

Land management and rural development

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Introduction

Land management and rural development are intimately linked. Despite having very different proportions of land of good quality, Denmark and Scotland have developed their agricultural and forestry industries in similar ways though perhaps at different rates and intensities. In this paper Scotland has been used as the major source of information to demonstrate recent trends and to explore potential ways in which land use and management are likely to change in response to European and national policies for agriculture, forestry and the environment.

The land resource

The land in Scotland as we know it today is the result of processes that have been in progress, as they have in Denmark, for many millions of years. Scotland contains an unrivalled geological diversity, with rocks from periods of geological time represented in a relatively small area. The mountainous nature of Scotland contrasts markedly with the relatively low-lying character of much of Denmark. As in Denmark, however, the most significant and recent geological and climatic developments have taken place during and since the last Ice Age resulting from the southerly shifts in the Polar Front.

The geology, the climate and the retreat of the glaciers of the last Ice Age, together, have developed soils of great diversity in Scotland. Their development was initiated between 15000 and 10000 years ago at the end of the Ice Age. A largely barren land surface was gradually transformed as climatic conditions improved. The soils of Scotland

can be broadly divided into four main groups: peats, gleys, podzols and brown forest soils. These broad categories are further subdivided which, in combination with measures of climate, and a knowledge of the growth potential of a wide range of plants, provide the basis of the Land Classification for Agriculture (LCA) [MLURI 1991] and the Land Classification for Forestry, (LCF) [MLURI 1998] maps for Scotland. These classifications form the basis of our understanding of the potential of Scotland's land for agricultural crops and a wide range of forest trees and woodland. Only about 15% of the land is suitable for intensive arable agriculture compared to more than 50% in Denmark.

The land cover of Scotland is the result of the natural evolution of vegetation succession in response to soil development and climate change but in the last 2,500 years, land cover has been affected significantly by the activities of man. The land cover in Scotland as recorded in 1988 [MLURI 1993], is the result of centuries of natural and human induced processes but an analysis of the changes in land cover and land use that have taken place in recent times, provides a context in which future changes in land management in relation to rural development can be considered.

Analysis of change

Agriculture

For the last century at least, rural land use in the United Kingdom and in much of Europe has been dominated by agriculture. Historically, this has had much to do with the conviction that primary food production was essential for food security while also being, for much of the time, a worthwhile economic activity. Since the Second World War, and particularly since the introduction of the Common Agricultural Policy (CAP), the agricultural industry has received significant financial incentives to continue with this activity. The fact that this has now led to an oversupply of many primary food products, at a huge cost to the European taxpayer has, among other factors, brought current agricultural land use under close scrutiny. Because it is such a dominant land use, any change in agriculture is likely to have a significant impact on other land uses, not least forestry, and consequently on the economic, social and environmental fabric of rural areas.

AGRICULTURAL STRUCTURES – DENMARK & SCOTLAND							
	Land (m ha)	GDP (£b)	Holdings				Nos. Employed
			Total Nos	Av Size (ha)	Owned (%)	Leased (%)	
Denmark	3,000	5.9	61,900	43	91	<5	106,000
Scotland	5,500	1.0	33,000	157	69	31	25,000

The basic structure of the agricultural industry in Denmark and Scotland is given in Table 1. The main differences between the two countries reflect the differences in the quality of land available for agriculture and the number of intensive pig and dairy units which produces a six fold greater GDP from agriculture in Denmark as compared to Scotland. There are almost twice the number of agricultural holdings in Denmark but they are a third of the size of those in Scotland. Most Danish farms are free-hold and family-run farms in individual ownership which in part explains why there are a third more people directly engaged in agriculture as compared to Scotland. However, irrespective of these differences, because agriculture is such a dominant land use in both our countries, any change in agriculture is likely to have a significant impact on the economic, social and environmental fabric of rural areas. It is important, therefore, to examine a little more closely some of the more recent changes in land use that have occurred as a result of the European Common Agricultural Policy and agriculture's technical development and economic performance.

