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Farming the Iveragh Uplands

A tale of humans and nature

Kramm, N.; Anderson, R.;
O'Rourke, E.; Emmerson, M.; O'Halloran, J.; Chisholm, N.









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Farming the Iveragh Uplands

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EFNCP







Foreword

by Dr. Eileen O'Rourke

The uplands hold a special place in the Irish psyche, not only because of their enigmatic landscapes of blanket bogs and heather moorlands, but also because traditions die slowly in steep places. As Braudel put it; 'mountains tend to resist the march of history'. The Irish uplands are important repositories of our entwined cultural and natural heritage. Today the uplands are at the threshold of change, as the recent subsidy driven overgrazing of the hills is now giving way to undergrazing and possible abandonment. No where is this trend more strongly reflected than on the isolated Iveragh peninsula, jetting out into the Atlantic Ocean and watched over by the lofty heights of Carrantuohill.

Marginal places often tend to be forgotten places. The Science Foundation Ireland (SFI) funded BioUp research project, which studied the links between the rich upland biodiversity and farming systems on the Iveragh peninsula, has attempted to rupture its research isolation. Over the course of the three year research project two UCC Doctoral students, Nadine Kramm and Roslyn Anderson acquired an intimate knowledge of both the landscape and the people of the Iveragh. What follows is their tale. However, that tale is strongly peppered with the voices of the people on the ground, especially that of the hundred farming families who participated in this research. Their voices put flesh on the dry bones of statistics and empirical field data, and are central to a holistic social-ecological understanding of what is going on here today. As both the custodians and co-creators of the Iveragh's landscapes, biodiversity and community life, farm families will necessarily play a pivotal role in the future evolution of the peninsula, as it moves from the somewhat derogatory term 'less favoured area' to a 'high nature value' landscape.

This research was also strongly supported by other key stakeholders on the ground, including the National Parks and Wildlife Service (NPWS), Teagasc, South Kerry Development Partnership (SKDP), and the Irish Farmers Association (IFA). But, without the considerable personal commitment of Nadine and Roslyn this book would not have materialised. It is their way of giving something back to a place and a people who have given us so much.

Dr. Eileen O'Rourke,
Department of Geography, UCC,
Principal Investigator on BioUp Research Project (August 2010)

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Farming the Iveragh Uplands

A tale of humans and nature

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1. Introduction

The rugged beauty of the Iveragh peninsula has fascinated many a passing visitor and never fails to make some of us linger or stay for good. For those who need proof of the area's uniqueness, a variety of national and European designations provide ample attestation of the splendour of Iveragh's scenery, the diversity of its landscape and its heritage.

Being surrounded on three sides by the Atlantic, Iveragh is the largest and most geographically isolated peninsula in Ireland whose western extremity, the Great Skellig, forms the westernmost point of Europe. Despite its maritime location, Iveragh's character is fundamentally determined by the mountains, valleys and streams that form the peninsula's interior—the bequest of a landscape sculpted by ice thousands of years ago (Crowley and Sheehan, 2009).



Distinctive mountain scene in the Bridia Valley, Glencar

Perhaps most distinctive, however, are the extensive blanket bogs and upland heather moorlands that cover most of the peninsula and captivate the imagination with the wild and austere appeal of an area where life did not change much for man and beast until relatively recently.

Having come into existence in the wake of woodland clearances, the cutting of vegetation for fuel and the harvesting of crops for food and fiber by Neolithic farmers in the first and second millennium BC, this unique cultural landscape continues to be managed by traditional farmers and their animals to the present day.

Farming the Iveragh Uplands



The value of areas such as Iveragh as repositories of a unique flora and fauna has long been recognized, but they have entered a period of major transformation as the agricultural economy that lay behind them no longer exists (Webb, 1998). The single largest danger is that farming communities may not survive the present discussion of how competitive European agriculture should be, as under present market conditions they are unable to compete without fundamentally changing their way of farming (Luick, 1998).

The last 10 years have seen a growing debate over the future of areas like the Iveragh peninsula that may be 'marginal' in agricultural terms, but that are quite essential to life in Europe as we know and cherish it. Upland farmed landscapes provide clean water, maintain a rich plant and animal life and help to keep families in regions that offer few alternative employment opportunities – at the same time as attracting millions of tourists each year.



The Caragh in Glencar—one of Europe's cleanest rivers

Such areas, also termed high nature value farmland, cover about 25% of all agricultural land in Ireland and include, besides Iveragh, other parts of Kerry, Connemara, Mayo, Donegal, the Comeraghs, Wicklow, the Burren and the offshore Islands.

