lands. Given the high prevalence of both agricultural land uses (predominantly low-intensity grazing) and the emphasis on regional woodland expansion in the Cairngorms, the support and promotion of such systems regionally would appear to offer a considerable opportunity.

Finally, a key measure which is also likely to offer considerable scope for narrowing the agriculture-forestry divide is pointed out by Price *et al.* (2002): as the development of training opportunities for farmers relating to all aspects of forestry. As highlighted by many respondents to this study, forestry has for centuries remained the domain of large landowners, which has essentially led to a dearth of forestry skills among the farming community. Training, which could be subsidised by the State and facilitated by FCS or the CNPA, would allow for the breaching of this knowledge gap and the strengthening of confidence among farmers in relation to forestry practices.

9.2.2   Communication, collaborative management and the potential for policy regionalisation

A key opportunity for dealing with many conflicts and integration issues in the region to enhance communication between those involved in managing different land uses on landholdings. Similarly Wolf and Primmer (2006) argue (in relation to multifunctional forest management in Finland) that interaction within and between organisations leads to those involved acquiring new understandings and capabilities, thereby naturally implementing a more multifunctional approach to forest and wider landscape management. This reflects the arguments of Buttoud (2002) presented in section 2.2.3, where increased communication between stakeholders at the level of policy development was seen as resulting in a more optimal multifunctionality derived from communicative action and compromise. Many of the landholdings reviewed here, and particularly heavily diversified estates, could be viewed as 'organisations' with multiple different land uses and management divisions. The practical implication is that regular meetings between land managers and estate 'divisions' (within estates), as well as between estates, are likely to lead to greater (and more optimal) integration between forestry and other land uses without the development of conflicts.

Collaboration between landowners in the region also appeared to be supporting further development of the Cairngorms FHN, though collaborative deer management and joint landowner Capercaillie conservation initiatives. Partnerships between different types of landowner (particularly private and community landowners) were also seen as allowing for greater access to funds for the delivery of environmental and public benefits. Chenevix-Trench (2004) argues, in this regard, that partnerships between NGOs and community groups, in particular, allow the sustainability of land management to be strengthened through embedding management decisions locally. The development of greater unity among private forest owners/managers, in the form of forestry lobby groups or marketing co-operatives, as well as a longer-term unified commitment to consistently supplying timber markets, was also seen as key to developing a private forest sector more influential in both the market place and the policy arena. Van Gossum *et al.* (2005), in a study of forest owners in Belgium, showed that forest owner groups also acted as support mechanisms to private forest owners through facilitating personal contact between owners and knowledge sharing, and that stimulating close-to-nature management (through policy initiatives) was easier among forest owners within owner groups.

A history of partnership-based, landscape-wide initiatives exists in the region, with the CP having been dissolved with the recent establishment of the CNP (Chapter 4). However, no forum or committee currently represents the interests of forestry at the Cairngorms regional level and, while FCS have a strong presence in the region, it is the CNPA which is focused on the area as a recognisable regional entity. Regional Forestry Forums exist in Scotland, and a large part of the Cairngorms region is covered by the Highland Forestry Forum. These regional forums are large and diverse committees, with representatives from a range of relevant (often non-landowning) interests. As existing regional forestry forums include the Cairngorms region (although not with a forum designated specifically and solely for the Cairngorms), it appears unlikely that a separate Cairngorms Forestry Forum will be set up. It is also unclear from the findings reported here as to how such a forum would be received in the

region, or even if one is necessary. What is clear, however, is that forestry cannot be treated in isolation and that future collaborative efforts may need to consider multiple land uses from an integrated perspective, rather than from the perspective of one land use.

Regional Forestry Forums in Scotland represent a diversity of forestry interests and, given existing structures, a multi-stakeholder committee for forestry interests in the Cairngorms might also potentially further complicate the existing bureaucracy affecting the region. However, regional or sub-regional (e.g. Strathspey, Deeside) forest owner cooperatives could present opportunities (particularly for medium and small forest owners) for the further development of multifunctional forest management in the region, through presenting knowledge sharing opportunities (including FHN development opportunities), strengthening funding opportunities, and potentially increasing economies of scale through collective timber harvesting and marketing. As Van Gossum *et al.* (2005) and Brunson *et al.* (1996) note, private forest owner groups are likely to be much more effective if a) they are organised in accordance with the opinions of the owners and b) wood trade remains a protected forest function. If these factors are accounted for, members of such groups do appear to exhibit greater interest in close-to-nature management. Kittredge (2005) recommends that, while government involvement should not be a strong element of forest management cooperatives, government (preferably locally rooted) organisations are often required to 'jump-start' such initiatives. In the Cairngorms, the CNPA (operating in conjunction with FCS) could support forest owner cooperatives by providing meeting spaces and (when necessary) staff with strong public sector knowledge to facilitate awareness of policy opportunities.

9.2.2.1 The potential for regionalised policy approaches in the Cairngorms – targeted grant schemes and reward based incentives

The appropriateness of the further regionalisation of forest policy in the Cairngorms was questioned by respondents partly due to the difficulty in defining the Cairngorms as a region,

particularly from a forestry perspective. However, the establishment of the CNP implies that further policy regionalisation may be inevitable. The development of regional 'Cairngorms specific' support mechanisms will perhaps need to proceed cautiously in this regard, to discourage divisiveness, in terms of disadvantaging certain landowners who consider themselves either within or on the edge of what they perceive as the Cairngorms region. The analysis of constraints also highlighted the fact that the scale at which the concept of multifunctional forestry should be applied in the region is somewhat unclear.

Further forest policy regionalisation was generally seen as allowing for greater clarification of regional land-use policy priorities, and as such could provide a vehicle for further clarifying the scale at which multifunctional forest management is to be practiced in the region. The concept of a targeted grant scheme, to support forest habitat development in specific locations, was strongly supported by both survey and interview respondents. The 2006 revision of the CFWF appears to have been carried out primarily to address the designation of the CNP and changes in relevant policies and did not address the issue of financial support. As outlined in section 8.2.2.2 a full and thorough revision of the framework in future years, in conjunction with the development of a targeted regional forestry grant scheme, represents a clear opportunity to enhance multifunctional forestry at the regional level.