Since 1944 the area of tillage in Scotland has declined and the proportion of different crops grown has changed as new crops and crop varieties have been introduced and bred, and as consumer demand has changed. Whereas in 1944, there was a need to produce as much of our primary food supply as possible, now, in a situation of surplus, a considerable area is set-aside. Reductions in arable land have also occurred in Denmark, but as in Scotland the level of physical outputs have been largely maintained or increased indicating that both countries have successfully improved productivity over the period. This same level of improved efficiency and intensification is reflected in their pasture based livestock industries. In Scotland livestock numbers have been main-

tained even though a significant amount of land has been lost to forestry and urban infrastructure. Furthermore, as in Denmark, even though overall milk production has declined as the number of dairy cows have been reduced, the milk yield per cow has increased, thus partly compensating for the overall decline and again demonstrating the capacity of agriculture to continue to increase its productivity. In contrast to Scotland, however, Denmark has a large intensive pig industry that contributes significantly to the 65% of agricultural product that it exports. Most of Scotland's agricultural production is consumed within the UK. Whereas Denmark might expect to gain an increasing competitive advantage for its export-oriented products as prices move towards world market prices, Scotland is likely to be more vulnerable, particularly with respect to livestock products that are supported by significant amounts of subsidy.

Over and above the uncertainties of CAP reform and Agenda 2000 and the forthcoming GATT negotiations, agriculture in Scotland is faced currently with particular uncertainties and difficulties: a strong pound, low prices, falling incomes, competition from world markets, the continued controversy of BSE and GMOs, food safety, animal welfare, access to the countryside, and environmental damage, to name but a few. For example, the effect of reduced demand and prices for lamb and beef from livestock farms in the least favoured areas of Scotland, and the increasing proportion of their income that relies on EU and UK subsidies and the extent of their vulnerability is given in Tables 2 and 3. Although there are many factors that are likely to influence the way the agricultural industry will change in the future it is these underlying trends in the economic performance of primary food production that will determine the ultimate outcome.

McInerney (1999), in a recent analysis of the agricultural industry of the UK concluded that changes in the policy structures that have sur-

INDICES OF NET FARM INCOME BY FARM TYPE IN THE LESS FAVOURED AREAS IN SCOTLAND (Expressed in Real Terms)				
SCOTLAND	1990/91	1996/97	1997/98	1998/99
SHEEP	96	133	78	43
MIXED CATTLE & SHEEP	92	127	54	9
Average of three years 1989/90 – 1991/92 = 100				

**TOTAL DIRECT LIVESTOCK SUBSIDIES AS A PERCENTAGE OF
NET FARM INCOME IN THE
LESS FAVOURED AREAS IN SCOTLAND**

	1996/97	1997/98	1998/99
SHEEP	140.9	215.6	433.9
MIXED CATTLE & SHEEP	175.8	349.8	1819.7

rounded agriculture for a long time are not the primary instruments that will determine future change in agriculture. Rather it is low growth in product demand and downward pressures on prices that will determine change. Such economic forces are 'inexorable and invariant; policy interventions may hasten or delay them along their path, disguise or divert them for a number of years, but in the end they will break out and catch up with where they were always going.' In Scotland we can see this continuing decline in the outputs from both the livestock and crop sectors. Despite there being significant year to year variation, the mean decline in output from crops is estimated to have been £5.5m per annum in real terms since 1973. The decline in livestock output in real terms over the same period has been much more consistent at £26.4m per annum.