The farming systems of these areas are characterised by extensive mixed livestock grazing and little agro-chemical inputs combined with labour-intensive management practices. Without dedicated farmers and their families, the character of these areas would change completely leading to the disappearance of unique cultural landscapes with effects such as rural depopulation and the loss of local communities.

Already farming systems have changed substantially with livestock being concentrated on better quality land while marginal areas are being abandoned. Along with this, there are changes in the animals being farmed. The traditional Scotch Blackface sheep are increasingly crossed with or replaced by lowland breeds to satisfy market demands for heavy lamb. This has led to a softening in sheep and the fear among farmers that the traditional grazers of the uplands may be extinct in years to come. Going, too, is the use of the native rustic Kerry cow that grazed the rough



grasses, bracken, gorse and soft rushes in the winter - growth that sheep cannot control.

Unsurprisingly, this disruption over a relatively short time, in what was formerly a sustainable relationship between farming and nature, will have implications for the area's flora and fauna. Some of the repercussions are obvious; others need to be researched in more depth if appropriate solutions are to be formulated. It is now a stated objective of EU environment and rural development policy to maintain and conserve traditional farming systems like the one practised on Iveragh.

Beyond acknowledging the importance of traditional farming for nature conservation and local livelihoods, it is necessary to understand how such farming systems function and to determine how the inevitable process of change can be redirected to provide a way of life that is socially and economically rewarding for farm families while preserving the farming practices necessary for Iveragh's unique landscape to persist into the future.

In this light, University College Cork (UCC) in conjunction with the Environmental Research Institute (ERI) and funded by Science Foundation Ireland (SFI) initiated BioUp, a 3 year research programme to investigate the upland farming system and rich biodiversity associated with it.

Managing rural change in the uplands calls for the active involvement of many stakeholders, including farmers and agricultural advisory groups, land owners, conservation groups, forestry, tourism, and local authorities. In the BioUp project, researchers and stakeholders worked closely together. It is hoped that this will help to obtain a better understanding of the social, economic and environmental challenges facing Iveragh and promote greater public appreciation of the indispensable contributions made by farm families to maintaining our unique heritage - a service that has gone unappreciated too long.



BioUp Steering Group
Teagasc Killarney, August 2009

2. High Nature Value Farming

Background

Traditional farming systems are found throughout the European Union where they exist in a variety of environments, climatic conditions, economic contexts and production systems. This diversity, having arisen out of the requirement to suit local social needs and to utilise the resources at hand, stands in stark contrast to most other agricultural sectors that are marked by homogeneity of crop and livestock breeds as well as management systems.

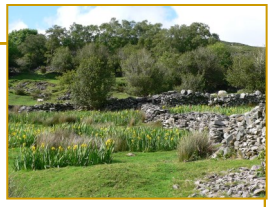


Traditional farmed landscape consisting of a mosaic of stone walls, improved green land and rough grazing in Keas, Glencar