Any revision of the framework could incorporate a more comprehensive approach to framework map development, which maps habitats as well as timber transport infrastructure, and accounts for commercial viability of forest resources by zoning the region according to multiple criteria (distance to market, accessibility, management, yield classes, species etc.). Future maps could also account for areas under long-term tenancies and other areas which, for practical reasons, are unlikely to be planted or have woodland regenerated on them in the near future. Policy objectives could then be prioritised for specific areas within the region, accounting for both public benefits (e.g. biodiversity, landscape, recreation) and commercial viability (e.g. timber production), and targeted grant schemes developed to assist in delivering

these objectives. Such grant schemes could include regionally-specific measures to support expansion of the Cairngorms FHN and to support the removal of non-commercially viable plantations which have low aesthetic or biodiversity values – with these grants accounting for the highly inaccessible nature of certain forest locations in the region. Highland Birchwoods currently oversees a pilot grant scheme which offers support to planting or regeneration schemes within the Highlands which lead directly to the creation of new forest habitat within an FHN (see www.highlandbirchwoods.co.uk). The results presented in Chapters 6 and 8 illustrate that the accessibility of sites from a commercial forestry perspective varies widely across the region. Taking accessibility into account when 'zoning' the region for grant applications could allow targeted support of activities related to biodiversity, recreation, or landscape enhancement, in areas less suited to commercial forestry.

9.2.3   Markets – a question of scale

Market constraints were seen as a major issue by survey and interview respondents. Haulage and harvesting costs, the availability of cheap imports, and market accessibility were seen as major constraints to productive forestry. These constraints were seen as leading to a decline in interest in forestry as a land use and a reduction in the level of active management (specifically thinning) of the region's forests, which in turn was seen as potentially leading to a gradual loss of forest functionality. This issue of declines in active management is reflected in recent publications on the forests of the region, such as Davies *et al.* (2001a) who express concern regarding current management levels and the associated quality of timber from the Badenoch and Strathspey region over the next 20 years. Furthermore, the planting and regeneration of woodlands for biodiversity reasons, while leading to expansion of the Cairngorms FHN, is unlikely to contribute to future timber production levels, as the establishment of such woodlands rarely takes future timber production into account, with trees being planted more widely apart than in commercial forestry (Davies *et al.* 2001a).

The decline in productive land use in the UK, referred to previously, is therefore also apparent within forestry and specifically timber production in Scotland. Low timber prices appear to be driving a decline in silvicultural activities among landowners, in favour of grant-aided biodiversity-related forestry initiatives. Clearly this has environmental benefits; however, as Towers *et al.* (2006) point out, low timber prices have led to forest establishment initiatives often being of smaller scale than previously, as well as declining interest in investing in forestry among landowners due to the low potential returns. This is crucial, as the SFS predicts significant increases in projected timber outputs from Scottish forestry over the next 20 years (SE 2006a). However, without sufficient planting and expansion now, it will not be possible to maintain this level of timber outputs (and associated employment) in the longer term (Towers *et al.* 2006). The SFS (SE 2006a) outlines plans for further support of active forest management, and especially thinning, for the private forest sector, which is likely to ensure continued interest in productive forestry on many sites. However, the SFS also promotes the further use of CCF systems, which some respondents felt could affect the predictability and consistency of timber market supply, particularly if implemented at large scales or in unsuitable locations.

Globalization, and particularly the availability of cheap imported timber, is a major influence on timber prices in Scotland. However, some respondents were also critical of domestic market processes and specifically the activities of FCS. Macmillan (2005) echoes these criticisms, arguing that the structure of FCS stifles the development of entrepreneurism largely due to the organisation being 'captured' by environmental groups such as the RSPB. Macmillan (2005) also argues that FCS is over committed to the large-scale processing industry in Scotland, resulting in the saturation of the low grade (pulp, fence posts etc.) timber market in Scotland, which leads to further declines in prices within this market sector. FCS respondents felt that the commitment of FCS to large-scale processing markets ensured the survival of this (weak) market in the long term. However, it could also be argued that over commitment to large-scale markets implies that it will be difficult for FCS to downscale their

timber production efforts. As recognised in Chapter 8, however, many of the opportunities for forestry market development may revolve around market diversification and a down-scaled, more localised approach to harvesting, processing, and marketing. It appears the entire process of down-scaling may therefore perhaps be more suited to private estates. A key opportunity for the private forest sector, which would allow for a greater level of influence on timber markets, would appear to be a greater level of cooperation between forest owners – such as at the level of marketing partnerships or cooperatives as suggested in section 9.3.2.

Perhaps more fundamentally, a key underlying issue was that, among respondents, fluctuations in timber markets appear to have acted as a considerable influence on past management and, in some instances, market constraints appeared to still be a key driver of management decisions. As discussed in sections 2.1.5 and 9.2.4, allowing markets to act as the fundamental influence on management decisions is, in many respects, a flawed approach, as making decisions according to short-term market changes fails to account for the long-term limitations and requirements of sustainable forest systems (Krauchi *et al.* 2000). Furthermore, neither the UK or the EU as a whole can meet internal timber demands (Farrell *et al.* 2000) and, so that increased local and national production and consumption of timber could ensure a more sustainable approach overall, rather than the ongoing heavy reliance on imported timber products.

9.2.3.1 *Woodfuel and alternative forest product markets*

This recognition of the potential advantages of down-scaling harvesting and processing activities, combined with continually rising oil costs, led to many respondents highlighting the potential of the woodfuel market to tackle market constraints. This support for woodfuel market development is reflected in recent studies (Highland Birchwoods 2003, Rippengal 2005, McKay 2003) which confirm the huge potential of woodfuel to provide a significant

proportion of future renewable energy demands in Scotland and the UK generally. As Rippengal (2005) points out, woodfuel systems have one of the lowest outputs of carbon dioxide of any energy generating system in use in the UK and, from a cost perspective, such systems are competitive with both gas and oil heating systems. As noted in section 3.2.5.2, the Scottish Government has committed to a 80% reduction in CO^2 emissions by 2050 and Highland Birchwoods (2003) argue that the further development of the woodfuel heating market - seen as neglected by the Scottish Government in favour of supporting electricity generation from wind power - could contribute significantly to these targets.

Both Highland Birchwoods (2003) and Rippengal (2005) also conclude that the development of woodfuel heating systems is likely to be best suited (from a cost efficiency perspective) to more localised applications, ranging in scale from domestic homes, to manufacturing plants, schools, and offices. The use of log, pellet, and woodchip boilers in particular, to provide heat in social housing developments or community heating systems (e.g. a large woodchip boiler providing heat to a network of houses), public sector facilities such as schools, and private sector facilities with high heat demands, such as hotels or private estates, were all seen as offering major potential for the adoption of woodfuel heating systems (Rippengal 2005). The further development and use of such systems in the Cairngorms therefore offer considerable opportunities to reduce carbon emissions and fuel transport costs (and associated environmental affects), as well as providing a local market for lower quality wood products.