As he points out, the crucially important fact for conventional agricultural production, is that the income elasticity of demand for food in the UK is now only about 0.2. Thus, even if consumers' incomes in real terms rise by 1.5% per annum over the next 10 years, as they have in the 90's, expenditure on food will increase by only 3% which converts to a demand for primary products from agriculture of 2.5%. The message for the agricultural sector is that if it does not adapt, its incomes will rise by 2-3% while everyone else's will go up by 15%. In order to retain the existing parity between the incomes of full-time farmers and those in the rest of the economy over the next 10 years, there would need to be an 11% reduction in the number of farmers which, as it turns out, is the same rate of reduction that has been taking place over the last 25 years within the UK. As we have observed there has also been a relentless increase in efficiency within the industry over the same period of around 2% per annum. In Scotland this has led to a reduction in the number employed in agriculture from 120,000 in 1944, just prior to the end of the Second World War, to 50,000 in 1969 and about 25,000 in 1994. The trend as in the rest of Europe, including Denmark, indicates that fewer people will be employed directly in agriculture.

Thus, the conclusion for the longer term, irrespective of the policy changes that may arise from CAP reform and Agenda 2000, is that agriculture will be characterised by a low but highly selective growth in demand for its primary produce, downward pressure on prices, and higher resource productivity. There will be, therefore, less of a requirement for resources (land and labour) to sustain food supplies, fewer and bigger farms, and more part-time farming businesses. The consequences for land use change seem inevitable. There will be less land in conventional primary food production and there will be a change in the relative intensity that land is farmed, depending on farm size, farm type and land quality. The prospects of this land reverting to largely unmanaged countryside being converted to farm and amenity woodland and forestry seems high.

Forestry

In post-glacial time, the countryside in Scotland, as in much of Britain, was largely forest. With the arrival of man in neolithic times, the progressive and increasing utilisation of woodland began, initially for fuel, and timber for the construction of shelter, and then for the cultivation of crops and the grazing of livestock. From the sixteenth century until the advent of iron and steel production, there was also a significant demand for timber for shipbuilding. By 1860, however, it was clear that there would be no long-term future demand for oak for boats. It was also the case that the demand for wood for fuel declined rapidly during the latter part of the nineteenth century as alternatives and substitutes were found, (e.g. coal, gas and electricity for domestic heating). By the end of the century, North America and continental Europe had become the main sources of supply of timber for the UK and the forest area in Scotland had declined to 4.5% of the land surface area, as a consequence of inadequate replanting for many years (Mather 1993, Aldous 1997).

While there had been increasing concern expressed about the low levels of tree planting from a strategic point of view, for many years before the First World War, it was not until the crisis of wood shortage experienced during that war that any action was taken to ameliorate the problem. In 1919, a state forestry authority, the Forestry Commission was established. At that time Scotland's forests still represented less than 5% of the land area. Since then the woodland area has expanded steadily and in 1995 covered some 14-15% of the Scottish land area (D Roberts – personal communication). But, of course, the rationale for afforestation has changed in emphasis since the First World War, when

the primary purpose for afforestation was the establishment of a strategic reserve of timber for a period of three years. This was very quickly followed by a requirement that afforestation should also relieve unemployment and forest-worker holdings were created.

After the Second World War it became apparent that the policy objective of maintaining a standing reserve of timber for use during a period of war became irrelevant. The rationale for afforestation came to be based on commercial and social objectives. For example, in Scotland the planting targets during the 1960's were increased in three successive years, with a view to providing employment in the rural disadvantaged areas of the north and west of the country. During this period private land owners were given incentives to plant through planting grants and favourable treatment of investment in forestry under both income- and capital-tax arrangements (Aldous 1997).

In the late 1980's the grants and tax concessions that had encouraged widespread coniferous afforestation were removed. Since then, grant schemes have been introduced that encourage the planting of broadleaved woodlands on better quality land on farms and also are designed to encourage the regeneration of native woodlands. The changes that have taken place in the area and proportion of different forest types in Scotland demonstrate that an increasing proportion of new planting is broadleaved woodland. These changes represent an ascendancy of the conservation and recreational benefits of forestry and a relative decline in the weight placed on traditional or commercial objectives of forestry policy. It acknowledges that there is surplus agricultural production and less of a requirement of land in agriculture, an increasing public concern about landscapes, and a growing recognition of the ecological benefits of native woodlands. The historical changes in forest and woodland cover in Denmark, parallel almost exactly the rationale for change, over a similar period, in Scotland *viz.* a period of multiple-use and over-exploitation, (1600-1850), a period of single-use forestry dominated by the planting of conifers, (1850-1950), and then a return to forestry of multiple-use.