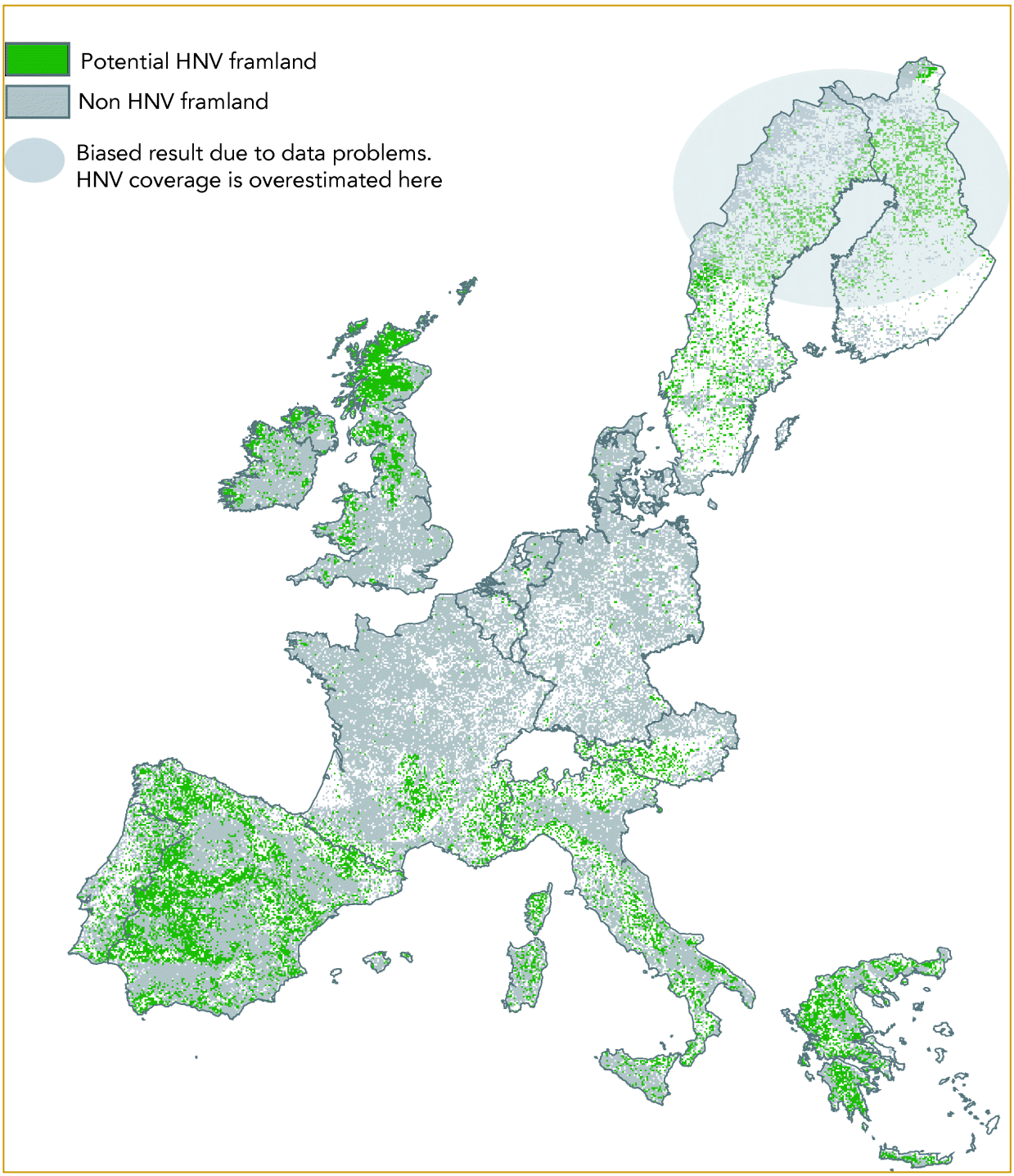
Only recently have traditional farming systems become the subject of political and scientific discourse. This is the result of increasing recognition of the important role played by such systems in maintaining cultural landscapes, producing high quality food, preserving rare breeds, providing an economic base for tourism and maintaining demand for rural services.

Because farming in such areas tends to be of low agricultural productivity, they have long been called marginal, but over the last decade, this has been gradually replaced by the term 'high nature value' (HNV) farming which emphasise the pivotal role of traditional farmers as custodians of unique and highly valued cultural landscapes and their traditions from generation to generation.

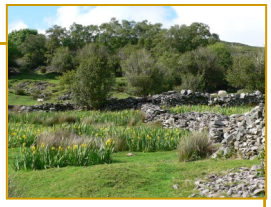
Farming the Iveragh Uplands



Importantly, the concept of HNV farming is based on the explicit recognition that nature conservation goals in European cultural landscapes cannot be met solely by protecting particular habitats or species, or by designating Special Areas of Conservation (SAC), but is dependent on the continuation of the traditional land uses.



Potential HNV farmland according to minimum Corine selection
Source: European Environment Agency (EEA), 2004



Characteristics of high nature value (HNV) farming

At its most basic, the HNV concept describes farming systems that are heavily dependent upon vegetation composed of wild plant species for grazing or fodder production. This applies to farmland that has not been fundamentally altered through drainage or large-scale improvement. Research found drainage to have a negative effect on wading birds by destroying their breeding and foraging habitat (Green & Vos 2001). Large areas of unimproved rough grazing are also documented to benefit raptors and owls (RSPB, 1993, 1995).

Natural and climatic constraints - typically perceived as inhibiting the mechanisation and intensification of farming - result in a diverse mosaic of semi-natural vegetation interspersed with other types of land cover. Field margins, exposed rocks, water bodies, woodland and scrub all offer suitable habitats for birds to breed, forage and roost.

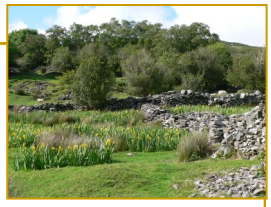


The shores of Lough Cloon, Glencar

In addition, the low levels of fertiliser and agro-chemical application that are characteristic for HNV farming, create conditions that are essential for the survival of numerous plant and invertebrate species that are intolerant of high nitrogen and phosphorus levels.