As Highland Birchwoods (2003) note, Scotland is an exception in Northern Europe in not having a well developed professional woodfuel industry, which contrasts strongly with the fact that over 40% of Scotland's energy demand is heat. Clearly, the further development of the woodfuel industry represents a key opportunity, which, if developed at the local/sub-regional level, is likely to provide a market for the wood products of thinning processes (McKay 2003), as well as decreasing transport costs due to the associated localisation of wood markets. Highland Birchwoods (2003) also argue that, in recent years, support for development of

woodfuel heating systems has been concentrated on community developments and the demand side of the industry, resulting in the neglect of support for the producers of woodfuel, and particularly support for woodfuel initiatives on private landholdings. The support of short-rotation coppice (SRC) forestry, such as willow and poplar plantations, is, however, now supported by forestry grant schemes (previously under SFGS and in the future under the RDC system). SRC systems generate fuel more rapidly than pine plantation systems and Andersen *et al.* (2005) found that they could potentially supply 31% of Scotland's current domestic electric energy requirements and reduce carbon emissions by up to 15% from 1999 emission levels.

Another area which appears to offer potential for development is the expansion of the Birch timber market. Much of the Birch resource in the region is of poor quality with an uneven age structure; however, unquantified volumes of birch occur in mixture with conifer crops throughout the region. Much of this may be of sufficient quality to support the development of local birch wood processing in the future (Davies *et al.* 2001a). Mason *et al.* (2004) also support suggestions by respondents that the potential for taking Scots Pine timber into the higher-priced joinery market has yet to be developed in Scotland, due mainly to poor supply chain development and particularly the lack of secondary processing facilities, such as moulding and kiln drying, in local sawmills.

The development of the timber framing and cladding market and local furniture production have been highlighted as opportunities of particular importance for more localised consumption of timber products and publications by Davies *et al.* (2002), Davies *et al.* (2001a, 2001b) and Wilson (2001) who confirm that the timber housing market is under utilised in Scotland and represents a considerable untapped market opportunity. Davies *et al.* (2001a) propose, in particular, the establishment of a small-scale hardwood flooring factory in the Strathspey area to add value to small volumes of medium grade birch sawlogs along with other hardwoods imported into the area. The active marketing of both Scots Pine and Birch timber

products is likely to be crucial to the success of further development of localized processing and marketing of these products.

A final area which would appear to deserve consideration is that of non-timber forest products (NTFPs), such as mushrooms and berries, with generally very low interest among respondents. Most argued that the scale of their forestry activities was such that small scale NTFP endeavours were simply not profitable, as they were generally time-intensive and small-scale, and that the picking/consumption of such products by locals/recreationalists was uncontrollable. However, Dyke and Primrose (2002) argue, smaller-scale (tenancy/farm level) forest and woodland owners, such products may offer potential for development, with the adoption of picking and marketing cooperatives between landowners recommended as the most suitable base for this development. Furthermore, Dyke and Primrose (2002) note the potential for further regulatory legislation to ensure a degree of landowner compensation where products are being removed for profit and to ensure future NTFP development does not adversely affect other forest values such as biodiversity.

9.2.4   Bureaucracy, multi-level governance and public pressure

Bureaucratic complexity was raised as a major constraint to multifunctional forestry within the thematic analysis, with intensive bureaucracy seen as discouraging productive land use and interest in commercial forestry in particular. Slee (2007) recognises this downturn in the economic significance of traditional production-based land uses in Scotland, attributing it to an increasing recognition of the importance of the social and environmental (as opposed to economic) aspects of these same land uses and the parallel and ongoing development of EU policy. Given the potential future importance of the private forest sector to future timber production, both regionally and nationally, bureaucratic complexity is clearly an issue. The FTA (2003) argue that the forest sector is under a much greater burden of regulations than the

agricultural sector, despite receiving considerably less financial support at the national level (see Section 3.2.5.1). A major issue in this regard, as highlighted by some respondents, is the comparative weakness of the forest sector as a lobbying force both in Scotland and the UK as a whole. As Macmillan (2005) points out, FCS, due to its structure and affiliation with the Scottish Government, cannot effectively lobby ministers on issues relating to funding or regulations. This has the effect of weakening the forestry lobby in Scotland, as over 30% of forested lands are owned by FCS.

Environmentally positive or 'good' forest management was also seen as going unrewarded in Scotland, with the establishment of native woodlands for biodiversity reasons seen as being under similar regulatory burdens as productive forestry plantations. Management incentives would appear to have the capacity to counterbalance these regulatory burdens; however, as Wightman (2000) points out, incentives do not differentiate between who owns the land or how it has been previously managed. Serbruyns and Luyssaert (2006) also show that Belgian forest owners who apply for subsidies use the incentives for well established management practices, or activities which are entirely in agreement with estate objectives. This review has shown that while uptake of biodiversity-related grants in the Cairngorms has been high, the success of these schemes is most likely strongly related to the interest of the landowners in these management objectives – they are not doing anything that is against their ways of thinking.

As Ziegenspech *et al.* (2004) show, forest policies which negatively affect owner autonomy and restrict a landowner's productive capacity (e.g. restrict timber production in certain locations) are often poorly received, particularly among owners with a tradition of productive land use on their landholdings. This is reflected in the Cairngorms in the negative attitudes of forest managers towards regulations affecting the timing and location of felling operations. The tradition of large-scale estate-based recreation, specifically shooting and deer stalking, may also imply that, while biodiversity initiatives are received favourably, the further development and

encouragement of public recreation in the area may be less well received. The findings of both the interviews and surveys show that recreational (and associated) developments within forestry appear to be often of much lower importance, even on large estates, than management for biodiversity reasons. Wolf and Primmer (2006) propose a method for assessing material practices and organisational strategies in relation to their effectiveness or 'competence' in managing for biodiversity objectives within a multifunctional forestry framework in Finland, and rewarding those actors which demonstrate positive 'conservation performance' through the allocation of further resources. Such a reward-based system could operate in Scotland through management assessments, whereby those deemed as managing at a high level of sustainability could be allocated a greater degree of funding – although such an approach could prove complex and divisive in operation.

Regulatory agencies such as SNH were also heavily criticised for producing what were perceived as conflicting land-use policies. The level of bureaucracy in the region was generally attributed to the multiple levels – 6 - of representative governance effective in the area. The development of more integrated land-use policies, either through inter-agency collaboration, or through the development of integrated regional land-use policies (as currently being carried out by the CNPA – see Section 4.5.1.5) offers an opportunity to lessen bureaucracy, although without changes to the current policy and agency framework it is perhaps unlikely that even regional policy development will lessen the bureaucratic load.

