

Non-market Benefits Associated with Mountain Regions

Report for Highlands and Islands Enterprise
and Scottish Natural Heritage

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Executive Summary

Remit

1. The aim of the study was to review the provision of non-market benefits in mountain areas and assess the scale of different benefits in upland Scotland, in order to inform future policy decisions concerning support for mountain areas. The remit identified three elements:
 - To identify the non-market benefits delivered in mountain areas;
 - To quantify, as far as possible the likely scale of the non-market benefits in mountain areas of Scotland; and
 - To provide case study examples of the range of possible non-market benefits and the types of policy instruments that might be used to implement relevant policies.

The study used a review of the literature and four cases studies to collate the evidence and draw conclusions.

Non-market benefits from mountain areas

2. The main non-market benefits in mountain areas are derived from biodiversity, wildlife and landscape, recreation opportunities, cultural heritage and hydrological protection. No economic valuation studies were found on the benefits that society derives from the cultural heritage or the maintenance of population and socio-economic activity in mountain areas. There is a need for further research to quantify these public benefits.

Value of environmental goods in mountain areas

3. There is good evidence from valuation studies that Scottish people are willing to pay to protect and enhance wildlife, biodiversity and landscape. In general, the more unique the asset, the higher will be the perceived value. Several studies on Environmentally Sensitive Areas (ESAs) in the uplands indicate that benefits to the public, as measured by their willingness to pay to support policy, substantially exceed policy costs.
4. Valuation studies have typically identified benefits to residents, visitors and the general public. The 'existence' value of biodiversity and landscape to the general public usually dominates the aggregate valuation, but in popular tourist areas the benefits to tourists are very important. Valuations are usually higher in contexts where there is a mixture of 'use' and 'existence' value. In Scotland, the public have preferences for farmland characterised by broadleaved woodland, heather moorland, wetland, coastland, charismatic species and forest biodiversity. Improved grassland, stone wall improvement, archaeological interest and a number of other habitats and landscape features are less highly valued.
5. Valuations vary considerably with one-off payments to preserve landscape such as the ESAs, Caithness flow country or Mar Lodge typically varying from £10-40 per household. Valuations associated with biodiversity and charismatic species in highland forests vary from £8 to in excess of £100 per year (for beaver introduction).

Use values of recreational sites

6. Substantial use benefits also derive from recreational opportunities, with most of the research concentrated on forest recreation. The willingness to pay (WTP) for these benefits varies from £0.7 to £4.25 per person per visit. With recreational use, proximity to the site is an important determinant of its value particularly for sites where there are numerous local substitutes. Nationally important sites with a variety of facilities and recreational opportunities are more highly valued than local woodlands or farmland.

Residents, visitors and the general public

7. Where use value is important (areas used for recreation and tourism), valuations are often dominated by the preferences of tourists and visitors. Residents' per capita values may be higher than those of visitors' but where visitor numbers are high they dominate the aggregate valuations. Hence, in sparsely populated tourist areas it is the WTP of tourists that dominates the use value of the environment. In the non-tourist parts of the Scottish LFAs the value of the public goods generated by farmers and land managers is mainly determined by their value to the wider Scottish population.

Differences between areas in the value of public goods

8. The table below summarises the factors that determine whether mountain areas are likely to produce non-market benefits highly valued by the public. It excludes community and cultural values for which there is no information. It indicates that, on the basis of landscape, biodiversity and recreation alone, there will be substantial differences between upland areas in Scotland in their non-market valuation.

Land with high aggregate WTP for protection/enhancement	Land with low aggregate WTP for protection/enhancement
Particular landscape and/or biodiversity interest (e.g. in/near designated area, ESA-type scheme. presence of charismatic species)	No outstanding environmental attributes
Recreation /access opportunities	No access-recreational opportunities
Popular tourist area or near population centre	Not a tourist area or near population centre

Case study 1: Cultural landscape services of agriculture and forestry in the Austrian Alpine zone

9. This case study focused on the role of agriculture and forestry in delivering environmental and landscape services in the Austrian Alps. This area represents a sizeable proportion of the federal territory and is frequently described as a cultural landscape.
10. Pruckner (1995) estimated the landscape benefits to tourists as £54m per year. There is no information on the size of the benefits from associated biodiversity services or on cultural values. Traditional management of the alpine landscape provides a wide range of valued public goods varying from landscape features to soil protection and biodiversity. Agriculture is the key activity and tourists a principal beneficiary. Biodiversity has a vital function in protecting against natural disasters.
11. The valuation research centred on benefits to tourists because they are a critically important group for local economies in the Alps. There is a widespread perception that mountain farming support is justified and large benefits to the Austrian population as a whole are attributed to diversified, small-scale mountain farming.
12. The policy justification for supporting mountain farming is being re-examined in the context of WTO considerations and the need to clarify the public good output from alpine mountain areas. The current landscape and ecological services provided from farming and forestry are heavily dependent on support for agriculture. The effects of any removal of support would be drastic, particularly in marginal areas like the mountains.

Case study 2: Changing the basis of agricultural support in Norway to payments for public goods

13. This case study describes research undertaken by Brunstad *et al.* (1995, 1999) which models the impact on the agricultural sector of a radical change in the support system to one based solely on the production of public goods. A sectoral model is used to

investigate the impacts on Norwegian agriculture of changing the basis of support to one which delivers food security, maintenance of population in remote areas and landscape preservation.

14. Landscape values were estimated from a Swedish study in which residents were asked how much they were willing to pay to prevent half of all the agricultural land being converted to spruce. The average individual WTP was 78.5 ECU per year. The population WTP was 485m ECU (140 ECU per ha). Nature conservation was the most important motive in the WTP bid followed by aesthetic considerations.
15. The model indicated how Norwegian agriculture would be transformed were the objective in policy only to produce the required public goods in the most efficient way. Output of all sectors was reduced dramatically. The subsidies required to support the food security and population goals were between 750 and 1,500 ECU per ha. These greatly exceed the WTP for landscape based on Drake's study. The conclusion is that, in the Norwegian context, the goal of landscape preservation is dominated by other public policy objectives goals and can be obtained without additional payments to farmers.
16. A subsequent study estimated the optimal level of landscape services in Norway. Only a minor fraction of today's support level would be paid to farmers to procure the landscape benefits from agriculture. The landscape benefits do appear to be high enough to keep a major part of the land area under farming but this does not prevent a major shift away from cropping to grassland with its higher landscape value.
17. Brunstad's model is of considerable interest because it includes both market and public good services from agriculture. Results have to be interpreted as indicative only but they do suggest that environmental services alone are not valued highly enough to support Norwegian agriculture at current levels. The public's concern to maintain population in remote areas is the dominant factor in policy intervention.

Case study 3: The value and impacts of payments for environmental services – the case of Environmentally Sensitive Areas (ESAs) in Scotland

18. This case study estimates the value of the benefits from Environmentally Sensitive Area (ESA) policy (operated under 2078/92) in Scotland. Benefits from changes to land management in four Scottish ESAs were investigated by asking different groups of the public for their WTP to support ESA policy. Residents' WTP was between £13.0 and £31.4 per household per year (£0.14 - £0.19 million per year in total). The total benefits to visitors (mainly tourists) to the ESA areas show wide differences between ESAs. The popular area of Loch Lomond has the highest aggregate valuation of about £2m per year.
19. In the Breadalbane and Machair ESAs, where the general public were also interviewed, the total WTP of the resident and visitor groups was dwarfed by the WTP of the general population. This reached £44m per year in Breadalbane. The bids may be subject to bias and a more conservative estimate is £2.7m - £4.4m. Even with this estimate, the total WTP greatly exceeds the annual cost of operating the ESA policy. It indicates that policies to procure environmental goods from farmers represent good value for money.
20. ESA payments had a significant impact on the farm incomes of participants. Farm income increased on average by over £3,300 per year. In some areas the viability of farms was dependent on ESA payments. Whilst payments for agri-environmental goods help to maintain farming it is clear that much higher payment rates would be needed if support were to be totally based on farming's public good output.

Case study 4: Payments for the provision of access to woodlands on farms in Britain

21. This case study is an example of a direct payment scheme set up to procure access to new woodlands in Scotland for walking and recreation. A £950 per ha supplement is paid to those farmers and land managers who facilitate public access under a 10-year contract.

There are over 300 individual contracts in Scotland. It is a direct example of the state procuring additional public good output by making additional payments to land owners.

22. The public benefits derived from the scheme were measured by surveying local residents. The aggregate WTP per year for the woodlands varied substantially between woodlands - from £65 to £30,269 (£42 to £20,179 per ha). The variation was related to the location and quality of the woodlands, the awareness of the public about the availability of access and, above all, the size of the local user population. Public benefit declined sharply with distance from the woodland. Where woodlands were in relatively sparsely populated areas the aggregate WTP tended to be low. Some woodlands represented very good value for money; others were less satisfactory.
23. The case study demonstrated the importance of location in the value of recreational and access services. Sites situated close to a large pool of local users can generate important public benefits and justify policy. But in remoter areas procurement of services that require visits (generating use value rather than existence value) is much more difficult to justify in terms of public policy. There will be exceptions in areas where tourists numbers are large or on specialist sites that offer facilities attractive to people living further away. The opportunities in mountain areas of Scotland for recreational access payments will be restricted to high quality sites and tourist areas.

Conclusions

Non-market benefits in mountain areas

24. Mountain areas produce a wide range of non-market benefits valued by the public. Most of the quantitative evidence from economic valuation studies relates to environmental, recreational and landscape benefits. There is little quantitative work on the value attached by society to cultural identity and the maintenance of rural communities and cultures.

Magnitude of benefits

25. Overall, for all types of recreational activity, WTP values fell in a fairly narrow band between £0.69–4.25 per person per site visit. Values for biodiversity, wildlife and landscape services are much more variable. Generally, non-use values when aggregated exceed use values and there is clear evidence that biodiversity generated in forestry and agriculture is highly valued.

Distinctiveness of mountain areas

26. Mountain areas face major climatic and territorial disadvantages and this has provided the basis for distinctive policy measures under the CAP. The analysis in this study indicates that there may be significant locational differences in the extent to which future support can be justified by the environmental and cultural goods produced. In Scotland, areas of high conservation and tourism interest where farming contributes to the biodiversity and landscape would feature highly, as may crofting areas where the cultural value could be high.

Implications for policy development

27. Economic valuation can play a useful role in informing policy decisions by estimating the size of policy benefits in money terms. Whilst CV benefit estimates have clearly influenced policy in the USA and UK, this is less apparent in many other countries. The European Commission has found it more difficult to incorporate non-market benefit estimates into EU policy because of the fragmented state of the data across Europe. However, as the application of economic valuation increases it is likely to have an increasingly important impact on policy in Europe.
28. The evidence from contingent valuation studies helps to underpin policies that pay farmers and landowners to protect and enhance biodiversity and landscape. It is likely that there is

a willingness to support vulnerable, rural populations where there is strong cultural heritage but more research is needed.

29. Mountain areas faces major climatic and territorial disadvantages and this has provided the basis for distinctive policy measures under the CAP. The analysis in this study indicates that there may be significant locational differences in the extent to which future support can be justified by the environmental and cultural goods produced. In Scotland, areas of high conservation and tourism interest where farming contributes to the biodiversity and landscape would feature highly, as may crofting areas where the cultural value could be high.
30. It is possible to make a case for supporting mountain areas that reflects their economic and social vulnerability. This would depend on three elements:
 - Clear evidence that policies to maintain remote populations and cultures are valued by the public;
 - The need for active land management to maintain the biodiversity and landscapes created by farming and forestry; and
 - The contribution of landscapes and the environment to tourism in mountain areas.

The development of agricultural policy

31. There is an evolving case for supporting mountain areas based on sustaining valued environments and cultures. It could replace the current justification for LFA support based on compensation for disadvantage. In Scotland a new Rural Stewardship Scheme was established under the Rural Development Regulation (RDR) to enhance habitats and biodiversity. This is discretionary, but LFA farmers are likely to be the major beneficiaries because the highest quality biodiversity tends to be concentrated in the LFAs. The LFA Hill Farming Allowance Scheme has been modified to remove headage-based payments but will require a firmer rationale in the future.
32. The Scottish Executive (2001) considers that land management contracts such as those developed to deliver the RDR in France could be a suitable mechanism for use in Scotland. The *contrat territorial d' exploitation* (CTE) contains a mixture of socio-economic and environmental measures. It is regionally based so that it can reflect the priorities and needs of different regions.
33. Whatever form policy takes, mountain areas will be best able to compete in the policy arena if there is adequate evidence to support their case. This study has demonstrated that the benefit valuation literature can be used to underpin policies to support the environmental goods produced by mountain areas. But this only provides a partial case. Further work is needed to quantify the benefits from policies that support communities at risk and the cultural heritage, and to quantify the links between environmental quality, cultural heritage and benefits from tourism.

1 Introduction

1.1 Introduction

The aim of this study is ‘to review the provision of non-market benefits in mountain areas and assess the scale of different benefits in upland Scotland, in order to inform future policy decisions concerning support for mountain areas’. The remit identified three elements:

1. To identify the non-market benefits delivered in mountain areas;
2. To quantify, as far as possible the likely scale of the non-market benefits in mountain areas of Scotland; and
3. To provide case study examples of the range of possible non-market benefits and the types of policy instruments that might be used to implement relevant policies.

‘Non-market benefits’ refer to those goods and services valued by the public, which are produced either as externalities from commercial market activity or through the intervention of policy (e.g. farmed landscapes, environmental protection). Where non-market goods are produced as a result of policy intervention they are termed ‘public goods’.

1.2 Policy context

Future reforms of the EU structural funds and the CAP will have major implications for mountain areas. The future allocation of structural funds will be influenced by both the progress made to date in achieving convergence between lagging and non-lagging areas, and the implications of enlargement. This may result in further targeting of structural funds with the current EU-15 likely to receive a declining proportion of the total.