At the same time, however, the low nutritional value of semi-natural vegetation restricts the land's carrying capacity and therefore sustains a lower livestock density. Grazing pressure can only be sustained for limited periods of time after which herbivores must move to another area. This process leads to high structural heterogeneity and diversity of the vegetation which, again, benefits many species of bird and invertebrate.

Farming the Iveragh Uplands



To suit the harsh conditions, use is made of hardier, often regional livestock breeds of great genetic diversity. These animals are well adapted to the local environment and can survive largely on rough vegetation with little concentrate feed. While the yield of such animal breeds tends to be limited under present market conditions, their utility goes far beyond economic concerns as they are the only types of livestock capable of converting low quality resources to high quality protein (meat and milk) and multiple other products such as wool, hide and dung.

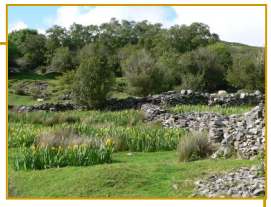


Scottish Blackface ewe, grazing on semi-natural vegetation
in Carriginane, Glencar

Management on HNV farmland closely follows the natural growth cycle. During the time of slowest vegetation growth, use is made of improved grassland, both to avoid damage to semi-natural vegetation and to provide for livestock at times of highest requirement , i.e. during late pregnancy and lactation.

While re-seeded and fertilised grassland is often considered as species-poor and of little conservation interest, it is important to note that the very mosaic character of more and less intensively managed land parcels is central to supporting a large number of bird species (Bignal and McCracken, 1996).

An often overlooked, but fundamental component of HNV farming systems is the immense contribution made by farmers themselves who harbour a wealth of traditional knowledge accumulated and handed down over many generations of intimate contact with the land (Dunford, 2002). This knowledge of local environmental conditions, the inherent fertility and carrying capacity of the land, breeds, grazing and feeding regimes has been translated into a continuity of management and valuable area-specific traditions that, once gone, will be lost for good.



The impacts of grazing on vegetation

It is well known that grazing has an important function in creating and maintaining open upland habitats. In its absence, below the tree line all but the wettest blanket bog would naturally succeed to trees (Thompson *et al*., 1995).

By way of selective feeding, grazing livestock play a critical role in determining the type and relative abundance of species in a habitat. This preference in food selection is largely determined by vegetation quality, digestibility and accessibility. Seasonal availability also plays a role. It has been found, for instance, that sheep on heather moorland tend to feed on Purple Moor-grass (*Molinia caerulea*) and Deergrass (*Trichosporum caespitosum*) in summer while preferring Heather (*Calluna vulgaris*) and Harestail Cotton-grass (*Eriophorum vaginatum*) in winter (Grant *et al*., 1976, 1985).

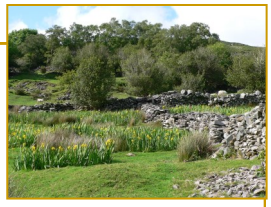
As a result, the impact of grazing can vary significantly over large tracts of semi-natural farmland with vegetation composition and structure attracting grazers to some areas while others are ignored. Frequently used walking paths and gathering places (for shelter, excretion and resting) can further enhance the natural variation in habitats.

Grazing also has consequences for the microclimate of the soil and sod. Changes in these conditions are known to affect seed germination and the establishment of grass, herbs and woody plants, especially when interacting with abiotic factors such as drainage and nutrient supply. This complexity presents considerable challenges for scientists trying to distinguish which factor is of greatest consequence.

Some authors have commented that conclusions regarding the effects of grazing tend to be assumptions rather than the sum of substantial factual evidence (Kuiters, 2002) which, once again, highlights the importance of farmers' intimate knowledge of their land that can only be supplemented, but never replaced, by scientific measures.



Flowering Cotton-grass near Cloon Lake, Glencar



Different livestock breeds

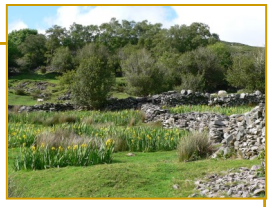
The impact of grazing is determined in large part by the type or breed of livestock present. Sheep tend to choose a high percentage of their diet among preferred plant species which significantly affects the floristic diversity of vegetation communities. Similar to cattle, they lack upper incisors and are thus unable to cut their food, yet they can bite closer to the ground than either cattle or horses. As a result, the preferred grasses become rapidly depleted in densely stocked areas. In the case of large unfenced areas under a low stocking regime, sheep tend to congregate in places with better quality forage while poor vegetation becomes tall and unpalatable. Heather, in particular, can become leggy and degenerate in the absence of grazing. Controlled burning then becomes necessary to rejuvenate it and enhance the nutritional value of young shoots.