The continued decline in the value of output of agriculture and the requirement for less land for primary food production in combination with current afforestation policies will almost certainly lead to a continuation of the conversion of agricultural land to forest and woodland. But the social dimension of rural land use and management will also influence change. It is generally acknowledged that up to the present time, although rarely stated explicitly, much of the financial support that

has been deployed into agriculture and forestry has been as much to do with retaining a rural population and community infrastructure, as it has had to do with primary food and timber production. Yet as we have seen, while such financial support has perhaps slowed down the reduction of employed workers in agriculture in the UK it has not stopped it. Nor has it stemmed the reduction in aggregate farm incomes (the return to farmers and their spouses for their labour, management skills and own capital invested after providing for depreciation). Accepting that there have been significant year to year fluctuations, aggregate farm incomes have halved in real terms over the last 25 years. Also while the area of forestry has increased significantly, the number employed in forestry has declined. There is therefore an urgent need to develop alternative strategies to retain viable rural communities and infrastructures.

But social objectives extend beyond the goal of maintaining rural employment, communities and infrastructures. During the last three decades societies in Europe have become increasingly concerned about the quality of their rural environments and have developed changed perspectives on how they should be used.

The rural environment

In the UK since the 1970s, there has been increasing concern about the impact of the rural land use industries on the rural environment as well as the impact of anthropogenic pollution arising from urban based industrial and power generating activities. The passing of the Wildlife and Countryside Act in 1983 and the creation of the Scottish Natural Heritage and the Scottish Environmental Protection Agencies in the last decade, as well as the influence of European environmental policies have brought about a greater emphasis on the conservation and protection of the countryside in terms of land management and pollution control. As a consequence of research that has characterised the extent of vulnerability of our land to acid deposition, pollution abatement policies in line with international agreements have been put in place to reduce both sulphur and nitrogen emissions. Similarly, in response to some of the changes in land use features that have occurred since the Second World War as a consequence of intensifying agriculture (e.g. removal of hedgerows, increased stocking densities) and planting large tracts of land with conifers, there are incentives and legislation now being put in place to reverse these trends.

But reversing these trends is no longer just associated with a reaction to the extreme exploitation of land for production purposes. Countryside agencies and non-government voluntary bodies focus increasingly on environmental enhancement and proactive environmental management. This is because there is also a more explicit demand from the public for environmental goods and services associated with recreation, sport, tourism and a general enjoyment of the countryside. In Scotland, tourism has become a significant component of economic activity and rural policy development. Of the 11.2 million trips taken in Scotland in 1996, around 6.4 million trips can be regarded as being associated with rural tourism [Scottish Tourist Board, 1998]. These trips are estimated to represent £692m or 46% of the total expenditure on tourism in Scotland. But much of this tourism depends on ready access to the countryside and the Scottish Executive is under pressure to legislate for that right. Consequently, it is almost certain that land reform legislation and the reform of the CAP will lead to easier access and payments to land managers in some areas for the delivery of environmental goods where now they receive support for food production. These payments will be linked to more positive land management for wildlife and habitats, the planting of trees and hedgerows, and the creation of attractive landscape features and visual amenity. Countryside agencies will enter into partnership and provide financial support to facilitate access. Negative environmental impacts caused by agriculture and forestry will be increasingly tightly controlled. The requirement by the EU that all member states produce river catchment plans will also require that environmental objectives to maintain high levels of water quality are integrated fully into land management objectives.

Implications for rural development

What do these changes in the agriculture and forestry industries, and the requirements for more sensitive environmental management mean for land management and rural development in Scotland?