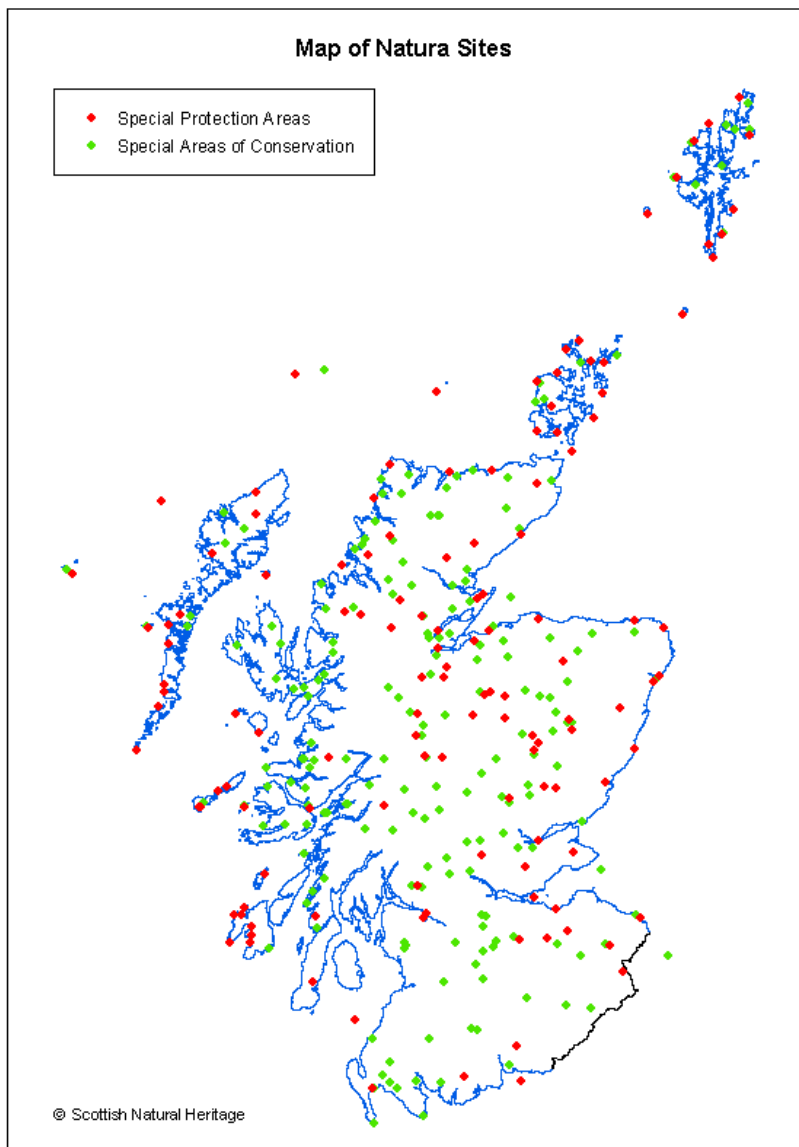
There are continuing pressures from WTO negotiations to restrict payments to producers to those that produce public benefits and are decoupled from output. Recent policy developments include measures (Rural Development Regulation 1257/99) to procure non-market benefits from agriculture and forestry (including agri-environmental schemes, woodlands and organic farming). Land managers are paid to produce public goods for which there is a perceived demand from the public and which markets have under-supplied.

Mountain farming is supported under EU structural policy (Regulation 950/97). Support is provided to ‘ensure the continuation of farming, thereby maintaining a minimum population level or conserving the countryside in certain less-favoured areas (LFAs)’. The payment principle is one of compensation for disadvantage. It seems likely that in future trade negotiations this principle will come under scrutiny. Payments may need to be justified by identifying the public benefits that society receives from mountain areas.

1.3 Non-market benefits in mountain areas

Mountains are typically places of high environmental quality, a reflection of their climate, soil, topography and limited development. Upland and mountain areas have their own distinctive habitats and species, and biodiversity is commonly greater than in more populated regions. The high ecological value and sensitivity of mountain areas is recognised in Agenda 21 where Chapter 13 deals specifically with ‘Managing Fragile Ecosystems: Sustainable Mountain Development’. Mountain landscapes are also distinctive, giving a sense of nature and wilderness that makes them especially valued for recreation and tourism. This richness of wildlife and landscape is typically reflected in the number of protected sites and national parks. The Scottish LFAs are rich in biodiversity and habitats with a concentration of protected landscapes and habitats that is exceptional in a UK context (see Figure 1.1).

Figure 1.1 Scottish Natura 2000 sites



In addition to biodiversity and landscape, mountain areas may provide other benefits to society because of the distinctive communities and cultures associated with them. This value is reflected in policies that provide special economic and social support to communities in remote and less favoured areas. There may be particular concerns about depopulation in remote areas because of its association with land abandonment, social decline and loss of traditional cultures. Maintenance of the agricultural population may also be important in order to retain rural activities and landscapes that are valued for recreation, tourism, and their associated environmental quality.

Agricultural and forestry activity in mountain areas can also have an important role in protecting water resources and reducing erosion.

To summarise, in mountain areas the most important non-market outputs are¹:

- Biodiversity, wildlife and landscape ;
- Recreation opportunities;
- Cultural and rural heritage; and
- Hydrological protection.

It is also important to recognise that mountain agriculture and forestry can produce negative effects on the environment. These include damage from over-stocking, erosion, water pollution and loss of landscape diversity. Negative impacts are progressively being addressed through EU policy. The Rural Development Regulation (RDR) links the payment of support to the maintenance of environmental standards. The shift to an areas basis for compensatory payments in LFAs will also reduce negative externalities from over-grazing where this occurs in upland areas. Hence, we must expect that the detrimental effects of agriculture and forestry will be reduced over time through regulatory measures. In this study we concentrate on the positive externalities from mountain areas and the role of policy in procuring public goods from farming and forestry.

1.4 Methodological approach

1.4.1 Contingent valuation and other methods

This study uses non-market valuation techniques and in particular contingent valuation (CV), to estimate the size of the benefits that the public derive from mountain areas. This method (see Appendix 1) is based on a referendum approach in which survey methods are used to measure the preferences of individuals. It is an approach that is attractive because it values non-market goods in money terms. This makes it more straightforward for policy makers to assess the costs and benefits of policy measures that relate to landscape, biodiversity and recreation.

However, CV is a relatively new method and the reliability of the results is sometimes questionable. In addition, referendums are not widely used in democratic decision-making and they fail to allow any role for elected representatives, experts or interest groups. Other methods such as citizens' juries, stakeholder negotiations and focus groups also have a role in informing policy and are preferred by those who are sceptical about valuation methods (e.g. Foster and Grove-White, 2000). These methods are useful for identifying issues and perspectives in a consultative context. But as Dixon (2000) notes, consultative approaches are normally used in pre-survey testing prior to CV. When used alone they fail to include any sense of cost associated with policy choices. The outcomes can thus be misleading.

Economic valuation can play a useful role in informing policy decisions by estimating the size of policy benefits in money terms. Whilst CV benefit estimates have clearly influenced policy in the USA and UK, this is less apparent in many other countries. The European Commission has found it more difficult to incorporate non-market benefit estimates into EU policy because of the fragmented state of the data across Europe. However, as the application of economic valuation increases it is likely to have an increasingly important impact on policy in Europe.

¹ Carbon sequestration is also a significant benefit from forestry. This is not considered here.

1.4.2 Impacts on local economies

The environment in mountain areas can be important in generating employment and incomes for local people through recreation, tourism and nature protection. In many mountain areas tourism is a key element in the regional economy and it benefits from a well-maintained and attractive landscape. It was beyond the scope of this study to investigate the link between the production of non-market goods and the indirect benefits they provide to local economies from tourism. It is briefly discussed in Section 2.3 and is highlighted in the Austrian case study (Chapter 3) where the income from tourism in mountain areas plays a vital role in the Alpine economy.

1.4.3 Structure

This study concentrates on identifying the size and nature of the non-market goods and services delivered by mountain areas. We use the Scottish less-favoured areas (LFA) as the context for the study. We first review the evidence for non-market benefits in mountain areas and summarise the economic valuation literature. Then, we present a number of case studies. These are used to demonstrate the valuation and delivery of different types of non-market benefit in a range of contexts. We conclude with an analysis of the implications of the study for future policy development.

2 Non-market Benefits in Mountain Regions

2.1 Introduction

2.1.1 Classification of benefits

This chapter examines the evidence for the four types of non-market benefit:

- Biodiversity, wildlife and landscape, including valued habitats and species;
- Recreation opportunities, including amenity values and public access;
- Cultural and rural heritage, including maintenance of remote populations and cultures; and
- Hydrological protection.

We begin by describing the methods used in the economic valuation of non-market benefits and how these benefits can produce income and employment benefits for mountain economies.

2.2 Benefit valuation and economic impacts

Two types of non-market valuation have been developed in economics. In the first, preferences are revealed by examining the behaviour of the public (revealed preference). In the second, markets are simulated by asking the public to state their preferences (stated preference). Stated preference methods, and in particular contingent valuation, have proved the most versatile and widely applicable. They normally operate in a referendum mode in which the public are asked for their willingness to pay (WTP) for specified goods or policies. More recently, choice experiments have been used to value attributes of the environment. A substantial literature now exists on valuation methods (e. g. Garrod and Willis, 1999; OECD, 2000). The methods are summarised in Appendix 1.

2.2.1 Use and non-use values

A distinction is frequently made between two different types of non-market value:

- *Use value* refers to the utility that a person gets from a visit. Examples are visits to nature reserves, forests or recreation sites.
- *Non-use (existence and bequest) value* is the value that people ascribe to knowing that a good exists even if they have no direct contact or use of it themselves. They may also benefit from the knowledge that goods are preserved as a bequest for future generations. Examples are the values attached to the protection of rare species or habitats.

Table 2.1 categorises the benefits of the different non-market outputs from mountain areas. Only recreation has no non-use element because it normally involves a visit and cannot be undertaken remotely. Hydrological protection probably confers both use and non-use values through its role in safeguarding landscapes and catchments.

Table 2.1 Use and non-use values

Public good output	Use value	Non-use value
Biodiversity, wildlife and landscape	✓	✓
Recreation opportunities	✓	✗
Cultural heritage and rural activity	✓	✓
Hydrological protection	✓	✓

2.2.2 Benefits to local economies

Most environmental outputs from mountain areas are either externalities from production or public goods. They are not sold as such and do not generate a source of income for farmers or land managers. Nor does the local economy benefit directly because no payments to local businesses are involved. However, this does not mean that producers and local businesses cannot benefit indirectly. Table 2.2 shows the different ways in which the non-market values can produce income for land managers and local economies. One route is via policy-related payments (e.g. agri-environment or forestry programmes). The second route is via additional tourism induced by the environmental or heritage change. Finally, it may be possible for land managers to benefit from specialised quality markets for their products because of an association with a high quality environmental image.

Table 2.2 Economic impacts from environmental programmes

Type of Injection	Benefits to Land Manager	Benefits to Local Economy
Policy related payments for environmental protection and enhancement	Net Income from payments	Income and employment effects from land managers' expenditures
Additional tourist expenditure	Income - only if land manager has tourism activities	Income and employment from tourist expenditures
Income from quality products	Income from enhanced quality	Income and employment effects from land managers' expenditures

The local economic impacts of policy measures designed to protect and enhance the mountain environment have been quantified in several Scottish studies (e.g. Crabtree *et al.*, 1994; Crabtree *et al.*, 1999; Rayment, 1997).

2.3 Biodiversity, wildlife and landscape

2.3.1 Introduction

Species and ecosystem diversity provide a range of non-market benefits. These vary from services of global importance such as ecosystem stability, where the loss of biological diversity may threaten the stability of economically important ecosystems (Pearce, 1993), to benefits that exist at a more local level where individuals may value the direct experience of nature and wildlife. In particular, mountain areas are thought to support a wide variety of species, which may distinguish them from other regions.

For this reason mountain areas are recognised as particularly valuable areas for biodiversity conservation (UNCSD, 1997). Much of Scotland's wildlife is of conservation importance at a

national and international level. There are certain rare or endangered species, such as the Scottish crossbill, which is endemic, and other distinctive species such as the capercaillie and the Scots pine. The mountain areas of Scotland have distinctive and extensive heather moorland, and sub arctic flora on the Cairngorm summit, which are rare in the British context. Mountain areas also offer a wide variety of landscapes. The extreme topography of mountains and glens in Scotland offer dramatic and inspiring scenery.

2.3.2 Agriculture

There is extensive evidence of non-market benefits being provided by species and ecosystems, which are valued both for the direct experience that people may have of them and also simply for the fact that they exist (see Appendix 2). Agriculture and native forestry are important contributors to these non-market benefits where appropriate management is adopted. Around half of the European network of Natura 2000 sites designated under the Habitats and Species Directive (92/43/EEC) are farmed environments (Bennett, 1997). Low-intensity and traditional farming (*high nature value*) systems are often considered to produce the highest wildlife benefits (Baldock *et al.*, 1996). Scotland has much low-intensity land use including species-rich grasslands, hay meadows, grazed wetlands and moorland habitats.

Valuation estimates

The technical review (Appendix 2) shows a wide variation in the public's WTP for policies to support biodiversity and landscape in an agricultural context. These are generally Environmentally Sensitive Area (ESA) policies and there are several estimates of their value in a Scottish LFA context. The Scottish studies are examined in detail in one of the case studies (see Chapter 5).

Most of the Scottish studies give a WTP of households to support ESA policies of between £13 and £100 per year. Some of the variation reflects differences in methodology and the types of respondent (local residents, tourists and the general public). Residents and visitors typically have higher valuations because their bids reflect both use and non-use values whereas the general public's WTP only relates to non-use value. Because of the total size of the general population, it is the non-use values that typically dominate the overall aggregate valuations.

Individual components of ESA policy

Research on the value of individual elements of policy is limited. Gourlay (1995) found that in two Scottish ESAs respondents valued wildflowers, broad-leaved woodlands, hedgerows, marsh and wetland, gorse and broom, heath and moor. Expenditure to improve dry stone walling was not highly valued. These results are consistent with those of Hanley *et al.* (1998) who found the highest benefits derived from the woodland element of ESA policy, followed by heather moors, wet grasslands, dry stone walling and archaeology.

Policy value for money

In all cases of agri-environmental policy valuation, the value of biodiversity, wildlife and landscape benefits greatly outweigh the costs of the programmes designed to promote such benefits. This evidence indicates that they provide good value for money from public expenditure. It is likely that the benefits are over-estimated because the policy impacts are over-stated in the information given to respondents (Hodge and McNally, 1998). Even so, this is unlikely to undermine the conclusion that such policies provide good value for money.

2.3.3 Forestry

Valuation estimates

There are few estimates of the value of biodiversity benefits from Scottish forests (Appendix 2). They range from £8 to 62 per household per year which is the same order of magnitude as the ESA values discussed above.

The survey by ERM (1996) dealt specifically with the biodiversity benefits of different forestry management regimes in a selection of British forests. Ninety percent of respondents chose management options that offered more wildlife diversity, and overall the study gave strong evidence that the public were prepared to pay for existence benefits from forest biodiversity. Macmillan (2001a) explored public support for restoration of Caledonian pine forests and obtained WTP values for biodiversity, landscape and recreation benefits of £28-43 per year. The public were prepared to pay more to enhance biodiversity by introducing the beaver and wolf.

Finally, ENTEC (1997) examined the benefits from enhanced landscape design in forests and found that the WTP per household fell within a fairly narrow band of £11-13 per year.

2.3.4 Natural areas

This section reviews the WTP of the public for policies that support 'natural areas' with high ecological or landscape value. The WTP values are given in Appendix Table A2.3. Most use a 'once and for all' payment method, for example into a hypothetical trust fund.

The figures are quite variable and range from £2.26 to £41.26. Two particularly interesting studies were those by Macmillan *et al.* (1999) and Cobbing and Slee (1993). Macmillan *et al.* (1999) derived the WTP to support community purchase of the island of Eigg. Although the individual WTP bids were relatively low (£2.66-£4.62) when aggregated they were more than sufficient to purchase the island. Cobbing and Slee (1993) found higher WTP values for the purchase of Mar Lodge estate in the Cairngorms but the charismatic nature of the estate may have led to higher bids in that case.

2.3.5 Biodiversity, wildlife and landscape: conclusions

Benefit estimates for biodiversity and landscape are extremely variable reflecting major differences between individuals, the particular environmental feature in question and the environmental choices being considered. Existence values usually dominate the total aggregate estimate of benefit particularly in less populated regions. In many mountain areas where tourism is important and population density low, the valuation placed on the biodiversity and landscape by visitors can be much higher than that for the local population.