The impact of cattle grazing differs significantly from that of sheep. Owing to their larger mouths, cattle are less selective in their feeding habits than sheep and can exist on forage of lower nutritional value. Cattle walking through high vegetation disturb invertebrates that are vital food sources for birds and bats. At the same time, they provide corridors for a number of small mammals as well as for moorland and woodland birds. In particular, they facilitate the movement of broods of young birds during the breeding season. Cattle dung is not only nutrient rich but also supports a range of invertebrates that birds and small mammals prey on. This is well illustrated by Swales *et al.* (2004) who note that one adult cow produces around four tonnes of dung a year which supports approximately 25 percent of her own body weight in invertebrates.



Mixed grazing of sheep and cattle near Cloon Lake, Glencar

The herd behaviour of cattle - including grazing, dunging, resting and ruminating in favoured places according to the season - is known to create a range of habitats and associated biodiversity that cannot be achieved without the use of cattle grazing (Wright *et al.* (2002) . This effect is further enhanced in mixed grazing systems that are widely recognised—both by researchers and farmers—as being the best form of management for upland areas (English Nature, 2001).



High nature value farming in a modern agricultural context

Sheep husbandry in Europe traditionally provided subsistence farmers with many important products, including meat, milk, wool and skins. The large-scale marketing of these products only began in the latter half of the 20th century, when it led to increased specialisation in production.

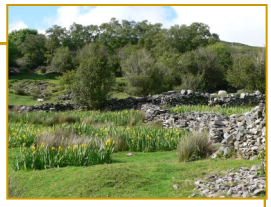
Until relatively recently, the main output from extensive sheep farming in northern Europe was wool. Reduced demand due to the use of synthetic fibres, however, led to a gradual and ongoing downward trend in wool prices that began in the 1980s. The consequence was a movement of resources into the production of other commodities. Meat is now the main income-generating product of European sheep farmers, whereas wools and skins have all but lost their economic importance with shearing costs often exceeding revenues from selling wool.



Mr Neilie O'Leary, Chairman of the IFA's Hill Sheep Committee, shearing a ewe

As current market prices for the sale of meat lambs cover little more than production costs, the future of extensive sheep farming seems to be dependent on the production of high quality lambs sold for premium prices. This, however, poses considerable problems for farmers as quality meat production requires a complete re-orientation of production systems that were traditionally geared towards wool production. Luick (1998: 981) illustrates their dilemma as follows:

'The large flocks of previous times needed 'something' to eat throughout the year, and the poor diet that grew on the mountains was just enough for their maintenance. The growth rate of the lambs was, of course, very limited. In contrast, a modern shepherd cannot make a living (only) on the uplands with their high nature value, because the production of marketable lambs requires better quality grazing. This leads to a limiting point of modern sheep keeping, which is the difficulty of finding the necessary good grazing at low cost.'



Land abandonment

One of the greatest challenges facing high nature value farming systems over the medium to long term is the scarcity of farm successors, due to a combination of declining market incomes, long working hours and a shortage of suitable employment opportunities within commuting distance to supplement farm incomes.

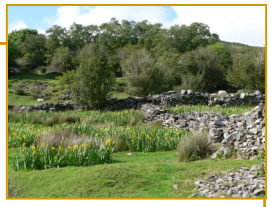
The abandonment of agricultural land is now widely recognised as the main threat facing European mountain areas. Although the reversion of previously managed land to 'natural' habitats may have positive impacts on some species, traditional farming practices in Europe have, over the centuries, contributed to maintaining local biodiversity and ecosystem services with the result that the areas concerned quickly lose environmental value if those practices cease.



Abandoned farm building in Keas, Glencar

The invasion of vegetation onto old field sites and woodland clearings is often perceived as a loss of openness and mosaic-features, or the wholesale loss of a cultural landscape created by earlier generations of farmers. Less obvious is the subsequent reduction in genetic diversity in both wild species and local livestock breeds which are often well-adapted to particular semi-natural habitats.

While we know that the abandonment of low-intensity grazing can have drastic consequences for the ecological character of an area, there has been little research to date on the connection between land abandonment and local socio-economic impacts. Overall, the loss of agricultural land weakens the economic base of local communities. The knock-on effects can be even more serious than the actual loss of agricultural incomes if areas are important for nature tourism and recreation, as reduced farming activity can also imply the loss of potential incomes from tourist accommodation where farmhouse accommodation closes down and scrub encroachment reduces the attractiveness of the landscape for visitors (DLG, 2005).