Public pressure and increasing policy requirements for public consultation within forest management were also perceived by respondents as low-level management constraints. However, Chapters 3 and 4 have clearly shown the strong requirement for participative approaches within sustainable forest management. In this regard, while respondents viewed such issues as representing constraints, the more important issue from a multifunctional forestry development perspective may be the fact that respondents were so adverse to participative approaches. Generally, public or community involvement was low or absent on

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most landholdings, with managers/owners generally appearing reluctant to engage further than necessary with the public. This would appear to be a crucial issue given the importance of the private sector within Scottish forestry, as Buttoud (2002) and Sheppard (2003) argue that local participation within forest management processes is key to developing socially sustainable forestry. Indeed, even respondents to this review recognised the increasing power within local communities and the growing requirement to gain local approval for estate developments and activities.

Weldon (2004) argues that the FCS must also further adapt its approach to partnership and participatory management, to account for the needs of a wider range of stakeholders. Issues relating to participation and consultation are therefore not solely restricted to the private sector. At least part of the objection to participative approaches within the private sector relates to an associated perceived loss of control, combined with the view that such activities are time-consuming and not cost-effective. However, proactive engagement of the general public was also recognised by a minority of respondents as leading to stronger public support in the longer term. Currently, the LTFP system represents the main potential area for public participation within forest management (see Section 3.3.3.4); however, some large-scale forest owners in the region have not developed or implemented LTFPs and seem unlikely to do so in the future. Further financial support and proactive leadership through demonstration on the part of the FCS would therefore seem necessary to ensure clear mechanisms and processes for public participation within forest management on private landholdings becomes more common in the future.

9.2.5 Unpredictability and inconsistency and the need for a long term perspective – the building of resilient systems

Interview and survey respondents highlighted unpredictability and inconsistency as major constraints to multifunctional forest management. Both rapid changes in grants and regulatory

systems, as well as natural factors such as climate change and windthrow were perceived as creating feelings of insecurity among forest owners and managers, particularly in relation the future of commercial forestry in the region. Towers *et al.* (2006) confirm that political inconsistency is an issue for the private forest sector across Scotland, and the early closure of the SFGS in particular appears, from this review, to have increased feelings of insecurity. Ziegenspech *et al.* (2004) notes, in relation to farm-foresters in Germany, that farmers were unlikely to engage with grant initiatives without feeling secure about the future long-term reliability of the system in question. This issue is key, particularly given that current policies place the onus for future expansion of the Scottish forest resource on the private sector. The development of a consistent and secure support system for private sector forestry in Scotland is therefore fundamental to the successful future implementation of the SFS.

Inconsistency in the past management of certain forests (and particularly a lack of thinning in the early stages of management) was also seen as having resulted in poorly (structurally) diversified resources on some sites. Cameron (2002) confirms the findings presented in Chapter 8, that this lack of thinning is linked with the low value of early selective thinnings. Cameron (2002) also points out that, while delayed thinnings (as opposed to early thinning) may give higher rates of return, this approach also often results in stand instability, which has resulted in 'no thinning' policy often being employed in the UK on sites subject to snow or wind damage. In practice, this decline in forest thinning, and particularly early thinnings, appears to have led to a decline in saw log quality in the UK, leading Cameron (2002) to conclude that, while early thinnings may result in a short-term loss, the use of discounted cash flow methods allows such expenditure to be treated as an investment, with the associated improvements in log quality increasing return in the long term.

Reliance on land agents and forest management consultants on many properties was also raised within the thematic analysis as potentially leading to inconsistent management and the disassociation of forest owners from forest management decisions. As outlined in Section

8.6.1.3, this is a complex, and contentious issue, and few firm conclusions can be drawn with regard to the effects of management systems (e.g. land agents or consultants) on the consistency of management. Further explorations of the effects of land agent and forestry consultant approaches on forestry management (relative to in-situ manager or owner management systems) are necessary, in this regard, to clarify the advantages and disadvantages of different management approaches.

A fundamental opportunity recognised in Chapter 8, with the potential to help combat the unpredictability and inconsistency associated with both the natural and more socio-political sides of multifunctional forestry, was the greater development of a long-term planning approach to forest management. Interview respondents recognized the potential for greater use of long-term forest plans, where the specifics of stand management were outlined, while maintaining a flexible approach within a framework of clear and consistent long-term strategic management aims. The SFS reflects this recognition of the importance of long-term planning, recommending in particular that all privately owned forests be under LTFPs by 2050 (SE 2006a). However, as apparent from Section 8.2.6.1, some respondents were critical of the (FCS developed) LTFP process due to its fragmented approach (e.g. deer control is not included within LTFPs) and there were no LTFPs for some relatively large forest sites.

As noted in Section 3.3.3.4 and by some respondents in Section 8.2.6.1, however, the LTFP system represents an opportunity to develop a more adaptable approach to management through increasing management response time and clarifying the direction of management. Furthermore, the LTFP process has the potential to lessen the bureaucratic load on forest managers, with LTFP development and approval (by FCS) including approval of all felling and re-stocking plans over the long term, thus eliminating the need for approvals and licence applications each time felling or restocking is undertaken. As the long-term outcomes of thinning processes are also apparent in LTFPs, the process of justifying investment in forest

management and specifically thinning is also simplified, as the benefits of investment in early thinning can be clearly stated through harvest value projections.

The importance of the development of a diverse forest structure and a mix of species through long-term planning was also seen as crucial to ensure the development of forests capable of adapting to the various natural and socio-political inconsistencies and fluctuating market demands affecting these resources over time. The advantages of CCF approaches from a multifunctional forestry perspective have been outlined in Section 2.2.1, such approaches offer considerable potential for future forest management in a region with such strong multiple management objectives as the Cairngorms. However, a number of respondents (Chapter 8) argued that the use of regeneration as a primary restocking mechanism (often seen as key to CCF approaches) was often ineffective for commercial forestry practices, as the results were too unpredictable.

As stated in Section 2.2.1, the key area of CCF development in Scotland is the transformation of existing even-aged stands; however, as some respondents (Chapter 8) pointed out, many plantations are in fact beyond a suitable age for transformation to CCF management. Mason (2003) also notes that less than 25-30% of conifer high forests in Scotland are sufficiently windfirm (due to underlying soil properties) to be converted to CCF systems. Clearly recognising whether or not CCF approaches are suitable requires a site-specific approach, which recognises the soil qualities and exposure of different sites (Spiecker 2003, Mason 2003). A key opportunity for the Cairngorms region, in this regard, would appear to be the detailed recognition of those sites most suitable to conversion to CCF systems – within revised CFWF maps for example.