The value of biodiversity, wildlife and landscape benefits to residents, visitors or the general public outweigh the costs of the programmes designed to promote such benefits. Agricultural and forestry policies designed to protect and enhance biodiversity and landscape (such as agri-environment policy) show clear public benefits that exceed the exchequer costs of financing the payments to farmers.

2.4 Recreation opportunities

Mountain areas are likely to have a good potential for recreation and tourism. The natural topography gives opportunities for hill walking and climbing. A sparse population typically leads to less recreational pressure on the land although heavy use by tourists in mountain areas can result in environmental damage (e.g. Stac Pollaidh, Lochnagar). Scottish holdings can be very large and this often gives more opportunity for unrestricted hill walking than may be possible where there are continuous property boundaries and restrictions to access.

Mountain recreation activities such as hill-walking, climbing, ski mountaineering and cross-country skiing is becoming increasingly popular in Scotland with recent estimates of visitors engaging in such pastimes as 767,000 (HIE, 1996).

2.4.1 Forestry

Forestry management has allowed the public to take advantage of enhanced access in many areas of Scotland and the rest of the UK. A large number of studies have been undertaken on the recreational opportunities afforded by forestry (see Appendix Table A3.1). Bateman *et al.* (1999) collated all the recreational use value estimates from visits to UK forests. The mean value of recreational use value was £0.62 per person per visit, or £0.91 if the option value of future visits is included. Discrete choice methods give estimates that are £0.75 higher. There is evidence that visitors are willing to pay more for higher quality sites (Hutchinson *et al.*, 1995).

Benefits from access to forests depend highly on their location, since this affects the number of users. Bateman and Lovett (2000a) and Willis and Benson (1989) demonstrate that the pattern of demand for additional recreational woodlands is closely related to population density. Recreational value will generally be highest near where people live. This means that forests in remote parts of the country will not have a high recreational value unless they have particular qualities that attract people from long distances.

2.4.2 Natural areas

Natural areas in Scotland provide many opportunities for recreational activities. Much of the less exploited land is upland and moorland, for which Scotland is famous. There are unique opportunities for hill walking and rock climbing. Several studies have used an entrance fee approach to show the value of sites for recreation and appreciation of wildlife. Four studies in Appendix Table A3.2 demonstrate a higher WTP than for entrance to forest sites (range of values £1.98 – 4.25).

Crabtree and MacDonald (1997) undertook a meta analysis of individual WTP using valuation estimates from 58 UK recreational sites. The aim was to explain differences in WTP based on site characteristics (presence or absence of forestry, birds, water), elicitation method and a variable to indicate whether option value was included in the WTP. Adjusted to 2001 prices, the mean use value for forestry sites based on open-ended elicitation was £0.92 per visit. Sites with bird and water features were valued more highly at £3.2 per visit and where the WTP included an option value the values were higher on average by £0.62.

2.4.3 Recreational opportunities: conclusions

The literature clearly demonstrates the value of recreational amenity in Scotland. Overall, for all types of recreational activity, WTP values fell in a fairly narrow band between £0.69–4.25 per person per site visit. This is what, on average, an individual visitor is prepared to pay for a visit to a site where entry is at present free (e.g. such as a Forestry Commission woodland or nature reserve). Values are higher where the experience is more diverse and quality is high. Location is critically important in determining value, and sites close to where people live generally have the highest value. However, sites that attract tourists because of their special recreational and amenity qualities can provide high benefits despite a remote location. In (remoter) mountain areas these more special areas will be the ones that attract visits from the public because of their intrinsic qualities.

2.5 Hydrological protection

Land use activities in mountain areas (particularly forestry) can provide additional non-market benefits in the form of hydrological protection. Mountain areas typically have high rates of erosion due to the extreme topography, thin soils and extremes of climate. Much of

this erosion is due to water flow and therefore the amelioration of the erosive effects of the hydrological cycles is important. Mountain forestry can provide benefits in terms of regulation of hydrological cycles through interception of rainfall and stabilisation of soils by the root network. Forestry reduces the extremes of the hydrological processes and thus benefits the whole catchment. However, in order to avoid some associated problems, best practice, as defined by the Forestry Commission 'Forestry and Water Guidelines' should be applied, and the benefits of natural regeneration as a means of forest expansion should be considered (Davison, 1996).

We cannot, locate any measure of the benefits from such activities but policy measures in some European mountain areas have the prevention of soil erosion and protection of hydrology as objectives in land management (see case study 1).

2.6 Cultural and rural heritage

We are not aware of any economic valuation studies that quantify the benefits to the Scottish people from the continued presence of communities and related employment in mountain areas. Similarly, there are as yet no economic benefit estimates of the cultural component in the valuation of cultural landscapes. There is indirect evidence of public support reflected in the existence of structural and regional development policies applied to peripheral areas. These reflect society's interest in supporting measures to prevent population decline and the loss of traditional culture and rural activities. The crofting population also has a number of special arrangements under agricultural policy. In some countries such as Norway the desire to maintain remote populations underpins agricultural policy (see case study 2).

There is more general evidence that social and economic activities, especially those that are of a more traditional nature, are also valued for their cultural as well as practical significance. In cultural terms, mountains world-wide are often characterised by great ethnic, linguistic, and socio-cultural variety (Kraas, 1996). It is important to recognise the value of a region's social and cultural capital as a necessary cohesive and facilitational element of communities. This is especially true where communities are more isolated. More particularly, in the mountainous regions of Europe, a number of studies (OECD, 1999) have highlighted the need to recognise the value of mountain farming in supporting and maintaining a rural 'cultural landscape' and cultural identity. Again however, there are no measures of the value of the public goods that these contribute.

Evidence of support for peripheral communities also comes in the form of public and government assistance for communities to purchase land and property. In Scotland there have been a number of public appeals on the part of communities wishing to secure greater freedom for economic and social development. Macmillan *et al.* (1999) demonstrated the strong public support as evidenced by donations to a trust fund to assist in the purchase of the island of Eigg for the local community. Several other communities have also been successful in raising public donations to purchase land. This reflects the public's interest in supporting particular vulnerable communities in their development.

While such evidence does indicate widespread support for mountain peoples and cultures, further research is clearly needed on the public good benefits derived from maintaining populations in mountain areas. This is a high priority.

2.7 Geographical distribution of benefits

Up to this point this report has considered non-market benefits in the whole of the Scottish LFA. But the region will generate different benefits depending on location. Value (in terms of WTP) will be affected by the amount of information the public has, and except for very well known features information will decline with distance. Where use value is concerned,

distance has a second effect because it imposes travel costs. The greater the distance that has to be travelled the lower the net benefit from a visit. An exception to this is where areas are valued primarily because of their isolation from population centres. The sense of wilderness that many people enjoy about Scotland and the opportunity to be far away from signs of contemporary life are the appeal of isolated areas. Whether the total use value of such areas is greater or less than recreational areas near large centres of population depends entirely on the size of individual valuations and the amount of people holding such values. Existence value is less dependent on the location of the population because the travel element is irrelevant, although the information element still remains.

Several authors have found distance decay effects in relation to non-market benefits. Bullock and Kay (1997) found that interest in the landscape benefits of the Southern Uplands decreased rapidly in residents further away from the study area. ESA residents and visitors had greater WTP for non-market benefits than the general public. In an evaluation of the Community Woodland Supplement (Crabtree *et al.*, 2001) user benefits were found to diminish with distance from the community woodland. This is discussed more fully in case study 4 (see Chapter 6). Bateman *et al.* (1999) have also established the decline in benefit that occurs with distance for recreational visits to forests.

Research on the effects of environment on house prices using hedonic pricing found that house prices fell by 5.9% for each 1 km further away they were from forested areas (Garrod and Willis, 1992a). This is in keeping with other studies, which have found the most intensive use of recreational areas is in those near to the home (Sievänen, 1992; Jensen, 1995).

Precisely how this fall in WTP with distance relates to the different value concepts (use and non-use) has not been explored in the literature. One factor explaining the lower WTP of more remote individuals is likely to be the lower contribution of use value in the total valuation. But existence values are also likely to decay with distance from where people live unless they have relatively unique environmental or cultural significance.

2.8 Conclusions

Most of the UK and European literature on non-market benefits relates to landscape, biodiversity and access/recreational services provided by land managers usually as a result of policy intervention. Apart from the WTP estimates to support the community purchase of Eigg there is a dearth of research on the willingness of the public to support remote and rural populations or other public good benefits from land management (e.g. hydrological protection).

There is good evidence from valuation studies that Scottish people are concerned about wildlife, biodiversity and landscape. In general the more unique the asset and the greater its status in terms of legal protection, the higher will be the population's WTP to preserve and enhance it. Valuations vary considerably with one-off payments to preserve landscape such as the ESAs, Caithness flow country or Mar Lodge varying from £10-40 per household. Lower values were associated with the Isle of Eigg purchase. Valuations associated with biodiversity and charismatic species in highland forests vary from £8 to in excess of £100 per year (for beaver introduction).

Services from land managers that give use value to residents and visitors (from recreational visits) are generally valued more highly than when they do not (i.e. when the only benefits derive from existence value). Estimates of the willingness to pay for ESA type policies are large with many studies indicating a WTP by residents and visitors of £20 and £40 per household per year. These may be over-estimates of the value of current ESA policy. There is some doubt as to whether the changes observed on ESA farms in practice will

produce the impacts on biodiversity and landscape that the CV information packs used in the WTP study depict (Hodge and McNally, 1998).

Substantial use benefits also derive from recreational opportunities, with most of the research concentrated on forests and recreational sites. With recreational use, proximity to the site is an important determinant of its value particularly for sites where there are numerous local substitutes. Nationally important sites with a variety of facilities and recreational opportunities will be more highly valued than local woodlands or farmland.

We summarise the factors that affect the value of an area's landscape, biodiversity and recreation benefits (Table 2.3). It indicates that natural assets have to have distinctive qualities associated with location or ecological/landscape merit if they are to be highly valued by the public. Policies in support of biodiversity, landscape and recreation should focus on protecting and enhancing assets with the highest value. For biodiversity, this may require the support of large areas in order to give coherence and take account of connectivity between locations.

Table 2.3 Differences between geographical areas in biodiversity, landscape and amenity benefits

Land with high aggregate WTP for protection/enhancement	Land with low aggregate WTP for protection/enhancement
Particular landscape and/or biodiversity interest (e.g. in/near designated area, ESA-type scheme. presence of charismatic species)	No outstanding environmental attributes No access-recreational opportunities
Recreation /access opportunities	Not a tourist area or near population centre
Popular tourist area or near population centre	

Comparable information about cultural values and significance is much more sparse. One might expect there to be more support for the communities of the Highlands and Islands including the crofting communities because of their distinctive characteristics. The level of structural policy intervention in the Highlands and Islands, and the LFA measures within the CAP may also be presumed to reflect public support for communities within these areas. But policy development ideally requires new evidence on public benefits to support the case for intervention. There is indirect evidence (see Case studies 1 and 2) for public support for the maintenance of remote populations and cultures but the public's WTP for these benefits has not been estimated directly. More research is needed to demonstrate the size of these benefits.

3 Case study 1: Cultural landscape services of agriculture and forestry in the Austrian Alpine zone².

3.1 Context

This case study focuses on the delivery of environmental and landscape services in the Austrian Alps. It examines the role of agriculture and forestry in delivering environmental services, their value to the public and the extent of policy support for their delivery.

Austria's Alpine area comprises approx. 54,569 km², representing 65 % of Austria's total federal territory. Forty-nine percent of Austria's agricultural and forestry holdings are situated in mountain areas. These holdings keep 63% of the dairy cows, 61% of all cattle, 60% of all horses and 79% of sheep (Dax and Hovorka, 2000). Mountain farms are also of great importance for forest protection and the management of alpine pasture. Both forest and agriculture make major contributions to the biodiversity and landscapes of the Austrian Alps and together with tourism form the backbone of the alpine economy. Most mountain farms are mixed forage growing farms, which also manage a small share of forest area. The average holding size is only 13 ha agricultural area and 10 ha forest (Hovorka, 1999). There is a trend towards part time farming as farmers diversify in an effort to maintain incomes. This shift towards pluriactivity has been particularly evident in mountain areas in the 1980s and the first half of 1990s (Dax, 1998, p.43).

The Austrian mountain landscape is frequently described as a cultural landscape (Hovorka, 1997) because it reflects long-established mountain land management activities and symbolises cultural identity and heritage. It is farming and forestry that have produced valued biodiversity and landscape features within the cultural landscape. These landscapes not only produce public goods and services that directly affect the social well being of individuals but also represent important rural development assets (Dax and Hovorka, 2000).

The Alpine environment and landscape also represents a major tourist asset. The mountain area accounts for nearly 90% of overnight tourist stays and the associated economic activities. Tourism in Austria is based on the generally high quality of the cultural landscape as rural amenity. Whilst the demand for environmental and cultural services from tourism is important for many mountain communities, Dax and Hovorka (2000) indicate that the image of the Alps as a unique tourist area often leads to an overestimation of the economic role of tourism. The resulting focus on tourism development as the exclusive perspective for regional development neglects the potential of other sectors. It also gives little attention to the problems that arise from tourism concentration and settlement development, including some adverse effects on the environment. An essential element of the alpine economy is the inter-dependency between mountain agriculture, landscape and tourism. Tourism contributes to the incomes of the farming communities whereas agricultural management of the land maintains the high quality environment and landscape services for tourism.

² This case study has made extensive use of OECD documents on the environmental and amenity services from mountain regions in Austria (OECD, 1998a; 1998b, 2001), and from a European Commission research project on the mountain policy and environment (Dax and Wiesinger, 1998; Euromontana, 1998). It has also benefited from the assistance of Thomas Dax of the Federal Institute of Less-Favoured and Mountainous Areas in Vienna.

3.2 Services provided by forestry and agriculture

In prehistoric times the Alps was almost entirely covered in forest as the natural vegetation. From the Middle Ages, agriculture, and to a lesser extent forestry, have formed the current landscape and its associated habitats and species. This opening up of the natural forest has produced a richly varied landscape. Forest-meadow transition zones are important sources of biodiversity and contribute to the wide range of landscape features.

Apart from their economic functions, Alpine forests provide numerous non-market services. Intact mountain forests function as protection against natural hazards including avalanches, mudflows, landslides, and erosion, thus making the Alpine area habitable and passable in its present form (OECD, 2001). They have a positive impact on microclimates, water management, the provision of habitats for numerous animal and plant species, important recreational uses, air pollution control, and make an important contribution to a varied landscape.

Mountain farming fulfils many more functions than food production and therefore represents an integral part of the sustainable development of rural areas. It is characterised by close connections between the environment and the economic and social activities of its inhabitants. The typically small structure of Alpine ecological sites combined with the effect of management for agriculture supports a high diversity of plants on the alpine pastures (Dietl, 1995). Many of the ecologically valuable, species-rich mountain areas developed only as a result of agricultural activities. While mountain meadows support approximately 30 – 60 species and fertile alpine meadows approximately 30–50 species, only 20–45 species occur on poor wet meadows and traditionally managed fertile meadows. Intensive grassland rarely supports more than 10 different species (Grabherr & Reiter, 1995).