European agriculture under transformation

The Common Agricultural Policy (CAP) is one of the oldest and most contentious policies of the European Union. While originally envisaged to shield the European farming sector until it had become sufficiently competitive, economic recession in the 1970s and 1980s in conjunction with falling world market prices, the erosion of non-agricultural employment, and a growing concern that family farms were the emblematic expression of rural social organisation gradually led to the establishment of a much more explicit agenda to ensure the existence of small producers. As such, the CAP played an important part in helping to maintain livestock farming in remote and disadvantaged regions.

Over the past two decades, however, the CAP has come under pressure. EU enlargement, world trade discussions, budgetary concerns and a commitment to greater integration between environmental and agricultural policies increasingly question the legitimacy of providing state payments to farmers and forced the EU to introduce a series of reform packages.

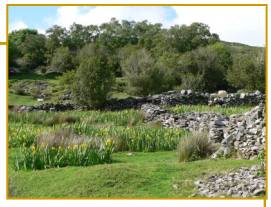


Remains of a horse drawn mowing bar & hay turner in Cappanthlarig, Glencar

In this context, the term ‘European Model of Agriculture’ (EMA) was coined to describe the key role of agriculture in defining the character of rural Europe. Under 1992 McSharry reform, the European Commission defended their resistance against steep reductions in price support by declaring that ‘sufficient numbers of farmers must be kept on the land’ if the appearance and social structure of the countryside, so valued by society, was to be maintained’.

It has become widely acknowledged that European farmers of the 21st Century are expected to produce more than food and fibres. Increasing public awareness of the value of maintaining environmental services, rural communities, and a growing concern about the future of the farmed environment has played an important role in this development. At the same time, however, changes in the CAP leave farmers increasingly exposed to the free market. An important question to pose in this context is how small family farmers will be able to respond to increasing market competition while continuing to farm in a sustainable manner.

Farming the Iveragh Uplands



This gives rise to a very urgent need to see how high nature value farming enterprises can best be integrated with other sectors such as tourism, forestry, recreation and landscape management. Importantly, mechanisms must be found and implemented so that the ecological services provided by traditional farming systems are rewarded by society or linked to new economic objectives, such as local value added products, niche markets and direct sales so as to enhance the living standard of farm families.

Making the transition from 'less favoured' agricultural regions to 'highly valued' environmental landscapes is central to this process. More funds are currently made available for rural development, including agri-environment schemes and nature conservation measures. The latter are, at present, not explicitly targeted at distinct areas of high nature value, but work is underway around the country where state agencies, departments and universities are working with farmers on high nature value farmland to support the continued development of farming systems that are economically and ecologically sustainable.



The BioUp 'Walk & Talk Saturday' in Gleninchaquin Park, Tuosist, was attended by over 50 people

3. The Iveragh Peninsula

Introduction

Iveragh is a peninsula of geographical contradictions, stretching from the fertile lowlands to the north to rugged mountains in the centre and an irregularly indented coastline in the west. Sixty five percent of the peninsula's land area is classified as mountain, compared to only 22% nationally. As such, Iveragh is the most mountainous part of Ireland, featuring cliffs, deep pockets, exposed rock, glens and narrow passes (Crowley and Sheehan, 2009).

Farming has been a decisive factor in Iveragh's development, but in recent decades tourism has begun to play an important role. The peninsula is one of Ireland's leading tourist destinations whose scenic beauty, landscape diversity and heritage are recognised through a variety of national and European designations.



The world-famous lakes of Killarney

Like many peripheral areas, Iveragh has undergone significant demographic change. A gradual decline in traditional employment in farming, matched with the ample availability of off-farm work opportunities in other parts of the country during the Celtic Tiger boom period, has been the chief factor leading to a declining and ageing population in the more rural parts of the peninsula. O'Rourke and Kramm (2009) observe, however, that Ireland has recently entered a more challenging economic period with a notable decline in off-farm employment in the construction sector that looks set to continue.

The aim of this chapter is to provide an introduction to the Iveragh peninsula, starting with the biophysical factors that have moulded and continue to mould the area. This is followed by a description of the ecology that forms the basis of today's unique cultural landscape. The final section of the chapter affords initial insights into life on Iveragh by drawing a sketch of its population, employment and farming system.



Geology and soils

The Iveragh peninsula is made up of rocks that were laid down between 385 to 330 million years ago during the Devonian and Carboniferous periods. Most of the mountains that dominate the scenery consist of Old Red Sandstone, a term denoting a number of continental sedimentary rocks including conglomerates, sandstones, siltstones and mudstones. The latter formed as part of a very large depositional basin, the Munster Basin, that stretched from Iveragh in the west to the Comeragh Mountains of County Waterford in the East. The sediments themselves were washed down by river systems from mountains lying to the north (Higgs, 2009).