Spiecker (2003) and McGrady-Steed *et al.* (1997) also argue that more diverse forest systems (as opposed to monocultural forest systems) appear to have lower pest damage and a higher resistance to invasive and weed species. Nyland (2003) also notes that a diverse forest

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structure can also contribute to building a forest's resistance to pest species. Worrell and Ross (2004) also note, in relation to growing Scots Pine for timber, that CCF systems, when properly managed, appear to give better rates of return than restocking by planting. Mason (1999) also notes the importance of mixing native and non-native tree species in forests where management is attempting to achieve multiple objectives. The promotion and further implementation of CCF approaches therefore appears to offer a major opportunity for future multifunctional forestry development in the Cairngorms region – in suitable locations. The links between CCF approaches and multifunctional management appear to require further clarification in a Scottish context, however, with no clear vision apparent within policy about what a multifunctional forest should comprise in terms of species and structure (Mason *et al.* 1999).

9.2.5.1 The issue of scale mis-matches in a Cairngorms forest management context

As outlined in Section 2.1.5, many environmental and sustainability issues or problems are the result of temporal, social, or organisational scale mis-matches between the ecological system being managed (e.g. a forest) and the scale of the social system involved in, or affecting, its management. Such scale mis-matches were evident throughout the constraints to multifunctional forest management identified in Chapter 8; Table 9:1 outlines the clearest examples evident in the region.

Clearly, the issue of scale is fundamental with regard to multifunctional forest management in the region. Hobbs (1998) argues that the implementation of management at appropriate scales (to avoid such mis-matches) is often likely to involve a collaborative approach which incorporates numerous agencies and landowners. In practice, this often implies a regional approach to policy development and management. Light *et al.* (1995) for example, note that a key issue with regard to scale mis-matches is often the lack of any relevant agency with a system wide perspective or jurisdiction. Thus, the ongoing development of the CNPA as a regional planning organisation is clearly advantageous in this regard.

Table 9-1 Key examples of social-ecological scale mis-matches evident within forestry in the Cairngorms region

Deer Population scale – landownership spatial scale mis-match   Red deer move across landownership boundaries in populations which graze, reproduce and function generally at the landscape level. This scale of ecological functioning clashes with the scale at which red deer are controlled – predominantly at the level of single landholdings, upon which objectives relating to red deer can vary considerably. Sporting estates, for example, often require relatively high densities of deer, while conservation-oriented landholdings often require low densities, resulting in highly variable deer densities across the Cairngorms region. This scale mis-match between the ecological scale of the functioning of deer populations and the scale of deer control is being addressed through the ongoing use of Deer Management Groups (DMGs), where groups of neighbouring landowners meet to develop sustainable and agreed deer population reduction targets across specified areas.
Political system – forest system temporal mis-match   Forestry plantations and native woodlands function at long-term temporal (ecological) scales. Even within productive conifer forestry, rotations can be 40-80 years, and Scots pine rotations tend to be longer than for non-native conifer species. The political systems and policies which affect forestry operate at more rapid socio-political time-scales, resulting in a temporal mis-match between the forest systems being managed and the policies which affect them, and inconsistent management and policy structures acting upon systems which require long-term consistency.
Markets – forest system temporal mis-match   Timber markets in Scotland are affected by European and global timber market fluctuations. The timber market system in Scotland is therefore part of a larger-scale system which is subject to short-term fluctuations. Forest managers often respond to these market fluctuations – much of the decline in thinning activities in the region, both historically and currently, is often attributed to the markets for the products of the thinning process. However, forest systems operate at long time-scales and therefore require consistency of management, which respects the requirements of the forest system (i.e. that regular thinning is required to sustainably produce high quality timber), as opposed to basing management decisions on short-term market fluctuations.
Policy and planning system (organisational scale) – Forest system mis-match   The bureaucracy affecting forestry management in the region is largely the result of national or European policy and planning developments (and various regional initiatives). This can be recognised as having led to numerous policies (with variable levels of integration between them) affecting the region's forests, which have been developed in a generic fashion to account for all Scottish forests – and other land uses. In practice, this appears to have led to a high level of bureaucracy affecting the region's forests, which is often perceived as being poorly integrated. The region's forests, on the other hand, deliver multiple functions, which are often a product of these forests acting as integrated systems. The organisational scale of policy and planning affecting forestry is therefore large (often national) and perceived as poorly integrated, while the scale of forestry processes is often more regional, requiring a degree of integration.
Forest habitat Network – Scale of landownership and management mis-match   Forest habitat networks exist at the landscape or regional level. The Cairngorms FHN applies at the level of the entire Cairngorms region, with ecological processes, such as species transference from one woodland to another, requiring multiple habitat linkages between different forest areas across the FHN. Thus the scale of ecological processes is regional, while forest management occurs in practice at the level of single landholdings – many of which have distinctly different objectives. The scale of social organisation (in this case landownership and land management) thus conflicts with the scale of the ecological processes which the FHN concept aims to manage and develop.

A key criterion of Ecosystem Management approaches, apparent from Section 2.1.4, is the matching up of the scales of management with the ecosystems being managed and the other criteria of EM approaches (Table 2:1) are clearly highly applicable in a Cairngorms region context. Lovell *et al.* (2002) argue that the matching up of the scales of management and human use with the scales of the ecological systems being managed is crucial, and advocate the setting of long-term management objectives to increase the resilience of such systems to future change and disturbance (resulting from social or ecological processes). Johnson (1999) also argues that 'adaptive management' approaches - in which management develops knowledge continually through stakeholder involvement and adapts management practices as this knowledge base evolves, with the resulting outcomes representing (as with multifunctional approaches) an optimal compromise – hold considerable potential for strengthening system resilience. Adaptive approaches can also lead to genuine empowerment of local communities, which as Lovell *et al.* (2002) point out, requires considerable political will and commitment. As Wiggering *et al.* (2003) point out, long-term objectives are also a necessity, particularly to combat temporal scale mis-matches, as the speed of organisational and land-use changes often vastly outstrip the adaptive capacity of natural resource systems.