Hovorka (1997) summarises the environmental outputs of Alpine agriculture and forestry as:

- ❑ Design, maintenance and tending of cultivated and recreational landscapes (main resources for tourism);
- ❑ Safeguarding the natural essentials of life - soil, water, species and landscape diversity (also for people living outside the Alps);
- ❑ Maintaining continued settlement of peripheral rural areas and their social and other economic activities;
- ❑ Development of ecologically compatible forms of management;
- ❑ Provision of regional economic impetus; and
- ❑ Protection from natural hazards and continuation of traditional cultivation methods providing protection against floods and avalanches.

In addition, the Alpine area is characterised by a highly diverse and isolated landscape structure, and demanding conditions for farm production. This has led to the development of a great diversity of rare and unusual breeds. These contribute to genetic diversity, landscape and cultural heritage. Most of these rare breeds are classified as highly threatened (BMLF, 2000).

3.3 Pressures on biodiversity, landscape and the environment from agricultural change

Whilst agriculture and forestry are key providers of landscape and biodiversity, pressures on these sectors are leading to loss of services as the quality of landscapes and habitats is

reduced. The essential reason for this development is that the returns from land use are low, and particularly so in less-favoured Alpine locations. Category 4 farms³ suffering severe natural handicaps earn only 14.6 % of the returns of lowland farms per hectare of land (OECD, 2001). The total earnings of mountain farms are only 45 % of lowland farms.

Pressures on the incomes of mountain farmers is leading to the dual effects of increased intensification of better quality, flatter land, where operations can be mechanised and fertiliser applied; and abandonment of more remote and steeper grassland (Dax and Wiesinger, 1998; MacDonald *et al.*, 2000). This reflects both the pressure to increase output on more productive land and the high labour costs and low output associated with the management of steep grassland and high level meadows. The maintenance of meadows and pastures also depends to a great extent on the continuation of grass-fed dairy cattle. With intensification of dairying and greater use of concentrate feed, the role for mountain meadows is reduced.

The Rural Development Programme for Austria (under Regulation 1257/99) (RDP) indicates that the abandonment of agriculture in low-yield areas and its intensification in favourable areas has a significant impact on the following problem areas:

- ❑ Soil: erosion risk from over- or under-grazing; water erosion;
- ❑ Water: nitrate and pesticide pollution through overstocking and farm manure, mineral fertiliser and plant protection product use; bacterial pollution of water through overgrazing; and
- ❑ Biodiversity/landscape: reduced biodiversity through over/under-stocking; reduced percentage of extensive grassland (brushland, forest conversion); loss of habitats for flora and fauna specific to regions, reduced gene pool in livestock and crops.

Over a long time period, biodiversity has benefited from extensive management, especially from the extensive management of meadows traditionally mown once or twice a year, and alpine pastures and forest pastures. Due to intensified use of pastures, species diversity has been reduced (Gepp, 1994; Ellmauer, 1993). Abandonment of land leads to a succession, which results in the development of dwarf shrubs and, ultimately, of secondary forests, thus causing a decline of species diversity and structural richness (Tasser *et al.*, 1999). It can also lead to soil erosion, increased avalanche occurrence, the destruction of slope terraces, and the loss of traditional landscape elements (Dax & Wiesinger, 1998). There may be additional undesirable social consequences from the loss of infrastructure and rural exodus (MacDonald *et al.*, 2000).

3.4 Policies designed to support mountain agriculture and its environmental services

The importance of mountain agriculture and forestry in underpinning the Austrian cultural landscape and supplying non-market services is evident from policy measures. Since the beginning of the 1970's support for mountain farmers has been prioritised through the 'Mountain Farmers Special Programme'. This is described in detail by Hovorka (1997) and consisted mainly of direct payments to farmers, regional investment aid, forestry and territorial improvement measures. The main environmental thrust in agricultural policy came via 2078/92 following EU accession in 1995. However, similar agri-environmental measures and programmes have been designed and implemented since the late 1980s. For example, support from some provinces for organic farming started in 1989 and the federal scheme for

³ A category within the national farm accounting system.

organic farming produced a substantial increase in organic farming in the years following 1992.

The agri-environmental programme (ÖPUL) had major positive benefits for mountain farming because the management systems used there correspond to a high degree to environmentally sound farming. Mountain farmers received about 45% of the ÖPUL budget (Dax and Hovorka, 2000). Support for organic farming is a key element of the scheme and in 1996 87% of supported organic farms were mountain farms.

The main thrust of ÖPUL is to encourage extensive cultivation including organic farming. Payments are made for extensive grassland use and reductions in stocking. Payments within the ÖPUL programme also contribute to the conservation of local breeds and smallholdings as well as to the tending of alpine pastures and slopes. In addition there are a number of regional projects that are highly relevant to mountain areas including payments for the mowing slopes and meadows, alpine pasturing and upkeep of environmentally sensitive areas. Management measures for abandoned areas are also available.

As assessed by the Austrian agri-environmental programme (BMFL, 1998), alpine husbandry premiums are very effective in maintaining an ecologically correct cattle density and maintaining extensive grassland. They are paid to about 7,000 farms and farm cooperatives with an area of about 735,000 hectares. Alpine husbandry also allows payments to be made for safeguarding and developing the diversity of farm animals and arable crops. About 61,000 farms throughout Austria, with an area of 231,000 hectares, have worked on mowing steep areas. This is expected to have similar effects, although the work is mainly designed to maintain grassland and keep an open landscape⁴.

Subsidy payments under the agri-environmental programmes for mountain farmers plus the compensatory allowance cover about 60 % of all state subsidies and compensation payments for such farms. Measures to support agriculture and forestry in the mountain region also make an important contribution towards strengthening the economy in rural areas and peripheral districts and have a stabilising effect on the local labour market (Hovorka, 1997).

3.5 Evidence for the value of non-market benefits

Apart from policy measures that are directly aimed at procuring environmental and amenity services (e.g. EU Regulation 2078/92), we can identify three groups that benefit from public good provision by agriculture and forestry - local people, tourists and the wider community.

3.5.1 Local and wider population

Although we are unaware of any economic valuation of benefits to local people, OECD (2001) states that a high existence or traditional value is often attributed to the traditional cultivated landscape and especially to traditional agriculture and forestry by the local inhabitants. The special appreciation of traditional agriculture and forestry, which often have to be practised under severe natural conditions, is one reason why the reduction in the number of mountain farms in recent decades has not been much greater than that of lowland farms (Dax, 1998, p.59).

⁴ These are two specific mountain measures out of the 34 in ÖPUL. In terms of overall subsidies to mountain farms, ÖPUL contributes 36%, compensatory allowances 20%, market support 33% and other subsidies 11% (data for 1995-1997 from Hovorka *et al.*, 1999).

The protracted political debate about support for mountain farmers has not just brought about a detailed support regime targeted at their specific production difficulties but also a discussion of the issue among local people and Austrian society at large. It may also have heightened the awareness of the non-agricultural role of mountain farming. The resulting widespread consent for supporting mountain farmers and the focus on initiatives to extend the activities of mountain farmers reflect these shared values.

3.5.2 Tourists

In 1999, the Austrian tourist industry had a total turnover of ATS 201.9 billion of which about 80 % was produced in the Alpine region. OECD (2001) estimate that the main motive for about 20 to 25 % of tourist visits to the Alps is to enjoy the natural and cultivated landscape. Even where sport is the main interest, landscape contributes to the experience. As OECD (2001) point out, it is impossible to state what tourism would be like if the landscape were not maintained.

Further evidence of the importance of the landscape and its agricultural management is provided from the activities of some municipal authorities. Some municipalities with large numbers of tourists pay additional alpine husbandry and mowing premiums to local mountain farmers in order to purchase the maintenance of a valued landscape for visitors. There is a clear perception that both the farm work itself (mowing, hay making and stock management) and the resultant cultivated landscape provide valued services to visitors and enrich the tourism experience.

3.5.3 Environmental interest groups

The valuation of cultural landscapes is also subject to a shift in stakeholders involved and increasingly interests from non-mountain areas. In particular, it is interesting to note the rising valuation from people from non-mountain areas, the relevance of non-use values and the change in the aesthetics of landscape development. For example, there has been a development of Alpine nature protection groups and associations, as indicated by activities led by CIPRA, local agenda 21 communities in the Alps and the discussions on the Alpine Convention. Conversely, the wilderness movement has emerged with new concepts of what constitutes desirable mountain landscapes (Stremlow, 1998). The comprehensive research programme on the development of cultural landscapes, commissioned by the Austrian Ministry of Science in 1995 has sought to broaden discussion and achieve an inter-disciplinary concept.

3.5.4 Economic valuation studies

There are relatively few economic valuation studies that directly measure the value of non-market benefits from mountain areas in Austria. Pruckner and Hofreither undertook the first studies on the value of landscape services (quoted in OECD, 2001). They used the travel cost method to estimate the effect of the agricultural character of a resort area on tourist expenditure. The agrarian character of the resort had a major effect on the tourists' valuation of the area as revealed in their travel costs. A 1 % increase of the agrarian character in the index increased willingness to pay by 1.4 % (i.e. a total of about ATS 800 million).

They also used a replacement cost approach to value the services of forests in relation to flood control, protection against erosion, conservation of water quality and avalanche control. The replacement value for the forest protective function of forests was taken as the cost of installing torrent and avalanche control measures for all the potentially threatened areas. The replacement costs without any discounting were huge at over ATS 4,000 billion for permanent control measures and about ATS 1,800 billion for temporary regulation.

Pruckner (1995) undertook a more direct valuation of landscape services provided by farming. This used a contingent valuation approach in which 4,500 visitors were asked for their willingness to pay (WTP) for farmers to maintain mountain farming activities and manage the

landscape. The WTP per tourist was ATS 9.2 per year. When aggregated this gave a total tourism valuation of ATS 1.2 billion. The figures may be compared with the direct payments to mountain farmers of 1.34m ATS per year in 1991.

The importance of the landscape to tourism decisions in Austria is indicated by the fact that 84% of interviewees regarded a well-kept landscape as the decisive factor in spending a vacation in Austria. Austrian respondents expressed stronger feelings than tourists from other countries. The study did not estimate the option and existence value of mountain landscapes for non-tourists. This would increase the total value estimated in the study. On the basis of a Swedish study, Pruckner (1994) suggests that it might be approximately ATS 9 billion.

Hackl and Pruckner (1995) also estimated the benefits provided by the Upper Austria Limestone Alps National Park. They estimated the willingness-to-pay for services provided by the national park among the entire population of Upper Austria and the tourists in the national park region. The average WTP varied between ATS 34 per person per year for non-visitors and ATS 56 for local inhabitants and tourists. The total value of services was estimated at between ATS 55 and 184 million per year.

The use benefits provided in national parks results in expenditure from visitors and positive impacts on local economies. The Austrian Economic Research Institute (quoted in OECD, 2001) assessed the income and employment impacts of Austria's national parks. The direct expenditure generated was ATS 168 million per year with the creation of 322 jobs. OECD (2001) suggest that the economic benefits from national parks may be much higher than this because designation positively influences the image value of entire tourist regions. This image value enhances the tourism experience and hence extends both the value of the benefits produced and the total expenditure of tourists and visitors to the Alpine region.

The relative lack of Austrian valuation studies may reflect the fact that mountain development achieved the status of a national priority at an early stage. Global support for mountain farming was esteemed necessary and provided at a nation-wide basis by applying a simple classification system across the mountain areas of Austria. This both addressed actual benefits provided, expressed primarily through a high level of tourist development, and also supported the potential of regions with few tourist facilities by preserving landscape features and agricultural practices.

However, the issue of sufficiently comprehensive valuations with the focus on detailed policy development, e.g. for specific mountain valleys or communities, has recently been highlighted in some local areas. These examples are either linked to very highly intensified tourist regions, where the continuation of farming activities is a real problem, or in other regions where the importance of small-scale sustainable development has been highlighted (e.g. several local action groups and LEADER initiatives, including experiences such as in the Lesachtal and other communities).

3.5.5 Conclusions on non-market benefits

We can draw a number of conclusions from these studies:

1. There is strong evidence that the traditional management of landscapes provides a wide range of valued public goods varying from landscape features to soil protection and biodiversity. Agriculture is the key activity and tourists a principal beneficiary.
2. OECD (2001) concludes that, depending on the approach, valuation method and context, very different monetary values can be calculated. They may vary from a few billion ATS (e.g. from the ecological accounts and people's willingness to pay for properly managed cultivated landscapes) to over ATS 1,000 billion (technical costs for replacing the function of forests to provide protection against natural disasters).

3. Despite the variability in benefit estimates these results 'underline the special importance of biodiversity conservation and maintenance and provide a basis for public responsibilities and intervention in general and also for strategic discussions' (OECD, 2001).
4. The valuation research has been limited in its scope by concentrating on benefits to tourists (with a focus on use value). There appear to be no estimates of what may well be very large benefits to the Austrian population as a whole from protecting Alpine biodiversity, landscape, culture and environment. The concentration on tourism almost certainly reflects the relative ease of measurement of use values and the importance of tourism for the Austrian economy.
5. There is a widespread common perception (and indirect valuation) in Austria that mountain farming support is justified and very large benefits to the Austrian population as a whole is attributed to the farm management of (diversified, small-scaled) mountain farms. Non-use values of European mountain areas (of biodiversity, landscape, water resources etc.) are increasing in importance in the international debate. Valuation of these aspects is subject to enormous conceptual and methodological difficulties.
6. The valuation data provide little guidance on the benefits provided by particular agricultural practices or specific outputs (landscape or biodiversity impacts). Nor do they inform about the benefits attributed to marginal changes in public good output such as a change in grassland management or greater afforestation. We can conclude that the valuations are not sufficiently comprehensive or reliable to form a basis for *detailed* policy development although they do provide a basis for action to support the output of public goods.

3.6 The Rural Development Programme

The new programme operating under EU regulation 1257/99 focuses strongly on the maintenance of the agricultural and forestry sector based on environmental principles and multifunctional, sustainable operation. Three sets of objectives are envisaged:

- Compensation for services;
- Preservation of assets; and
- Improving competitiveness.

It is notable that both 'compensation for services' and 'preservation of assets' derives from the principle of paying producers for public good output and the conservation of public good assets.

Agri-environmental measures are allocated 59% of the total budget with a further 26% for LFA measures. The agri-environmental measures contain a variety of payments to support mountain farming and specific practices that deliver environmental and cultural goods. These follow closely the previous 2078/92 measures with a mixture of basic conditions on land and stock management with premia for specific activities. It is important to note that most agri-environmental measures are not targeted directly at mountain farms. However, uptake is very high and has turned out to be the most important single support measure for mountain farming.

Part of the programme is defined in terms of payments for agricultural and forestry practices whereas other payments are more closely linked to environmental outputs or protection. It is probably the case that some of the cultural benefits depend on the continued viability of farming practices and direct support of these is an efficient mechanism. Clearly in the future there is scope for further refining the value of specific outputs so that payments can be better targeted.