As far as agriculture in Scotland is concerned, large farms with land of good quality are increasingly likely to become intensive agri-businesses with the aim of achieving greater efficiency in production through optimising inputs and maximising the usable product to meet precise requirements. Medium sized businesses are likely to become increasingly diversified while smaller businesses will operate on a part-time basis. A

new attitude of entrepreneurship will develop, seeking both to add value to primary produce and to exploit environmental goods on the farm. That land will convert to other forms of use is certain if farm and estate businesses are to remain viable (Maxwell 1998). Current proposals towards integrating agriculture within the broader context of rural development and increasing the proportion of structural funds, at the expense of commodity support, should provide opportunities for the development of a range of farm and land based activities. These are likely to include, forestry, industrial biomass crops for local heat and electricity production, nature conservation management, sport and recreation, tourism and accommodation provision. The proposition is that, together with changes resulting from land reform, the increased availability of structural funds will encourage and facilitate down-stream processing, a greater diversity of employment by attracting new business into rural areas, and a greater degree of social and community infrastructural stability.

In relation to recent and current trends it is difficult to come to any other conclusion than that agriculture (defined as a primary food producing land use activity) will become of diminishing importance whilst forestry and woodland establishment will become of increasing importance. The rate of planting will be largely determined by the fortunes of the agricultural industry and the extent to which the state is prepared to support the financial incentives that will be required to encourage private land owners to increase the woodland area on their estates.

New demands from society will require that future rural land use will deliver multiple benefits in greater measure than they have done previously. These benefits will not be delivered by chance nor by default but rather by proactive decisions and management. The benefits can be classified as being economic, (e.g. incomes and contribution to GDP arising from agriculture, forestry and other non-food goods and services), social, (e.g. diversity of employment, provision of community services), and environmental (e.g. maintaining soil and water quality, biodiversity, landscape and other non-market goods and services). They must also be lasting, that is they must be sustainable. The benefits that we identify are very different, however, in their characteristics and it is not clear that in achieving one benefit we can necessarily achieve another. But this is what sustainable development is all about and represents the conceptual framework within which future land use and rural development will take place.

In Denmark the context in which sustainable development will take place will be different because of the greater reliance on agriculture as an export earning industry. The aim will probably be towards greater efficiency with pressure on farm restructuring within the national policy framework determining land ownership. But the issues in balancing economic, social and environmental objectives will be very similar.

Creating sustainable solutions for our land and for rural development

In creating sustainable solutions for our land and for rural development it has to be acknowledged that there are no absolutes in determining sustainability. Depending on their economic, social and environmental status, and the stage that they have reached in their development, what is regarded as being sustainable in one community may be regarded as unacceptable in another. Relatively poor communities will tend to concentrate on finding solutions that maximise economic growth and increase personal incomes. They will exploit natural and other resources and there will often be a trade-off between achieving economic benefits and creating a negative impact on the environment. This is something which both Scotland and Denmark have experienced in varying degrees over many years. On the other hand, rich communities that have disposable income will tend towards maintaining and enhancing the environment and conserving natural resources. In this case the ethical emphasis is less concerned with the interests of the contemporary human being and more to do with the well being of future generations, goals which both Scotland and Denmark have now the opportunity to pursue.

This is no mean challenge. Our national and local governments, their agencies, voluntary bodies, land owners and local communities will all have to find new ways of interacting and finding a common purpose. That there is evidence already in Scotland that partnerships of a variety of kinds are being successfully put in place augurs well for the future. However, success will not only depend on finding a common purpose; it will also depend on the extent and quality of the information and the knowledge that communities have about the resources about which they are concerned. That depends, at least in part, on the output from re-

search undertaken in our universities and research institutes throughout Europe. It will also require the sharing of experiences and a need to collaborate widely. This Symposium demonstrates that small countries like Denmark and Scotland are in a uniquely favourable position to share their experiences and benefit from further analyses of their cultures and recent trends in the development of their respective agricultural, forestry, environmental and rural policies. It is frequently claimed that we are 'knowledge rich' societies: it is important that we share our knowledge and use it to good effect.

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