Fuhrer (2000) notes that many commercial forestry operations are based on management systems which aim to limit fluctuations and establish an artificially maintained stationary equilibrium with relatively high resistance to disturbances (e.g. storm events, fires). Such systems require frequent management intervention; key examples in a Cairngorms or Scottish (particularly commercial) forestry context include deer culling and the use of deer fencing, removal of windblown trees, and forest re-stocking (using planting) after fires and clear fells. Such 'resistance-based' systems tend to be more susceptible to changing conditions than 'resilience-based' ones, with the resilience of ecosystems being linked with structural and species diversity in particular (Fuhrer 2000, Spies 1998, Bengtsson *et al.* 2000, Spiecker 2003). Resilience-based management 'allows' forest systems to respond even to major disturbances, thus sustaining the reversibility of the induced change of condition (Fuhrer 2000). The

development of forest systems (e.g. CCF) with natural regeneration, as opposed to managing plantations which are re-stocked after clearfells and have low regenerative capacity, is a clear example of such a resilience-based approach.

Resilience-based management approaches ensure that forests are capable of recovering from and responding to change (such as windthrow) with minimal management intervention, and such systems, while not always suitable for highly commercialised forestry, offer potential to both allow for timber production and lessen overall management time and cost inputs. In terms of forest management, resilience-based approaches require a 'systems perspective', which accounts for the limitations of forests as interlinked 'social-ecological systems'. As Cumming *et al.* (2006) suggest, matching up the scales of human use and management with the scales of the ecological processes being managed can also enhance the resilience of the entire 'social-ecological system'. The setting of long-term goals at multiple scales is fundamental in this respect, with social-ecological resilience stemming from management and policy consistency and management approaches which encourage high structural and species diversity within forests. Furthermore, the setting of management objectives for forests at multiple scales - site, landscape, and even regional - which incorporate multi-stakeholder collaborative processes is essential to ensure sustainability (or resilience) in the long term. The CNPA has now developed a series of long-term management objectives for the Cairngorms region (CNPA 2007) and a consistent and committed approach in the long term, which adapts as new knowledge becomes available, is likely to be crucial to lessening constraints for multifunctional forest management in the region in the future.

9.3 **Conclusions**

Private landowners are of major importance for the development of multifunctional forestry in the Cairngorms and Scotland generally. This group, and their response to policy initiatives,

will effectively determine future forest expansion rates, as well as the management approaches taken to the majority of the region's forests. This must be acknowledged in future policy development, with the design and rates of future grant initiatives, in particular, now even more fundamental to the future of Scottish forestry. The key drivers of forest management vary, although on private estates owners' personal preferences are a key influence, with economic drivers being of greater importance in relation to commercial forestry practices. The surrounding land-use context is also important; on estates with low levels of productive land use and high levels of sporting land uses, interest in productive forestry is generally lower and forest management is often more driven by available grant aid, resulting in greater interest in biodiversity and conservation-oriented grant initiatives on these (low productivity) sites. The underlying motivations for ownership and the relative dependence on internal (estate management-derived) versus external income sources between landholdings are also likely to influence forest management. The land-use context for forestry is evolving, with tourism developments, in particular, increasing on many estates. This could be linked with the recognised decline in productive land use across the region, which implies that, while biodiversity-oriented management is likely to increase, interest in commercial forestry may decline.

This study has shown that, while the type of landownership can affect how forests are managed, no clear and consistent relationship is apparent between specific types of landownership and the level of forest management multifunctionality. How landownership systems are defined in the first instance is of major importance in any analysis of the effects of landownership on management, while ownership continuity can also have a dramatic affect on management approaches. NGO and public sector landowners generally exhibit stronger public benefit-related objectives than private landowners, although in certain cases, due to a combination of policy and personal drivers, private estate forestry also delivers a high degree of public benefit – although this is more actively managed for on NGO- and publicly-owned sites. Conservation- and biodiversity-related management objectives were common

throughout the region and across all ownership types, which appears to reflect both policy initiatives and a generic recognition of the importance of the region's natural heritage.

Public participation in management was, in contrast, an uncommon objective, particularly among private landowners. This was a more highly ranked objective on public and community-owned sites, although genuinely empowering participation was really only evident on community-owned sites, despite the current emphasis on such approaches in land use policies. The social aspect of multifunctional forestry approaches (as described in Chapter 2) appeared throughout this research as the weakest component of the process – particularly on private estates. It must be recognised in this regard, that silvicultural management cannot account fully for all the necessary functions of the regions forest's and increased participative management appears to be necessary. Future support for a diverse range of landownerships and continued support of participative approaches is likely to provide a rich mix of benefits and forest management objectives, with community forest ownership appearing to be particularly deserving of continued support, not least because it is currently quite uncommon.

A clear link was evident between forest multifunctionality and species and structural diversity, with increased multifunctionality apparent in forests with a diversified structure and a mix of species. A major opportunity for multifunctional forest management in the region, in this regard, is to enhance structural and species diversity within managed forests. Specifically, the further adoption of CCF systems at suitable locations has the potential for developing forest resources more resilient to disturbances and anthropological influences, as well as reducing management costs and allowing for the delivery of multiple forest functions in an integrated manner. However, the further development and expansion of higher-quality timber markets, such as timber framing and furniture, also requires the consistent production of higher-quality timber; future forest management (whether it be CCF-based or production-focused) would have to commit to long-term thinning and develop forest structures capable of delivering higher-quality products.

Conflicts between sporting management and forestry were apparent within and between landholdings, and farm-forestry integration was perceived as weak on many sites. The continued use of deer fencing on specific sites is likely to be necessary to alleviate forest-deer conflicts, albeit at smaller spatial scales and shorter time-scales then in the past. The further expansion of the woodland stalking and expedition-style stalking markets also offer opportunities for further deer-forest integration. The emerging RDC system offers potential for further farm-forestry integration, with further support being made available for woodland establishment on farmholdings and agroforestry systems, while the development of farm-forest co-operatives could assist in dealing with requirements for economies of scale in productive forestry. However, the fact that FCS do not own any agricultural land, combined with tenant farmers having limited rights to trees on their land, will ensure that the farm-forestry divide will remain a major issue, at least in certain locations, in the future.

Many integration and conflict issues are a product of the fragmented nature of landownership and management across the region, as well as internal estate conflicts. Further partnerships and collaborative management initiatives offer considerable potential in this regard, particularly in relation to the development of the Cairngorms FHN. Mixed landownership partnerships could also create opportunities for funding unavailable to private landowners operating independently. Further forest policy regionalisation may also offer potential for tackling many Cairngorms-specific issues, as well as potentially developing a vision for what constitutes a multifunctional forest, at both site and regional scales, in a Cairngorms context. A revised CFWF could also include clarification of future locational preferences for different forest types and their functions (e.g. potential areas of new CCF or areas of forest suitable for conversion to CCF). The setting up of a regionally-specific targeted grant scheme, linked to the locational priorities identified in the CFWF, also represents a key opportunity to further develop multifunctional forestry in the region.