3.7 Policy development

Role of direct payments and other support to agriculture

The current landscape and ecological services provided from farming and forestry are heavily dependent on support for agriculture. OECD (2001) concludes that removal of support would have dramatic consequences for land use. This is despite the fact that alpine farmers have adapted their businesses and diversified their income base through tourism, valued-added products and off-farm work. The OECD report concludes that 'the future of landscapes will be directly linked to the future of agriculture and agricultural policy. Abolishing the direct payments would not only cause fundamental changes in Austria's landscape features but would also seriously affect the social structure of rural areas. Many holdings would be abandoned; less-favoured sites would overgrow or be converted into forests. Agricultural use would to a high degree be replaced by forestry. This would lead to a decline of habitat diversity and, consequently, also to species loss; depending on altitude, different natural forest communities would develop'.

The social effects of removing support reflect the fact that mountain farming has a regional function, preserving a basic level of infrastructure, regional activities and social structure and a positive impact on the regional economy. There would be a loss of population and local culture.

Role of tourism

Most of the valuation information relates to the value of landscape services for tourists. It reflects the fact that they can easily be identified and are perceived as a critically important group for local economies in the Alps. The function of biodiversity in providing protection against natural disasters is also of great economic importance to tourist centres and their facilities located in the high Alps.

However, it may be difficult to argue for direct payments to farmers on the basis of tourism benefits alone. As a market activity it may be argued that tourism should itself procure the services it requires from land managers – using finance raised from taxation on tourists. Although this is one route from financing services valued by tourists we doubt if this would be feasible on any scale without compromising the competitiveness of the tourism sector.

Wider public benefits

What has not been explored through valuation studies is the more comprehensive set of benefits that the Austrian population derive from the alpine environment. In many UK and US studies, existence values have dominated the values to tourists or local inhabitants simply by virtue of the greater numbers involved. The benefits to the Austrian public from biodiversity, environmental protection and the cultural and heritage value of mountain communities could well be much greater than those estimated for tourists alone. The function of biodiversity in providing protection against natural disasters has widespread benefits.

Policy mechanisms and targeting

There is no single 'cultural landscape' – it will vary with place and over time. The implications are that payments to land managers will vary depending on what non-market services they produce and where they are located. Payments would be targeted so as to maximise their efficiency in delivering public goods. It is important to include non-use values and payments will be required over long time periods. The distributional effects of this could be substantial and force major adjustment on farmers that do not (or cannot by virtue of their farm or location) produce services that tourists and the public require.

To some extent this targeting principle is already operating within ÖPUL and the RDP. Farmers only qualify for certain categories of payment where they engage in particular activities. A

policy based solely on procuring non-market benefits would accentuate this targeting. But we should note that ÖPUL pays for activities not directly for services.

3.8 Conclusions

The economic valuations of Austria's Alpine zone cultural landscapes are limited in scope. Nevertheless the benefits are reflected in tourist demand and the widespread support at national and international levels for mountain policies. The support for mountain farming on a more general basis in Austria reflects the assumption by Austrian policy that additional benefits and effects for which the beneficiary cannot be addressed have to be taken into account.

Austrian mountain farming in the Alpine zone is highly multifunctional. It provides environmental, tourism, cultural and social functions within the overall cultural landscape. Other mountain areas (and more localised areas) are likely to differ in the types of services provided and the extent to which they are valued.

The high ecological sensitivity of mountain regions requires measures to safeguard and support the sustainable use of natural resources (in particular water and woodland). The tendency for agricultural intensification in more favoured parts of mountain areas is a threat to sustainable development and may include ecologically damaging forms of farming.

Both an effective agricultural policy and the contribution of other sectoral policies are important in safeguarding environmental amenities and the cultural landscape, and promoting rural development. Mountain farming policy has to actively integrate with other policy areas and address issues that go beyond regionally specific effects.

Figure 3.1 summarises the key points of the Austrian case study.

Figure 3.1 Summary of key aspects of the Austrian case study

Context
Long-standing public support for mountain areas. Multifunctional agriculture and traditional management provide a wide range of public goods (soil protection, biodiversity, cultural landscape). Tourism is very important.
Valuation
Limited number of valuation studies - mainly tourists' valuation of agricultural landscape and National Parks. Very variable results. Despite this, they provide some basis for biodiversity and landscape conservation. No direct estimates of the cultural contribution of the Alpine zone.
Policy
Agri-environment measures under 1257/99. Most not specific to mountain areas (some are specific). Very important source of income in mountain areas - often paid for maintaining existing activities. But policy objectives are not clearly defined and the inter-linkage of agricultural, environmental and rural development policies needs to be developed.

4 Case study 2: Changing the basis of agricultural support in Norway to payments for public goods

4.1 Context

This case study describes research undertaken by Brunstad *et al.* (1995, 1999). It models the impact on the Norwegian agricultural sector of a radical change in the support system to one based solely on the production of public goods.

Support to agriculture in Norway is amongst the highest in the OECD. This reflects the harsh farming conditions, the desire to maintain agricultural incomes and the importance of non-trade concerns (non-market services) such as food security, the viability of rural areas, the agricultural landscape and agro-biological diversity (Ministry of Agriculture, 1999, 2000⁵).

Brunstad *et al.* set out to investigate the impacts on Norwegian agriculture of changing the basis of support to one which delivers three of the public goods listed above:

- Food security;
- Maintenance of population in remote areas; and
- Landscape preservation.

Brunstad uses an economic model of Norwegian agriculture to compare the structure and incomes from agriculture under the current support arrangements with that predicted to occur if support were based solely on satisfying the three public good criteria.

4.2 Value of landscape and other public goods

Food security was included as a constraint in the model by listing the minimum outputs for agricultural products (the crisis menu) which agriculture had to deliver. This gives the population a basic level of food security. The concern with maintaining the population in remote areas was modelled by requiring that the population be maintained at at least 50% of the current level associated with agriculture.

The requirement that the agricultural landscape should be preserved was handled in a different way, by transferring CV estimates produced by Drake (1992) in Sweden. Whilst there is no guarantee that these are relevant to Norwegian conditions, the contexts were thought sufficiently similar to give at least indicative effects. Drake surveyed 1290 people throughout Sweden. They were randomly selected and were asked about their attitudes to the agricultural landscape and how much they were willing to pay per year in income tax to prevent half of all the agricultural land being converted to spruce. Respondents were shown drawings before and after the change in landscape. The average individual WTP was 78.5 ECUs per year. Aggregated up to the population this gave a WTP of 485m ECU (140 ECU per ha). Drake suggests that the results only give a general guide and the precision of the estimate is $\pm 50\%$.

Drake assessed the relative importance of different motives in the willingness to pay to preserve the agricultural landscape (Table 4.1). Nature conservation was most important followed by aesthetic considerations. The cultural value of landscapes was only a small proportion of the total.

⁵ Quoted in OECD (2001b)

Table 4.1 Allocation of WTP to different motives

Motives	Proportion of total (%)
Nature conservation	47
Aesthetic	22
Recreation	13
Cultural-historic	12
Other	7

Drake demonstrated that the WTP differed between different forms of land use. The landscape of land under grain production was valued the least highly at 124 ECU per ha. Grazing land was valued at 236 ECU per ha and a special type of wooded pasture was most highly valued at 300 ECU per ha. There were also locational differences, with a much higher WTP to preserve the agricultural landscape in northern Sweden (187 ECU per ha) than in the south (101 ECU per ha).

4.3 Procuring public goods through direct payments

The model indicates how Norwegian agriculture would be transformed were the objective in policy only to produce the required public goods in the most economically efficient way. Output of all sectors is reduced dramatically to the minimum required to satisfy the goals of food security and employment in remote areas (Table 4.2). Arable production is severely curtailed but this is not surprising given that Norway has very unfavourable growing conditions for arable crops. Grain production is largely replaced by extensive beef production and Drake's (1992) study indicates that this enhances the value of the landscape to the public.

Table 4.2: Norwegian agriculture under alternative policy scenarios

	Base situation	Production of public goods
Milk (m litres)	1,850.0	838.0
Beef (m kg)	740.0	697.0
Wheat (m kg)	145.2	41.6
Employment ('000 man years) – remote areas	51.9	26.0
Employment ('000 man years) –central areas	19.8	7.0
Land use (m ha)	0.70	0.38
Total support (billion ECU)	2.3	0.84

The subsidies required to support the food security and population goals were between 750 and 1,500 ECU per ha. These greatly exceed the WTP for landscape based on Drake's study (236 ECUs per ha for grazing land). Hence, the conclusion is that, in the Norwegian context, the goal of landscape preservation is dominated by other public policy objectives goals and can be obtained without additional payments to farmers.

The research concludes that there is no case for additional payments. Landscape goods are provided as a side-benefit from the inducements for food security and maintenance of the remote population.

It could be that the environmental benefits from agriculture were underestimated in Drake's study. The emphasis on landscape in the information set provided to respondents may have

concentrated on the aesthetic elements and less on the benefits through biodiversity and habitats conservation. However, the WTP figures were not inconsequential (mean 78 ECU per year) and substantially higher than the bids estimated by Pruckner (1995) for tourists in Austria (ATS 9.2). Even if the total WTP for all benefits had been higher than the value estimated by Drake it would have to be substantially higher before direct payments for environmental benefits could be justified.

It might also be argued that the re-shaped 'public good' agriculture does not deliver the same set of environmental goods as that of current agriculture. Substantial areas of land would be uncultivated (abandoned) and afforested. The present landscape mix would be lost. Whilst Drake's scenario does appear to account for this by posing the scenario of 50% of farmland converted to spruce, it might be expected that as agriculture contracted the WTP for a farmed landscape would increase.

4.4 Optimal level of landscape preservation

In a subsequent study Brunstad *et al.* (1999) take account of a varying WTP for landscape and estimate the optimal level of landscape services in Norway. In this case the WTP is treated as variable with a declining marginal WTP as agriculture expands. The optimal amount of agriculture is where the marginal WTP for landscape just equals the marginal profitability of agriculture, i.e. the marginal hectare is just kept in production by the landscape benefits it produces.

Again using Drake's (1992) CV data they show that only a minor fraction of today's support level would be paid to farmers to procure the landscape benefits from agriculture. The landscape benefits do appear to be high enough to keep a major part of the land area under farming. But this does not prevent a major shift away from cropping to grassland with its higher landscape value. Production and employment fall substantially as less intensive grassland farming become dominant.

4.5 Policy relevant conclusions

Brunstad's model is of considerable interest because of the inclusion of both market and public good services from agriculture. Results have to be interpreted as indicative only because of the imprecision in the estimates of the public WTP for environmental services. They do suggest that environmental services alone are not valued highly enough to support Norwegian agriculture at current levels of output and employment. But as incomes increase under future economic growth, environmental services, which are income elastic, will be more highly valued. There may then be a case for keeping land under some form of agricultural production rather than allowing it to change irreversibly (for example to forestry).

Figure 4.1 summarises the key points of the Norwegian case study.

Figure 4.1 Summary of key aspects of the Norwegian case study

Context
Norwegian agriculture is highly subsidised. An economic model is developed to investigate whether current levels of support can be justified by <ul style="list-style-type: none">❑ food security (crisis menu)❑ maintenance of population in rural areas (50% of current level)❑ landscape
Valuation
Swedish contingent valuation estimates used. WTP to keep agricultural landscape and prevent 50% of land being planted with spruce. WTP per head was 140 ECU per ha per year.
Analysis
Subsidies required for food security and population goals are much higher than WTP for landscape. Landscape effects are dominated by other goals. There is no case for additional payments for landscape over and above other payments. The study is indicative only but suggests non-market good values may not be high enough to underpin support at current levels.

5 Case study 3: The value and impacts of payments for environmental services – the case of Environmentally Sensitive Areas (ESAs) in Scotland

5.1 Context

There are 10 ESAs in Scotland covering an area of almost 1.5 m ha. The ESAs cover 19.8% of the Scottish land area and tend to be in remoter parts of the country where virtually all of the farmland is designated LFA. The ESAs were designated from 1987 onwards as target areas under EU Regulations 797/85 and 2078/92 with the objective of conserving and enhancing natural beauty flora, fauna and historic interest. Within these areas, farmers are offered incentives to adopt management prescription that will protect and enhance valued environmental features on farms. These features include wetland, woodland, water margins, herb rich pasture, bird measures and hedges. They also control livestock numbers in situations where the environment would benefit from changes in stock management. Payments at fixed rates are made for a range of activities including capital expenditure related to environmental management. Existing agreements with farmers in ESAs are continuing under the Rural Development Regulation.

This case study brings together two elements of the policy. The first is the research on the valuation of the public benefits from ESA policy. The second is the impact of the payments on farm businesses and employment.

5.2 Approaches used to value ESA benefits

Two studies have attempted to measure the value of the non-market benefits procured through ESA payments. The approach in each case was to measure the benefits from the policy by comparing the situation with an ESA policy to that without. Hanley *et al.* (1996) measured benefits from two ESAs – Breadalbane (in Highland Perthshire) and Machair (Western Isles). Gourlay and Slee (1998) investigated the benefits of the Stewartry and Loch Lomond ESAs. Both studies used contingent valuation with additional interview questions to elicit more detail on public attitudes to ESAs.

5.2.1 Breadalbane and Machair

Breadalbane ESA covers 179,000 ha and is an upland livestock area with both broadleaved and coniferous woodlands. The Machair is a coastal plain covering 16,000 ha. It is characterised by small scale farming and crofting based largely on sheep and cattle on grassland, and the cultivation of small strips of oats, barley and potatoes. The ESA is best known for its bird habitat (including the corncrake) and its shell sand flora.

Hanley *et al.* (1996) used CV to measure the WTP of three different groups for ESA policy. These groups were (i) visitors to the ESA area, (ii) residents in the ESA area, and (iii) the general public in Scotland. In order to define the impacts of the ESA policy on landscape, habitats, species and the protection of archaeological features, policy-on (with ESA policy) and policy-off (without ESA policy) scenarios were developed. These took the form of an information pack containing descriptions of the expected impact of the policy, and photomontages of typical landscapes both with and without ESA policy. The information packs allowed respondents to see the anticipated impact of the ESA policy on wildlife and landscape.

Random samples were taken of the members of the three groups of the public and respondents received either a postal or face-to-face questionnaire. A mixture of discrete choice and open-ended methods was used.

5.2.2 Loch Lomond and Stewartry

Loch Lomond ESA has Loch Lomond as its centrepiece and covers 37,000 ha of farmland, mainly comprising extensive hill farming units. The environmental interest centres on mountain, loch and moorland scenery and a range of woodland, wetland and moorland habitats. Stewartry covers 48,500 ha with a diversity of farming enterprises from dairying to arable cropping and livestock rearing. It has an interesting landscape based on varied field patterns with hedge and dry stone wall landscape features.

Gourlay and Slee (1998) used a variety of methods to investigate the preferences of visitors and residents. The quantitative part of the study used CV to estimate the WTP to support ESA policy. The qualitative part of the study asked respondents to state the importance of different aspects of environmental protection.

5.3 Estimated benefits

Table 5.1 gives the mean benefits per household estimated using the CV procedures. The residents' WTP was between £13.0 and £31.4 per year. When multiplied up by the size of the number of households in the local population, the benefits are between £0.14 and £0.19 million per year depending on the ESA. The visitor benefits show wide differences between ESAs and this reflects the different CV methods used. The total benefit to visitors to the Machair ESA are small because of the limited number of tourists per year. The popular area of Loch Lomond has the highest aggregate valuation of about £2m per year.