It was the last Ice Age with its alternations of cold and warm states, however, that put the finishing touch to Iveragh's physical landscape as we know it today. Many of the peninsula's dramatic corries, lakes, valleys and narrow passes, in particular, are remnants of the Cork/Kerry glaciation during which a great ice centre formed in the upper part of Kenmare Bay and chiselled out the spectacular Black Valley and Gap of Dunloe (Crowley and Sheehan, 2009). Given that rock is such a distinctive feature of Iveragh, it is hardly surprise that the area is home to Ireland's richest collection of rock art (Evans, 2009).



A fine example of rock art on Coumreagh, Glencar

Parent material formed through early geological processes largely determines heaviness, drainage and agricultural potential of Iveragh's soils. In 1957, Finch conducted a reconnaissance survey classifying the area's soils as lowland mineral, mountain and hill, and peat associations.

Lowland mineral soils, typically occurring below 500 feet above sea level, mostly originate from Carboniferous shale and sandstone drift. If well-drained, such soils are suitable for tillage and grassland enterprises, yet Iveragh's Atlantic climate and high levels of precipitation severely limit the range of well-drained mineral soils and restrict their use to grassland enterprises.

Farming the Iveragh Uplands



Mountain and hill soils, in contrast, are found mainly above 500 feet above sea level and are prevalent on Iveragh. They occur on Devonian Old Red Sandstone rock and colluvium with smaller pockets of glacial drift, and consist largely of peaty podzols, skeletal mineral soils, blanket peat and, in higher altitudes, outcroppings of rock.

Peat soils cover more than ten percent of County Kerry as a whole with the most extensive formations occurring in the Inny Valley and around Portmagee on the Iveragh Peninsula. The latter peat soils have been described by the Agricultural Institute's peat-land survey (1970) as belonging to three types. *Fen peats* - occurring along river valleys with or without a thin cover of river alluvium – exist in small pockets and vary in depth between 45 and 200 cm. The waterlogged and very acid *deep raised bog peats* are dominated by *Sphagnum spp*. and have a peat depth of between 2 and 4 meters. *Atlantic* (lowland) or *upland blanket peat* is most widespread on Iveragh with a peat depth that varies with the degree of slope from less than 30cm to 3 meters (Lee *et al*.,1972)

Traditionally, peatlands were used for extensive livestock grazing and the small-scale cutting of turf for domestic heating with the cut-over soil being used for the growing of domestic crops. Remains of reclaimed peatlands are found in many locations throughout the peninsula. More recently, however, the bogs of the remote Caherciveen Rural District, in particular have been used for domestic and industrial peat production. Large areas of intact or cut-over bog were also planted with coniferous trees.



Freshly cut turf in Droumteewakeen, Glencar



Climate

Iveragh's mild climate is determined in large part by its maritime location in the extreme south-west of Ireland and its long indented coastline. As a result, temperatures in most parts of the peninsula are directly affected by the warm Atlantic Drift. This moderating oceanic influence produces a mean temperature range of 7º - 16º Celsius.

In addition to the influence of the Atlantic, Iveragh's topography has a significant impact on the distribution of cloud, precipitation and sunshine. Connaughton (1972) describes in detail the orographic or lifting effects of the peninsula's mountains on moist oceanic airstreams that results in the formation of clouds and deposition of precipitation on elevated areas. Places in the lee of the mountains, where descending airstreams are warmer and drier, against this, are marked by lower precipitation levels and a higher frequency of sunshine.

Recorded levels of precipitation average 1,350 millimetres per annum, increasing to up to 3,000 mm in elevated sites (Met Eireann, January 2001). Snow and hail occasionally present problems for out-wintered livestock in the mountainous centre of the peninsula, yet rarely persist in lower-lying areas.



Snowfall on MacGillycuddy's Reeks, view from Moll's Gap

Iveragh's exposed location on the western seaboard close to the most common northeastward track of depressions across the Atlantic Ocean results in a relatively high frequency of moderate to strong winds, mostly between September and March.

Precipitation levels exceed evapotranpiration in winter and most summers. Ground conditions, as a result, provide a suitable environment for the snail *Limnaea truncatula* that acts as intermediate host of the liver fluke. The latter is a serious problem on the peninsula that demands the protection of sheep and young cattle, in particular against the disease caused by the parasite.