Market constraints were recognised as a major issue for forestry; with increasing transport costs and the availability of low-priced imported timber, in particular, negatively affecting forestry in the Cairngorms and Scotland as a whole. A down-scaling of the approach to timber marketing is crucial to combating these constraints, with localised timber marketing potentially lessening haulage costs. Furthermore, enhancement of alternative timber product markets, e.g. for woodfuel, timber framing and wood flooring, represent major opportunities. Supporting the woodfuel industry could also contribute to an increased shift towards renewable energy. The current levels of bureaucracy affecting forest management were also viewed as a constraint which, combined with market issues, appears to be discouraging landowners from engaging further in (particularly commercial) forestry. Enhanced communication between the relevant organisations offers scope for developing more integrated policies, leading to a more pragmatic approach to policy implementation.

Inconsistencies in management and policy, both historically and currently, are a major issue for multifunctional forestry in the Cairngorms. These negatively affect forest structural diversity and interest in forestry as a land use – with managers and owners being insecure in relation to regulations and support mechanisms. Inconsistencies in policy appeared to be compounded by market fluctuations, with past forest management having often responded to short-term market fluctuations, resulting in certain cases in a lack of forest thinning and a corresponding decline in the quality of the timber resource. To combat such inconsistency and its effects on forest systems, the setting of long-term forest management objectives at multiple scales (regional, landscape, site and even stand level) is crucial to ensure a consistent, yet flexible approach.

The initial policy and research context reviews (Chapters 2, 3 and 4), and the results of this research show that the key criteria for ecosystem management approaches are well suited to addressing many of the issues facing forestry management in the Cairngorms, at both site and regional level. If forestry and woodlands are to be managed in an integrated and holistic

manner, other landcover types and land uses cannot be ignored. The future management of the Cairngorms forest resource must therefore occur within a wider framework of integrated land management across the region. This must address the numerous constraints and issues within forest management which appear to result directly from mis-matches between the scale (temporal, spatial or organisational) of management and human use and the scale of the resources or ecological processes being managed.

A 'systems'-based approach, which recognises the interlinked nature of forests and ecosystems across the region as social-ecological systems, is likely to offer considerable potential in combating future land-use conflicts and management constraints. In particular, management approaches must incorporate an adaptive approach and incorporate multiple stakeholders, including local communities, within the making of management decisions. In parallel, the further development of scientific research initiatives and knowledge-based management appear crucial. The CNPA has now set multiple long-term management aims for the region and has a long-term commitment to these aims, including a consistent regulatory and funding framework, which will allow for the continued building of resilient social-ecological systems at multiple scales across the region.

9.4 <u>Recommendations:</u>

Drawing on the introductory chapters, the results of the research and the discussion and conclusions in this chapter, this concluding section outlines a number of key recommendations for the future development of integrated multifunctional forest management approaches in the Cairngorms region – at multiple scales.

9.4.1 Policy development and implementation

a) Further clarification and definition of the term multifunctional forestry, both at the national and regional (CNP policy) level, is required. This would foster more detailed application of the concept of multifunctionality at spatially defined scales, by both forest managers and policy makers, i.e. at the site or forest level and at the landscape or regional level. Specific criteria would probably need to be developed at different scales – the criteria presented in Chapter 2 could be used as a starting point for this.

b) Greater recognition is required within the Long Term Forest Plan (LTFP) system, of the higher complexity and cost of developing a LTFP within heavily designated regions such as the Cairngorms. Specifically, the increasing of Plan Preparation Grant rates within heavily designated areas, to support LTFP development, is recommended. Furthermore, as the current procedures for scoping within the LTFP process have been recognised as somewhat unclear, the future clarification of LTFP scoping guidelines (by FCS) is required.

c) To address the issue of poorly integrated policies and simplify the bureaucratic load on forest managers, stronger links should be developed between the agencies involved with land-use (and related) policy development including SNH; RERAD; SEPA and FCS. This could incorporate simply more inter-organisational meetings, or the development of a more integrated land-use policy and regulatory system, including organisational integration and restructuring. The development of more integrated land-use policies through greater organisational interaction is required.

d) To strengthen relationships between managers and policy makers, a greater degree of pragmatism in the implementation of policy, and specifically the application of

regulations, is recommended. This should take into account the previous record of management and adherence to regulatory frameworks on specific sites.

e) To allow for the tackling of regionally-specific issues and support FHN development, a detailed and comprehensive review of the Cairngorms Forest and Woodland Framework should be undertaken by 2010. It should be a cohesive single framework document, which takes into account both areas within the CNP and areas of importance from a forestry perspective adjacent to the CNP. The framework should incorporate a more holistic approach, taking into account the potential both for habitat development and FHN expansion and a regional approach to forestry more generally. New maps are required, not only including the previous approach of potential for forest expansion, but also analysing forest transport and processing infrastructure, resulting in maps of areas suitable and unsuitable for commercial forestry (including identifying areas suitable for non-native plantations). This work could also incorporate a yield class map for the entire region, to support the recognition of the suitability of different areas for different types and approaches to forest management (e.g. CCF, biological reserves, commercial timber production and recreational areas). The role of the CFWF in the planning consultation process for establishing new woodlands in the region should also be further developed.

f) To support the development of multiple forest types and management approaches by landowners in the region, in the most suitable locations, it is recommended that a regional (Cairngorms-specific) targeted grant scheme be developed, in conjunction with the proposed revision of the CFWF. This should include the targeting of specific grants for certain areas recognised as suitable for specific types of forestry within the revised framework. The grant scheme should, in particular, support the expansion of native woodland in areas which support FHN development, as well as providing

support for the restructuring of plantations or the removal of plantations where suitable.

g) To address the issue of inconsistency in land use policy objectives and implementation mechanisms (and the resulting feelings of insecurity among land managers), longer-term commitments are required to both strategic policy goals and implementation mechanisms, on the part of the Scottish Government and relevant national and regional organisations. The use of long-term support systems, which are phased out slowly as their objectives are realised, is recommended.

h) Greater emphasis should be placed on the role of forests and woodlands with regard to renewable energy generation by the Scottish Government. This has the potential to assist in reaching reduction targets for carbon emissions and provide locally-generated low-cost energy to local communities. The introduction of a reward-based system, on the part of the Scottish Government, for the development of carbon accounting and carbon neutral estates, which could be linked with forest management, also has potential to contribute towards emissions targets.

i) To ensure sustainable deer management and stalking, it is recommended that the Scottish Government, and particularly national park authorities, promote and support alternatives to traditional 'hill stalking' approaches. Specifically, future deer-related policy initiatives at the national and regional levels, should aim to encourage woodland stalking, expedition-style stalking and economy stalking packages. Furthermore, the Scottish Government should also explore the possibility of applying a tradable permit system for deer culling across Scotland as a whole.