Table 5.1: Mean household and aggregated WTP per year in Scottish ESAs

ESA	Residents		Visitors		General Public	
	per household (£)	total (£m)	Per household (£)	total (£m)	per household (£)	total (£m)
Breadalbane	31.4	0.19	98.0	0.86	22.0	44.1
Machair	13.7	0.15	378.0	0.18	13.4	26.8
Loch Lomond	20.6	0.14	1.98 ¹	2.04	N/A	N/A
Stewartry	13.0	0.18	2.53 ¹	1.47	N/A	N/A

Notes: 1 per visit
2 measured using a discrete choice method

In the Breadalbane and Machair ESAs, where the general public were also interviewed, the total WTP of the resident and visitor groups was dwarfed by the WTP of the general population. This reached £44m per year in Breadalbane. Some doubt may be expressed about the reliability of these estimates because of the high WTP per household recorded. While these bids do seem to reflect a concern for protection and enhancement of the environment, they may be subject to upward bias as respondents failed to separate out the individual ESA from broader government policy on environmental protection (part-whole bias). In the report, Hanley *et al.* (1996) suggest that a more conservative estimate would be 10% of the recorded figure – i.e. between £2.7m and £4.4m.

5.4 Preferences for specific public goods

In each study the public were asked about their preferences for specific types of non-market good that farmers were being asked to produce within the ESA prescriptions. Hanley *et al.*

(1996) used a choice experiment approach and found that in Breadalbane the ranking was: protection of woodland followed by heather moorland, wet grassland, stone walls and archaeology. In Machair, archaeology was ranked higher than birds or flora. In the Stewartry and Loch Lomond ESAs the ESA prescriptions were not well aligned with public preferences. The public did not indicate high benefits from dry stone wall repairs or wetland management yet these were important elements in ESA expenditure. Respondents were most concerned with the general tidiness of the landscape and protection of woodlands.

There is an indication from these results that the preferences of the public may not be adequately taken into account in the agri-environment prescriptions.

5.5 Payments to farmers for public good services

The system of payments for procuring environmental services under 2078/9 provided farmers who join ESA schemes with an additional source of revenue over and above that from their normal farming activities. They are paid to adhere to the management agreement with its list of defined activities. These agreements differ between farms depending on the environmental characteristics of the farm and the extent to which a farmer wishes to participate.

Not all of the payments directly contribute to farm income because the ESA activities typically involve changes to management and additional investment which can reduce income or increase costs. While from a public expenditure viewpoint the interest is in the level of payments made, the farmer is interested in the net gain in income. This will typically form an important element in the decision of whether or not to participate in the scheme and which activities to include in the contract.

By 1997, committed public expenditure totalled £23.4m for 1,349 contracts (Crabtree *et al.*, 1999). For the four ESAs discussed above, payments varied between £0.67m and £4.23m (Table 5.2). The average payment per farm was £17,346 spread over a 5 or 10 year contract period. Farm income increased on average by £3,366 per year. Actual effects on income varied between ESAs depending on the size of farms and the opportunities for environmental activity under the scheme. Some farms managed to increase income by over £8,000 per year by participating in the scheme.

Table 5.2: Scottish ESAs: payments to farmers and impacts on farm incomes and employment

ESA	Total expenditure (£, million)	Benefit to household income (£ per year)	Number of jobs created in local economy (full-time equivalents)
Breadalbane	2.12	4,360	43
Machair	0.92	1,205	64
Loch Lomond	0.67	3,129	19
Stewartry	4.23	3,901	110

The payments for additional protection and enhancement for wildlife, landscape and historic interest, although not huge, make a notable contribution to farm income. The Scottish Farm Accounts Scheme (SAC, 2001) records the average net farm income of LFA cattle and sheep farms at only £2,469 (1998-99) and £1,406 (1999-00). Corresponding figures for specialist sheep farms were £3,735 and £-211 per farm. In this context agri-environment payments clearly make a very important contribution to farm viability.

5.6 Policy relevant conclusions

The economic valuation studies on ESAs suggest that the public are willing to pay substantial amounts for additional public good services from farming mainly in the form of enhanced wildlife and landscape. There may be doubts about the veracity of the scenarios depicted in such studies (Hodge and McNally, 1998) and the reliability of the CV methods. Even so, the fact that the estimated value of the benefits is so much greater than the exchequer cost does provide strong support for such agri-environmental measures.

Not all farmers participate in ESA schemes but those that do increase their incomes, on average, by over £3,000 per year. The payments are made for the supply of *incremental* public goods (in the form of environmental protection and enhancement). These benefits are additional to any underlying positive (and negative) externalities associated with upland farming. Unlike the Norwegian example, this case study did not set out to value the total externalities from upland farming by comparing the current farmed landscape and its wildlife with an alternative unsupported scenario. Much higher direct payments than those provided under the ESA scheme would be needed to support farming as currently practiced in upland Scotland solely in terms of its public good output.

Figure 5.1 summarises the key points of the ESA case study.

Figure 5.1 Summary of key aspects of the Environmentally Sensitive Areas case study

Context
CV studies to measure in monetary terms the benefits from ESA policy in Scotland.
Valuation
Estimates of the WTP for policy benefits from visitors, residents and the general public. Four Scottish ESA covered. Valuations by visitors and residents were substantial per household but small in aggregate. Overall valuations of the benefits from policy were dominated by the valuation for the general public (for non-use value)
Policy
Results fully underpin policy and show public value far greater than the policy costs. Some questions may be raised over the reliability of the methods used, and particularly whether the scenarios presented to the public over-stated landscape and biodiversity benefits. Even so, the expected benefits to the public from agri-environment policy greatly exceed the exchequer costs incurred.

6 Case study 4: Payments for the provision of access to woodlands on farms in Britain

6.1 Context

This case study is an example of a direct payment scheme set up to procure use benefits from new woodlands. Within the Woodland Grant Scheme (WGS) an additional Community Woodland Supplement (CWS) has been payable since 1992 to those farmers and land managers who facilitate public access to new woodland planted under the WGS. It is a GB-wide scheme and not one specifically tailored to land in mountain areas. However, it has been taken up in all regions and includes numerous woodlands planted in the Scottish LFA.

Its interest as a case study is that a recent evaluation of the scheme used CV to measure the public benefits procured by the payments made to land managers (Crabtree *et al.*, 2001). It did this in a site-by-site basis and provides an interesting example of how direct payments can be used to increase the public benefits from woodland planting and provide additional income to land owners.

6.2 Community Woodland Supplement

Under the scheme, land managers planting woodland with WGS grant aid can apply for the CWS. A single payment of £950 per ha is made to those who satisfy the conditions of the scheme. In general the woodland must be within 5 miles of a population of at least 500 people in areas where the local availability of woodland access is low. The aim is to generate public benefits by trying to ensure that access is not purchased in situations where public use of the woodlands would be too small to justify the payment. In essence the public benefit has to exceed £950 per ha if the public procurement is to be justified on a value for money basis⁶. The main beneficiaries are expected to be local people living in close proximity to each woodland. Land managers are required under the term of the contract to manage the woodland for access and publicise the access opportunities.

There are over 300 CWS schemes in Scotland. The average size is 6.9 ha and most are in urban areas. However, there are CWS woodlands in remoter parts of Scotland where access opportunities to woodlands may be quite limited. These include schemes in the Western Isles, Orkney, Shetland, Sutherland and Caithness. The contract period is for ten years after which it seems likely that contract extensions will be negotiated for woodlands that provide clear evidence of public benefits.

6.3 Public benefits from woodland access

In the evaluation study, nine woodlands in Scotland were randomly selected and CV was used to estimate the benefits to the local population from the woodland access. These were all woodlands where the owners were paid the CWS to provide public access. In order to determine the benefits from access, 300 residents living near each woodland were surveyed using a postal questionnaire. The questionnaire identified the local woodland and asked the respondents about their awareness of access opportunities, their use of the woodland and their WTP to a trust fund to maintain access in the future.

⁶ Strictly the benefits would have to be higher than the payment to account for the social cost of raising public revenue and the transaction costs involved in operating the scheme.

The response rate to the survey averaged 33%. Table 6.1 gives details of the survey of residents living near the nine woodlands. The woodlands varied in size from 0.6 to 20.8 ha. On average only 29% of local residents knew that they could visit the woodland and 20% has done so. However, of those responding only 4-15% were willing to pay to maintain access to the woodland. It appeared that only a small proportion of the local population perceived a benefit from the new woodland.

Table 6.1 Residents' survey: awareness and use of CWS woodlands

Site ID	CWS area (ha)	number of responses	Proportion of residents who		
			knew site could be visited (%)	have visited the site (%)	are willing to pay to maintain access (%)
SC1	0.6	111	10	6	4
SC2	1.3	104	33	20	4
SC3	8.4	105	21	22	8
SC4	15.0	96	24	17	7
SC5	17.0	103	29	17	10
SC6	12.3	102	28	18	7
SC7	3.8	71	42	28	11
SC8	1.5	113	48	36	15
SC9	20.8	78	27	19	6
Mean	9.0	98	29	20	8

Logistic regression was used to obtain a better understanding of why some individuals valued their local woodland more than others. The results showed that people are more likely to be willing to pay if they have visited the site, the closer they are to the site, if they are in a higher income band and if they are male (perhaps because many women don't feel safe walking in woods alone). A higher proportion of people were WTP at 'better quality' sites and at those where the perceived need for woodland in the area was greater. Where there is a large local population in the vicinity of a public good then demand will be higher. Table 6.2 shows how the proportion WTP declines for residents living more than 2 miles from a site.

Table 6.2: Distance decay of percentage of respondents to Q11 who had visited the site and who were WTP for different groups

Distance from wood	Percentage who had visited the site	Percentage of visitors WTP	Percentage of non-visitors WTP	Overall percentage WTP
<1/4 mile	69	23	11	19
1/4-1/2 mile	59	24	13	19
1/2-1 mile	41	26	13	18
1-2 miles	30	23	14	17
2-3 miles	21	22	12	14
3-4 miles	14	19	9	10
4-5 miles	16	12	13	13
>5 miles	6	16	8	8

The WTP of individual residents was aggregated up by the size of the population. There was the usual difficulty with postal questionnaires of how to deal with non-respondents. In this case two alternative aggregate WTP figures were calculated. The first was a lower estimate based only on the assumption that those not replying had a zero WTP. The second approach assumed that non-respondents had a WTP equal to those of the respondents. Neither assumption is realistic and the 'correct' aggregate WTP will lie between these extremes.

Table 6.3 gives the WTP figures for each woodland. The lower bound values vary between £65 and £30,269. The range reflects differences between localities in the residents' WTP, the number responding to the questionnaire and, most importantly, the size of the local population. Highly valued woodlands tend to be those with good access quality located in more densely populated areas. For example, the low WTP for the SC1 woodland reflected its location in the Western Isles where the local population was sparse. It was also poor quality woodland having been largely eaten by sheep. This contrasts with SC8 which was located close to Edinburgh in an area popular for walking.

Table 6.3: Aggregate willingness to pay per year (WTP) for each of the woodlands

Site ID	CWS area (ha)	Willingness to pay	
		Lower bound estimate (£)	Upper bound estimate (£)
SC1	0.6	65	175
SC2	1.3	1,820	9,644
SC3	8.4	2,465	11,822
SC4	15.0	24,827	139,894
SC5	17.0	7,200	45,634
SC6	12.3	14,178	44,844
SC7	3.8	16,008	123,573
SC8	1.5	30,269	96,595
SC9	20.8	879	5,688
Mean	9.0	10,865	53,096

6.4 The cost-benefit of procuring access benefits

The aggregate WTP per year for the woodlands varied from £65 to £30,269. On a per ha basis the range was from £42 to £20,179. In order to continue to provide access to their woodlands land managers will require continuing payments. If these are pitched at the same level as the initial payments (£950 per ha for 10 years), it is clear that some woodlands represent very good value for money because the value to local residents greatly exceeds the cost of procuring the services from land managers. With others, the benefits are too low to justify continued procurement.

This case study highlights the difficulty in implementing a public good procurement policy when benefits are not easy to predict. It is also clear that the quality of the access experience and the size of the user population are key variable determining benefits. The evaluation identified examples where the value for money of the CWS was very high. Even so, it concluded that contracts on around a third of the sites on which access had been procured should not be extended because the public benefits were too low.

6.5 Policy relevant conclusions

This case study concentrates on the unusual situation of land managers providing additional *use* benefits to the public in the form of public access to land for recreation. It demonstrates that access to many new types of woodland generates very high benefits to the local population as indicated by their aggregate WTP. Others fail to generate much benefit at all.

What is crucial in the cost-benefit of paying land managers for recreational and access services is location. Sites situated close to a large pool of local users can generate important public benefits and justify policy. But in remoter areas procurement of services that require visits (generating use value rather than existence value) is much more difficult to justify in terms of public policy. There will be exceptions in areas where tourists numbers are large or on specialist sites that offer facilities attractive to people living further away. The opportunities in mountain areas of Scotland for access payments is likely to be restricted to high quality sites and tourist areas. There may also be significant benefits where procurement enhances existing public good provision – for example, where new access links up existing access areas or paths.

Figure 6.1 summarises the key points of the case study.

Figure 6.1 Summary of key aspects of the Community Woodland Supplement case study

Context
Under the Woodland Grant Scheme (financed under Regulation 1257/99), occupiers planting new woodlands may receive £950 per ha to grant public access for 10 years. This is an example of occupiers (mainly farmers) being paid for the provision of public goods.
Valuation
Postal surveys were used to estimate the WTP of residents within 5 miles of 9 Scottish woodlands for continued access to the woodlands once the 10-year contract expires. WTP had strong non-use element (non-users WTP). The WTP responses showed a marked decline in value for residents more than 5 km from the woodland.
Policy
Very variable aggregate WTP for woodlands depending mainly on woodland characteristics, location and the size of local population. Overall, the benefits substantially exceeded the policy cost but payments on 30% of sites were not justified because of the limited use.

7 Conclusions

7.1 Types of non-market benefit in mountain areas

Environmental benefits

Mountain areas produce a wide range of non-market benefits valued by the public. These include environmental services (habitats, biodiversity and landscapes), services to support recreation and tourism, and the maintenance of rural populations and cultures. Most of the quantitative evidence from economic valuation studies relates to environmental, recreational and landscape benefits.

Cultural and heritage benefits

There are no studies that quantify society's willingness to pay to maintain populations and their cultural identity in mountain areas. The Austrian study indicates strong support for mountain communities and culture but there is a need for research to quantify the benefits that mountain culture contributes to society as a whole. This would pose a challenge for economic valuation given the complexity inherent in cultural landscapes.

7.2 Size of benefits

Use values

There is increasing evidence on the value of the benefits produced by agri-environment and forestry measures. These estimates can in some cases be broken down into use and non-use components. Use benefits are derived from recreational opportunities. In general sites located near where people live have the highest use value. Overall, for all types of recreational activity, WTP values fell in a fairly narrow band between £0.69–4.25 per person per site visit. This is what, on average, an individual visitor is prepared to pay for a visit to a site where entry is at present free.

Non-use values

Values for biodiversity, wildlife and landscape services are much more variable. This reflects differences in individual preferences and the diversity of the environment. Generally, non-use values, when aggregated, exceed use values. There is good evidence that biodiversity generated in forestry and agriculture is highly valued. Limited progress has been made in valuing individual habitats and landscape features, but broadleaved woodlands, heather moorland, wetlands, coastal areas and charismatic species appear to be highly valued.

Scottish valuations

There is good evidence from valuation studies that Scottish people are concerned about wildlife, biodiversity and landscape. In general, the more unique the asset and the greater its status in terms of legal protection, the higher will be the population's WTP to preserve and enhance it. Valuations vary considerably, with one-off payments to preserve landscape such as the Caithness flow country or Mar Lodge varying from £20-40. Lower values were associated with the Isle of Eigg purchase. Valuations associated with biodiversity and charismatic species in highland forests vary from £8 to in excess of £100 per year (for beaver introduction).

Services from land managers that give use value to residents and visitors are generally valued more highly than when they do not. Estimates of the willingness to pay for ESA type policies are large with many studies indicating a WTP by residents and visitors of £20 and £40 per household per year. These may be over-estimates of the value of current ESA policy.

Residents, visitors and the general public

Where use value is important (recreation, tourism) valuations are often dominated by the preferences of visitors. Resident's per capita values may be higher than those of visitors but where visitor numbers are high they dominate the aggregate valuations. Hence, in sparsely populated tourist areas it is the WTP of tourists that dominate the use value of the environment. However, the sheer size of the general public can dominate the valuations of policy measures through the contribution to existence values (e.g. in the value ascribed to the benefits from agri-environment policy). In the non-tourist parts of the Scottish LFAs, the value of the public goods generated by farmers and land managers is mainly determined by their value to the wider Scottish population.

Regional differences

It is to be expected that there will be differences in services provided in different mountain areas. The logic is that payments to farmers and landowners would vary regionally reflecting the costs of production and the value of the benefits to society. The locational differentials are likely to be greater with goods which produce use value (recreational and tourism goods) because with these location is an important determinant of WTP. Where the value of goods is less location dependent (e.g. carbon fixation, rare habitats) payments would reflect the costs associated with producing the environmental good.

7.3 Implications for policy development

Justification for additional payments to farmers

The evidence from contingent valuation studies helps to underpin policies that pay farmers and landowners to protect and enhance biodiversity and landscape. It is likely that there is a willingness to support vulnerable, rural populations where there is strong cultural heritage but more research is needed.

Mountain areas

Mountain areas face major climatic and territorial disadvantages and this has provided the basis for distinctive policy measures under the CAP. The analysis in this study indicates that there may be significant locational differences in the extent to which future support can be justified by the environmental and cultural goods produced. In Scotland, areas of high conservation and tourism interest where farming contributes to the biodiversity and landscape would feature highly, as may crofting areas where the cultural value could be high.

The Norwegian case study shows that it may be difficult to justify current levels of support to farmers (at least in Norway) solely in terms of the environmental benefits they produce. But this is based on limited evidence specific to Scandinavia. In Scotland, the mountain areas could justify higher levels of support than many other areas because of the value of the biodiversity and cultural landscape that they support.

Social and economic vulnerability in mountain areas

It is possible to make a case for supporting mountain areas that reflects their economic and social vulnerability. There are three elements to such a case:

1. The strongest element would be clear evidence that policies to maintain remote populations and cultures are valued by the public. Evidence from the Norwegian and Austrian case studies reveal that there is strong support for maintaining remote communities. But there is a lack of economic valuation research that would provide quantitative data on the public's willingness to pay for such policies. In Scotland, land purchase by remote communities, and special support for crofters is indicative of public concern for vulnerable communities. So, also is UK government policy on sustainable development, although this has largely been confined so far to a concern with environmental sustainability.

2. A second argument rests on the need for active land management to maintain the biodiversity and landscapes created by farming and forestry. If biodiversity and landscapes are at risk, then the farming and forestry that delivers these goods will need to be supported. This fits well with a sustainable approach to environmental management where the maintenance of natural capital is a prime concern and policy aims to minimise the risk of environmental loss.
3. A final element is one based on the contribution of landscapes and the environment to tourism in mountain areas. There is evidence that tourists (and tourism) benefit from the effects of agri-environment payments in Scotland (Crabtree *et al.*, 1999). About 300 jobs depend on the visitor-related effects of ESA policy. Tourism was also the most important element in the justification for support for mountain farmers in the Austrian case study. There is little doubt that a strong argument could be made for maintaining the distinctive mountain landscapes and cultures that tourists are known to value.

7.4 The development of agricultural policy

The 2003 mid-term review of measures adopted under the Rural Development Regulation (RDR) will be a major step in developing the second pillar of the CAP. Since the regulation includes agri-environment, forestry and LFA payments, it is highly significant for the development of mountain areas.

There is an evolving case for supporting mountain areas based on sustaining valued environments and cultures. Following the analysis developed in this study, the level of support would reflect the benefits derived by local people, the public and tourists. This would fit well with the requirements for sustainable development which pays special attention to the maintenance of natural and social capital. It could replace the current justification for LFA support based on compensation for disadvantage. The current LFA boundary might still provide a basis for channelling support to the LFAs to reflect their environmental and cultural value, and its vulnerability.

In Scotland a new Rural Stewardship Scheme has been established under the RDR to enhance habitats and biodiversity. This is discretionary, but LFA farmers are likely to be the major beneficiaries because the highest quality biodiversity tend to be concentrated in the LFAs. The Hill Farming Allowance Scheme has been modified to remove headage-based payments but will require a firmer rationale in the future.

The Scottish Executive (2001) in its forward strategy for Scottish agriculture has indicated that Scottish agriculture 'needs a support system which recognises the variation in our farming and the fact the economic, social and environmental benefits it brings change from one part of the country to another'. It considers that the Land Management Contracts such as those implemented under the RDR in France could be a suitable mechanism for paying farmers for different types of public good in different areas. The *contrat territorial d' exploitation* (CTE) (Ministère de l' Agriculture, 2002) contains a mixture of measures, both socio-economic (e.g. promoting quality produce, creating employment) and environmental (e.g. measures in favour of biodiversity, management of the countryside and natural and cultural heritage). It is regionally based so that it can reflect the priorities and needs of different regions. There is as yet only limited experience in the operation of such contracts. To some they appear unduly bureaucratic but other observers suggest that CTEs are a multifunctional model for future EU agricultural policy (Lowe *et al.*, 2002).

Whatever form policy takes, mountain areas will be best able to compete in the policy arena if there is adequate evidence to support their case. This study has demonstrated that the benefit valuation literature can be used to underpin policies to support the environmental goods

produced by mountain areas. But this only provides a partial case and further studies are needed to quantify:

- the benefits from policies that support communities at risk and the cultural heritage; and
- the links between environmental quality, cultural heritage and benefits from tourism.

In both cases we might expect such studies to demonstrate substantial public benefits from continued support for mountain communities and their cultural heritage.

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Appendix 1: Methods of non-market valuation

Travel cost and hedonic pricing

The Travel Cost Method (TCM) has been used mainly with recreational goods where the public's travel behaviour and costs can provide measures of benefit. The Hedonic Pricing Method (HPM) has been used to disaggregate house prices in relation to house attributes, and hence value the environmental component in house location. Both TCM and HPM are restricted in their application and cannot provide comprehensive values for non-market benefits. For example, TCM only indicates the value of a landscape or wildlife site to those who travel to enjoy it – it omits the non-use element in the valuation. HPM requires detailed datasets and is only applicable in quite restricted circumstances.

Contingent valuation

Much wider use has been made of stated preferences methods and in particular the contingent valuation method (CVM). In this a hypothetical market for the good to be valued is created by using questionnaires to elicit the preferences of the population of beneficiaries. In 'open-ended' CVM the respondents are asked to indicate their maximum willingness to pay (WTP) for the benefit stream (or policy that generates a benefit stream). The common alternative approach (discrete choice) is one in which respondents are asked to indicate whether they would be willing to pay a specified sum. The mean WTP aggregated by the relevant population gives the aggregate benefit.

A major problem with CVM is that the results depend on the specific details of the methods used. It is known to be subject to a number of sources of bias, and results have often been criticised as merely artefacts of the methods used. For example, discrete choice methods produce higher WTP responses than open-ended methods and this is thought to reflect an element of strategic bidding. In this, respondents indicate a higher WTP than they would be prepared to pay in order to indicate some positive preference for the environmental good in question. However, the merit of discrete choice methods is that they provide a context that is similar to normal market purchase where goods have a stated price and consumers may buy or not at that price. There are also differences between approaches based on what consumers may be willing to accept (WTA) for loss of a benefit and what they are willing to pay (WTP) for the same benefit. Numerous experiments have revealed that WTP is 2-5 times the size of WTA for the same good and a substantial research literature has developed to explore the reasons for such differences (Garrod and Willis, 1999).

CVM methods have been widely used to value environmental outputs and policies that produce environmental benefits. Studies have concentrated on specifying a particular scenario (such as a change in biodiversity or the maintenance of a defined and valued landscape). Increasingly, the policy interest is in valuing particular environmental attributes (species, habitats, landscape features) rather than policies or change in aggregate. If the changes in attribute levels could be valued this could be used to target policy into the most efficient direction for maximising benefits in relation to cost. The valuation of benefits at such a specific level is in its infancy but methods are being developed in which consumers are asked to state their preferences for bundles of environmental attributes and associated costs (choice modelling). Instead of valuing a whole scenario, this approach enables preferences for environmental attributes to be explored. These approaches are reviewed in Hanley *et al.* (2001b) and have been applied to Scottish ESAs in Hanley *et al.* (1998).

Benefit transfer

Economic valuation is technically demanding and costly. This has stimulated research into the feasibility of benefit transfer (Garrod and Willis, 1999). Differences in methodologies, preferences and context make benefit transfer extremely difficult and the conditions under

which transfer can credibly take place have yet to be clearly defined. A broad conclusion from the academic literature is that benefit transfer models often fail to meet standard statistical levels of accuracy, but can get within error margins that might be acceptable to policy analysts.

Oglethorpe *et al.* (2000) developed an approach that tries to overcome the problem of valuation of individual features and allow values derived from one study to be translated to other situations. A model was developed to predict WTP for various habitats and then tested against actual WTP from a CV exercise. This was carried out for heather moorland and rough grazing in the North Pennines. Mean WTP results were insignificantly different from model predictions, although error bands were wide due to a small data input to the model. This report points out that, where habitats are created, the benefits from this creation are crucially dependent on what habitat is being replaced. The context of habitat or landscape change is therefore very important and illustrates the need to be aware of potential trade-offs between benefits. For details on a more sophisticated version of the Oglethorpe approach, see <http://www.defra.gov.uk/esg/econwork.htm>.

Particular caution must be used with international transfers because of possible differences between countries in preferences for environmental attributes. For this reason, valuation estimates made in an alpine or Nordic context could not be transferred to Scotland.

Appendix 2: Biodiversity, wildlife and landscape

Agriculture-benefit valuation studies

There have been a number of studies in which the benefits from the environment have been valued, most usually using CV methods. These demonstrate the values that people place on features of the environment and protection of the countryside and have often been part of the economic valuation of the benefits from agri-environmental policy. Results from the most relevant studies in the literature are shown in Table A2.1.

In all, 22 study results are shown in the Table, and these have been converted to 2001 prices. In all these cases the means of hypothetical payment were described to respondents in terms of a yearly taxation or trust fund. This is likely to elicit general support for the area or policy and therefore should include any existence value. In similar studies entrance fees have been used as the payment vehicle. In these cases the respondent is more likely to be identifying their recreational use value and therefore these studies have been shown in the section 2.6 on recreational opportunities, although it is possible that the values in Table A2.1 include some element of recreational use value.

It is important to realise that these values have been produced using different methodologies and approaches. Researchers were also not valuing the same environmental scenario: some variation in willingness to pay is thus to be expected. There is a considerable range of values - from £3 to £457 per household per annum. Studies using open-ended questioning (OE) tend to elicit lower values than a dichotomous choice format (DC) (Hanley *et al.*, 1998; Macmillan *et al.*, 1996).

Individual or household WTP has to be raised to the relevant population size (e.g. total number of visitors, for a visitor-based WTP) in order to estimate the aggregate population benefits. When this is done it is frequently the case that the size of the population dominates the aggregate valuation. The result is that the total value of landscape and biodiversity services is generally dominated by their existence value for the general public.

Value for money

Hanley *et al.* (1996) report a high level of public support for Breadalbane and Machair ESAs with more than half of the people surveyed willing to pay extra taxes to fund environmental improvements. In several studies it was found that the aggregate benefits in the form of WTP values outweighed the exchequer cost of the policy (Hanley *et al.*, 1996; Gourlay, 1995; Moss and Chilton, 1997). Bateman *et al.* (1994) found that 85 % of respondents were willing to incur extra tax in order to preserve the distinctive wetland characteristics of the Broads. Expenditure was only 26 % of WTP in the Stewartry ESA and only 3% in the Loch Lomond ESA. Expenditure levels were, however, low in these ESAs despite good uptake especially for Loch Lomond (Gourlay and Slee, 1998). In Ireland, in the Mourne Mountains and Slieve Croob ESA, Moss and Chilton (1997) estimated the value of different quantities of the ESA scheme by asking respondents about their WTP for the whole scheme and then for a scheme containing only half of the total improvements. A benefit-cost ratio of 48:1 was found for the half scheme while for the whole scheme the ratio was 32:1, revealing diminishing returns to increasing provision of ESA benefits.

Table A2.1 Selected Valuation Studies of Non-market Benefits in ESAs

Author	Study area	Type of benefits	Year of study	Elicitation method ¹	Mean household WTP (£/yr)	
					as published	2001 prices
Scottish studies						
Bullock and Kay, 1997	Southern Uplands- general public	Landscape improvements	1994	DC	83	108
Ibid	Southern Uplands –visitors	Landscape improvements	1994	DC	69	90
Hanley <i>et al.</i> , 1996	Breadalbane - visitors	Biodiversity, landscape	1996	DC	73	88
	Breadalbane - general public	Biodiversity, landscape	1996	DC	42-57	51-69
	Machair - visitors	Biodiversity, landscape	1996	DC	378 ¹	457 ²
	Machair – general public	Biodiversity, landscape	1996	DC	78	94
	Breadalbane – residents	Biodiversity, landscape	1996	OE	31.42	38
	Breadalbane - general public	Biodiversity, landscape	1996	OE	22.02	27
	Machair – residents	Biodiversity, landscape	1996	OE	13.66	17
	Machair – general public	Biodiversity, landscape	1996	OE	13.37	16
Gourlay, 1995	Loch Lomond - residents	Biodiversity, landscape	1993	OE	32.80	44
	Loch Lomond – visitors	Biodiversity, landscape	1993	OE	2.28 ³	3 ³
	Stewartry – residents	Biodiversity, landscape	1993	OE	22.56	30
	Stewartry - visitors	Biodiversity, landscape	1993	OE	3 ³	4 ³
Other studies						
Willis <i>et al.</i> , 1995	South Downs - residents	Biodiversity, landscape	1992	OE	27.52	37
	South Downs – visitors	Biodiversity, landscape	1992	OE	19.47	26
	South Downs – general public	Biodiversity, landscape	1992	OE	1.98	2.64
	Somerset Levels - residents	Biodiversity, landscape	1992	OE	17.53	24
	Somerset Levels –visitors	Biodiversity, landscape	1992	OE	11.84	16
	Somerset Levels – general public	Biodiversity, landscape	1992	OE	2.45	3.31
Willis and Garrod, 1993	Yorkshire Dales –residents	Landscape	1990	Not known	21.71-26.03	33-39
	Yorkshire Dales –visitors	Landscape	1990	Not known	22.12-27.08	34-41
Bateman <i>et al.</i> , 1994	Norfolk Broads	Wildlife, landscape	1991	OE	76.74	108
	Norfolk Broads	Wildlife, landscape	1991	DC	83.67	118

¹ DC=discrete choice, OE=open-ended

² the authors suggest that this high bid is due to strategic bidding

³ per visit

Individual components of ESA policy

Gourlay and Slee (1998) report on a resident and visitor survey carried out as part of the Gourlay (1995) study, that was designed to evaluate how various features of ESAs were ranked by the public. In two ESAs, between 48-80 % of respondents valued wildflowers and broad-leaved woodlands highly or very-highly, although a high proportion were also concerned with the clearing of litter, especially around Loch Lomond. Many other wildlife features were also valued highly or very highly but not by so many respondents e.g. hedgerows, marsh and wetland, gorse and broom, heath and moor. Both these evaluations show a knowledge and appreciation of Scottish ecological features, and that people were willing to pay to support provision of these non-market benefits.