9.4.2 Market support

1) To support the further development of local markets for locally-produced timber products, the increased marketing and promotion of timber from native and locally grown timber is required, both at the regional level (by the CNPA) and at the national level (by FCS). This should include the promotion of timber cladding and the use of timber framing in housing from local timber sources. The development of a requirement for a certain percentage of social housing or low-cost housing being built in the region to incorporate a degree of locally produced materials, including timber products, is also recommended.

2) To further develop localised markets for lower-quality timber products from landholdings in the region, the local/regional woodfuel market should be further developed. This should include the promotion of woodfuel heating systems and the provision of financial support (incentives) for the installation of these systems by the CNPA and other relevant organisations.

3) To diversify and further localise timber markets, the development of further financial support (by FCS and the CNPA) for small-scale wood processing systems, being set up at the estate level or by local communities, is recommended. Financial support should also be made available to companies producing small-scale timber products such as furniture and hardwood flooring, and should specifically include the provision of support for a hardwood flooring manufacturing company in the region.

9.4.3 Training and information

a) The development of an accurate and up-to-date database of landownership for the CNP and adjacent locations is recommended, to provide a base for collaborative management initiatives and ensure transparency in relation to landownership. This database should be accessible to the general public. The CNPA is the obvious organisation to facilitate the development of this database.

b) To support further farm-forestry integration, free or subsidised farm-forestry training courses should be made available to all land managers/farmers within the national park and bordering area. These should include training and policy awareness in silvopastoral systems and short-rotation coppice systems. It is suggested that this could be implemented by the CNPA in conjunction with RERAD and FCS.

9.4.4 Forest and Estate Management

a) To address a number of the constraints facing forest managers (and the delivery of multifunctional forestry generally) highlighted in Chapter 8, the further implementation of CCF regimes at the estate level in the region is recommended. This should be supported by recognition within the CFWF of the most suitable locations within the region for the implementation of such approaches. Furthermore, the promotion, through demonstration and research, of silvicultural systems which deliver high-quality timber, while also allowing for the delivery of high value biodiversity and landscape related objectives is key. This should incorporate the further development of best practice demonstration sites such as the FCS site at Inshriach. A privately-

owned best practice site could also be developed with the support of the CNPA and FCS.

b) To address inconsistencies in both natural and political systems affecting forestry and to ensure greater future security for forest managers, the development of long-term management plans, including strategic site objectives for 25-50 years, for all forest sites within the region, is highly recommended.

c) To ensure minimal levels of conflict within estates and to encourage more optimal (beneficial to all those involved) and integrated estate land management, it is recommended that estate management procedures incorporate regular (at least monthly) meetings between the different estate management divisions, including (where applicable) representatives from the tenanted farms on the estate, sporting management, forestry and general estate management.

d) To address issues associated with fencing (e.g. aesthetic impacts and bird collisions) and ensure minimal levels of conflict, it is recommended that estate and forest managers make greater use of small-scale, moveable, fenced exclosures – as opposed to large-scale perimeter fending.

9.4.5 Communication and partnership

a) To minimize inter-estate and landowner-agency conflicts, foster greater understanding between different types of landowners and support collaborative landscape-level forest management initiatives (such as the FHN), further meetings between landowners or landowner representatives are recommended. The CNPA is the obvious organisation to facilitate and provide support for such meetings. Continued support for existing

collaborative initiatives, such as the Forest of Spey and Deeside forest initiatives is also recommended, to ensure the enhancement of landscape- and regional-level perspectives on forest development.

b) The strengthening of the 'political voice' of the private forest sector appears to be necessary to address a) its lack of influence on forestry markets b) the imbalance, in terms of bureaucratic load and levels of grant support, between the forestry and agriculture sectors. This clearly requires the strengthening of private forestry lobbying organisations such as the FTA, particularly through increased collaboration between private forestry businesses.

9.4.6 Future Research

a) Building on the work done in this study, to provide a vital knowledge base for future management, policy and the monitoring of policy implementation, a detailed GIS for the forests and woodlands of the Cairngorms is required. It should include general forest and woodland characteristics including: forest and woodland type; ownership; designations; extent of Caledonian woodlands; forest structural and species characteristics. It could also incorporate a management objectives layer showing the management objectives for specific areas of woodlands across the region. These would have to be derived from discussions with landowners and the development of a generic regionally applicable typology for management. The database could also include information on forest management types/formats (e.g. in situ manager, forest consultant etc), permitting simple assessments of how forest policy (and other policy areas) initiatives are likely to be received on the different landholdings across the region.

b) Future GIS analysis, building on that presented in Chapter 6, could also include detailed comparisons of ownership with the level of designations in Scotland, to clarify which landowner groups are most affected by designations.

c) Further analysis, incorporating both interviews and quantitative postal questionnaires, is required of the effects of landownership on forest management and general land management at both national and regional levels in Scotland. This could include a survey of forest owners within the Loch Lomond and Trossachs National Park, for cross-comparison with the findings of this study. Postal questionnaires should aim for large (50+) respondent groups and incorporate all forms of landownership within a sample area to ensure that statistical cross-ownership comparisons are possible within survey analysis. Future (non-confidential) postal questionnaires and surveys could also be linked to GIS databases to allow for the development of a detailed database of forest management objectives in specific regions across Scotland.

d) The impacts of forest consultant and land management agency approaches to both forest and wider land management have been touched on in this study. To further clarify the constraints and opportunities associated with such management systems (as opposed to in-situ long-term managers), it is recommended that future research addresses this issue.

e) To further support innovative approaches to deer management and stalking (as recommended above), research should be carried out across Scotland and the UK as a whole to clarify the existing demand for non-conventional deer stalking packages, such as economy hind stalking packages, or expedition-style stalking. This could incorporate the use of online surveys developed on hunting/stalking-related websites or survey the memberships of hunting clubs or those subscribing to relevant publications.

f) Long-term management plans were rarely evident at the level of whole estates. Given the current emphasis on land use integration and the implementation of the Rural Development Contract system, an exploration of the future feasibility of developing long-term management plans at the whole estate level would appear to be required. This should incorporate both assessments of landowners' interest in such plans and the potential for developing support systems for estate management plans within Scotland.

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