Interestingly, Gourlay (1995) raises the question about who should be the beneficiaries of policy. In both Loch Lomond and Stewartry ESAs the most popular policy component that farmers took part in was dry stone walling, yet this was found to be valued least of the features about which the public were questioned. It was also found in these areas that the residents' aggregate WTP was low relative to the visitors' WTP. This is due partly to very low population density. Where the number of visitors greatly exceeds the number of residents concentrating expenditure on those improvements that are valued by visitors will increase the total benefits of a scheme (Stewart *et al.*, 1997). Gourlay (1995) also points out that there were certain components that were more cost-effective to provide than others, for example, the protection of rough land (a low or zero cost activity) was more cost-effective than visual benefits of painting buildings (a high cost activity).

The Scottish ESA study (Hanley *et al.*, 1998) provides an early example of the use of choice modelling for valuing individual ESA attributes. The highest marginal WTP was for the woodland element of ESA policy, followed by heather moors, wet grasslands, dry stone walling and archaeology. These results are consistent with those of Gourlay in that woodlands and floristic diversity were more highly valued than repairs to dry stone walling.

Landscape preferences

Valuation studies can also throw light on the public's preferences for landscape although there is no consensus of opinion. The CV study in the Southern Uplands ESA (Bullock and Kay, 1997) estimated that residents of the area, visitors, local bird watchers and ramblers preferred a more varied landscape with a moderate expansion of tree cover to the heavily grazed more monotonous landscape that currently exists in this area. There is evidence that stalkers have a preference for open landscape or possibly a mixture of open and wooded landscape, but not for shooting within forests (Bullock *et al.*, 1998). Mixed forest and open shooting is only preferred if the numbers and quality of deer are higher than current levels. A study of Mar Lodge Estate (Cobbing and Slee, 1993) found a positive WTP for characteristic upland Scottish landscapes and wildlife. There is clearly a trade-off to be made between open landscape, favoured by moorland management for grouse shooting and deer stalking, and an increase in forest regeneration. This raises the policy issue of how to respond to conflicting landscape preferences. Hanley *et al.* (2001a) found that people's preferences for upland landscapes depended on what the alternative is: for instance, people were WTP significant sums to protect rough grazing/pasture landscapes around Oban when the proposed change was to forestry, but not when the proposed change was to improved grassland. Hanley *et al.* (2001a) also show that the value for both heather moorland and rough grazing in Scotland depends on what 'alternative' landscape is used in the valuation study.

Despite the inference that certain landscapes may always be valued more highly than others, this should not be construed as a case for benefit transfer. It may be necessary to take even more care in translating valued landscape benefits from one study situation into another. Indeed, Macdonald *et al.* (2000) found evidence of contextual factors in an assessment of the landscape impacts of farmland abandonment in European mountain areas and Guillot *et al.*

(1998) indicate that landscape preferences are strongly influenced by the cultural and social interpretation of physical changes. The value of a landscape may often be determined by the degree to which it is considered to be characteristic of an area.

Forestry – benefit valuation studies

All the relevant UK studies used a discrete choice (DC) format for eliciting responses. The values of WTP per household per annum range from £8 – 118 per annum for preservation and improvement of non-market benefits (Table A2.2). With the exception of the extremely high figure for the Machair ESA, the range of forestry values is of the same order of magnitude as the ESA values.

Table A2.2 Selected Valuation Studies of Forest Non-market Benefits

Author	Study area	Type of benefits	Study year	Mean Household WTP (£ per year)			
				As published		2001 prices	
Scottish studies							
Macmillan, 2001a	Glen Affric - forest only	Biodiversity, Landscape, Recreation	1997	35 ⁺	37 [*]	41 ⁺	43 [*]
	Glen Affric – beaver	Biodiversity, Landscape, Recreation	1997	101 ⁺	67 [*]	118 ⁺	78 [*]
	Glen Affric – wolf	Biodiversity, Landscape, Recreation	1997	31 ⁺	10 [*]	36 ⁺	12 [*]
	Strathspey - forest only	Biodiversity, Landscape, Recreation	1997	53 ⁺	24 [*]	62 ⁺	28 [*]
	Strathspey – beaver	Biodiversity, Landscape, Recreation	1997	100 ⁺	91 [*]	117 ⁺	106 [*]
	Strathspey – wolf	Biodiversity, Landscape, Recreation	1997	61 ⁺	41 [*]	71 ⁺	48 [*]
Other studies							
ERM, 1996	British forests	Biodiversity	1995	7-13		8-16	
ENTEC, 1997	English farm woodlands	Landscape	1996	11-13		13 –15	

+ these values are for WTP only, * these values include the WTA (Macmillan *et al.*, 2001a)

Macmillan *et al.* (2001a) investigated the public response to schemes to restore large areas of native pinewoods in Strathspey and Glen Affric. There were also options to reintroduce the wolf or the beaver for each of these areas. Such schemes would offer benefits for biodiversity and landscape. This study took a novel approach by incorporating willingness to accept compensation (WTA) as a means of identifying potential losers following the initiation of such schemes. Figures in Table A2.2 show both WTP alone (+) and when WTA is incorporated in the model (*) and it can be seen that, except for the forest-only option in Glen Affric, the inclusion of WTA considerations reduced the estimates. Considering the non-adjusted WTP values (+), it is evident that these are highest for the forest with the beavers option in both locations, followed by wolf, and then forest-only options in Strathspey, and forest only, and then wolf options in Glen Affric. When WTA is included in the modelling these preference orders remained the same for the different reintroduction scenarios.

The survey by ERM (1996) shown in Table A2.2 dealt specifically with the biodiversity benefits of different forestry management regimes in a selection of British forests. It questioned 1,800 people on a range of management options that would enhance forest biodiversity to different degrees. The questioning stressed that these were isolated forests indicating that it was unlikely that respondents would visit them, specifically in order to elicit existence value only. The approach was also useful in that the forests were un-named and therefore, in effect

generic, and thus the results can validly be applied to any forest. This is in contrast to the usual valuation approach that identifies and values a particular forest. WTP was found to be in excess of management costs, as in the ESA evaluations. In an additional contingent ranking exercise 90 % of respondents chose management options that offered more wildlife diversity, even when this was achieved at higher costs than current management schemes. Overall the study indicates that the public have preferences for increased wildlife even if they are never likely to see it. This is clear evidence of existence values for forest biodiversity.

In contrast, the ENTEC study (1997) examined landscape benefits of woodlands in the U K. Both CV and choice experiments were used to value landscape attributes including forest shape, felling scheme and tree species mix. The results of both methods showed WTP per household were within a fairly narrow band of £11-13 for the CV study and £13-14 for the choice experiments for forest landscape changes. Forest shape was found to be the highest-ranking attribute.

Natural areas - benefit valuation studies

In contrast to the previous studies, the values in Table A2.3 represent one-off payments by the public. Excluding Hanley *et al.* (2001a), the figures are again reasonably consistent, ranging from £2.26 – 41.26. If the two high values given by visitors to the Flow country and Mar Lodge (£41.26 and £35.54, respectively) are excluded, the valuations are all under £22. The higher values given by visitors to the Flow country and Mar Lodge reflect the inclusion of use value as well as existence value. However, all the values for these areas are greater than the other studies shown in the Table, and this may have been due to the high public profile and charismatic nature of the areas, although interestingly the bids received as a hypothetical contribution to the purchase of the Isle of Eigg were some of the lowest values among these studies. The difference may be explainable by the fact that the Isle of Eigg was being purchased by the local community rather than protection of important areas for society in general. If benefits are seen to accrue mainly to a small discrete group the public may be less willing to contribute than if protection of an environmental resource is seen as, at least in theory, benefiting everyone.

The values from the Hanley *et al.* (2001a) study are also interesting in that they show the public's willingness to pay for protection of landscapes such as heather moorland and rough grassland. However, as in Macmillan *et al.* (2001a), account was taken of those who did not benefit from such policies, but in fact preferred the change from rough grassland to improved grassland. As can be seen from Table 2.3 this produced negative WTP estimates at the lower end of the value range once the WTP for improved grassland had been included. Both these studies highlight the fact that valuation of non-market benefits may change when all groups preferences are taken into account; an environmental 'good' or attribute valued by some may be viewed negatively by others.

Appendix Table A2.3 Studies showing one-off payments for conservation areas

Author	Study Area	Type of Benefit	Year of Study	'Once and for all' Payment per Household (£)	
				As published	2001 prices
Scottish studies					
Hanley and Craig, 1991	Flow country – visitors	Biodiversity landscape, recreation	1988	24.59	41.26
	Flow country – General public	Biodiversity landscape,	1988	12.15	20.39
Cobbing and Slee, 1993	Mar Lodge – visitors	Biodiversity landscape, recreation	1991	26.64	35.54
	Mar Lodge - General public	Biodiversity landscape	1991	15.14	21.33
Edward-Jones <i>et al.</i> , 1995- (5 ecologically valuable sites)	Upland grass and shrub, Bonaly	Landscape, recreation, biodiversity	1992	9.22	12.49
	Upland grass and shrub, The Howe	Ditto	1992	6.99	9.47
	Upland grass and shrub, Glencorse	Ditto	1992	8.00	10.84
	Coastal intertidal site, North Berwick	Ditto	1992	9.49	12.86
	Coastal intertidal site, Yellowcraigs	Ditto	1992	9.60	13.01
Macmillan <i>et al.</i> , 1999	Isle of Eigg	Biodiversity wildlife, landscape	1996	2.20-3.41	2.66 – 4.62
Hanley <i>et al.</i> , 2001a	Heather moorland	Biodiversity landscape	1998	9.4 - 6.5*	10.04 – 51.89*
	Rough grassland		1998	(-)36.8 – 28.9*	(-) 41.07 – 32.25*
Other studies					
Hanley and Spash, 1993	Ancient woodland Birkham wood	Biodiversity wildlife	1991	9.93	13.99

*Figures are net WTP which include the values of those who valued alternatives or would suffer loss from this environmental option. In this case the negative value shows that people did not value rough grassland highly and would prefer a change to improved grassland.

Appendix 3: Recreation opportunities

Forestry

Forestry management has allowed the public to take advantage of enhanced access in many areas of Scotland and the rest of the UK. A large number of studies have been undertaken on the recreational opportunities afforded by forestry. These have usually estimated use or option values, often in the context of forestry initiatives such as community forestry, farm woodland provision, and access to the countryside or forest parks (Table A3.1).

Appendix Table A3.1 Valuation Studies of Recreational Forest Non-market Benefits

Author	Study Area	Type of Benefit	Study Year	Method (DC or OE)	Mean WTP (£/ person/ visit)	
					As published	2001 prices
Bennet, <i>et al.</i> , 1995	Scots pine, Windsor	Recreation	1994	DC	1.11	1.60
Hutchinson <i>et al.</i> , 2001	14 Northern Irish Forest	Recreation	1992	DC	0.60-2.25	0.81 – 3.05
Hutchinson, 1995	Mean of 13 Scottish forests	Recreation, wildlife	1992	Not stated	0.5 – 2.20	0.68 – 2.98
Hanley and Ruffell, 1993	Mean of 13 British forests	Recreation, wildlife, landscape	1991	OE	0.93	1.31
Willis and Benson, 1989	Mean of 8 British forests	Recreation	1988	OE	0.82	1.38
Bateman and Langford, 1997	Thetford forest	Recreation	1993	OE	0.52	0.69
Maxwell, 1994	Forest project, Marston Vale	Recreation wildlife,	1992	OE	1.34	1.82
Bishop, 1992	Whippendell wood	Recreation wildlife, landscape,	1989	OE	1.34	2.15
Ibid	Derwent Walk	Recreation wildlife, landscape,	1989	OE	0.97	1.55
Hanley, 1989	Queen Elizabeth Forest, Aberfoyle	Recreation wildlife, landscape,	1987	OE	1.24	2.12
Whiteman and Sinclair, 1994	Mercia forest	Recreation	1992	OE	1.00	1.36
Ibid	Thames Chase forest	Recreation	1992	OE	0.71	0.96
Ibid	Great North forest	Recreation	1992	OE	0.81	1.10
Willis <i>et al.</i> , 1988	Castle Douglas	Recreation	1987	OE	0.80	1.36
Ibid	South Lakes	Recreation	1987	OE	0.86	1.47
Ibid	North York Moors	Recreation	1987	OE	1.03	1.76
Ibid	Durham	Recreation	1987	OE	0.56	0.96
Ibid	Thetford	Recreation	1987	OE	0.41	0.70
Ibid	Dean	Recreation	1987	OE	0.63	1.08

Table A3.1 summarises CV studies where the WTP has been estimated in the form of an entrance fee to a forest area or nature walk. The pleasure or benefit derived from such a visit may include biodiversity and landscape benefits but is undoubtedly in itself a recreational pastime and an opportunity to enjoy the natural environment. Thus a large proportion of the value estimated in the WTP is attributed to the recreational value of the visit. Forest recreation is a well-researched subject although much of the work has been devoted principally to methodological development rather than to produce usable valuation data for policy. Results are therefore not always readily comparable due to the different methods and approaches that have been used. The surveys all questioned people in terms of their WTP per visit for entrance to the forest. The values all fall within a narrow band ranging from £ 0.69 to 3.05 per person per visit.

Natural areas

Four studies shown in Table A3.2 are typical of the recreational benefits from Scottish wildlife sites. Benefits range from around £1 to £4 per visit.

Appendix Table A3.2 Selected Valuation Studies of Nature Sites

Author	Study area	Type of benefits	Study year	Mean WTP (£ per person per visit)	
				as published	2001 prices
Harley and Hanley, 1989	Loch Garten	Wildlife, recreation	1988	2.53	4.25
	Handa Island	Wildlife, recreation	1988	1.53	2.57
	Blacktoft Sands	Wildlife, recreation	1988	1.18	1.98
Heyes and Heyes, 1999	Dartmoor	Recreation	1996	3.04	3.68