Ecology

Owing to its mild climate and great range of habitats, Iveragh has an ecology that Mullane *et al*. (1972: 242) describe as unique in Northern Europe. Physical constraints to agricultural improvement have led to the continued existence of large tracts of traditional hill farming systems and semi-natural habitats. Of particular interest are extensive upland blanket bog and heather moorland habitats, internationally recognised as key biodiversity habitats and listed as Special Area of Conservation (SAC) under the European Habitats Directive (92/34/EEC).

Upland blanket bog with an average peat depth of 1-2 meters, found on flat or sloping areas at altitudes above 150 meters, is Iveragh's most frequently occurring habitat type. It is dominated by bryophytes (*Sphagnum spp.*) and lichens (*Cladonia*), communities of Deergrass (*Trichophorum caespitosum*), Cotton Grasses (*Eriophorum spp*.), the characteristic Black Bog-rush (*Schoenus nigricans*), and dwarf shrubs including Ling (*Calluna vulgaris*), Cross-leaved Heath (*Erica tetralix*) and Bilberry (*Vaccinium myrtillus*). Purple Moorgrass (*Molinia caerulea*) is locally abundant.

In steeper places and on shallower soils with a peat depth of no more than 15-50 cm, upland blanket bog forms mosaics with wet heath communities that are characterised by the presence of Heath Rush (*Juncus squarrosus*) and Green-ribbed Sedge (*Carex binervis*) as well as a high cover of dwarf shrubs such as Bell Heather (*Erica cinerea*) and Crowberry (*Empetrum nigrum*) that are absent on upland blanket bog.



Bell Heather (*Erica cinerea*), by Isabelle Kozlik

Montane heath is found at high altitudes and exposed locations, mainly on shallow mineral soils or on unstable, eroding peats. Dry siliceous heath tends to occur on areas with free-draining, but nutrient-poor soils. Trees and larger shrubs are interspersed with wet and dry heath communities, but – with the exception of the Gorse that adds a splash of colour to the hills – do not dominate. The latter contains elements of semi-natural (mostly dry-humid acid) grassland, most common near the upper limit of enclosed farmland (Fossit, 2000) and made up of both small, narrow-leaved grasses such as bents (*Agrostis capillaris*), fescues (*Festuca spp*.), Wavy Hair-grass (*Deschampsia flexuosa*) and Mat-grass *Nardus stricta*) as well broadleaved herbs including Heath Bedstraw (*Galium saxatile*), Tormentil (*Potentilla erecta*) and Common Dogviolet (*Viola riviana*).

Farming the Iveragh Uplands



Mammals commonly observed include Irish Mountain Hare (*Lepus timidus hibernicus*) and Feral goat (*Capra hircus*). Fox (*Vulpes vulpes*) and Badger (*Meles meles*) are common, but rarely observed. Sika deer (*Cervus Nippon*) are also prevalent.

The Kerry slug (*Geomalacus maculosus*) whose distribution is restricted to the South West of Ireland is typically found on lichen and moss-covered rocks (Sterry, 2004). Iveragh's upland habitats also contain important populations of birds species protected under Annex 1 of the EC Birds Directive (74/409/EEC) such as the Hen harrier (*Circus cyaneus*), Golden Plover (*Pluvialis apricaria*), Red grouse (*Lagopus lagopus spp. Scoticus*), Chough (*Pyrrhocorax pyrrhocorax*) and the recently re-introduced White-tailed sea eagle (*Haliaeetus albicilla*).



Feral goat kid (*Capra hircus*), observed in Loughbrin

Approximately four percent of the peninsula is covered by coniferous forest plantations, chiefly in more marginal areas where land is of low agricultural productivity. The majority of large forests are managed by Coillte, a private limited company that primarily manages estates owned by the Irish state. The smaller pockets of forestry seen on hillsides or in valleys mainly consist of privately afforested farmland and are often of little commercial value.

The main tree species are Sitka Spruce in wet areas with lodgepole pine ranking second, to be followed by larch. Clear-felled areas, particularly areas adjacent to streams or roads, are now increasingly planted with broadleaved species such as alder and birch to break up the monotonous green of conifer plantations and add a livelier colour to forest areas. Mountain tops are rarely planted to reduce the visual impact of the forestry.

The prospects for continued forestry development currently appear limited as forty-four percent of Iveragh's surface area is designated as SAC while its entirety has been assigned acid sensitive status. Even in the absence of designation, however, a large amount of land on Iveragh is either held in commonage or considered as unplantable due to its rocky character, steepness, exposure and generally low productive capacity. The timber produced on the peninsula, as a result, does not reach the quality standards required for joinery business.

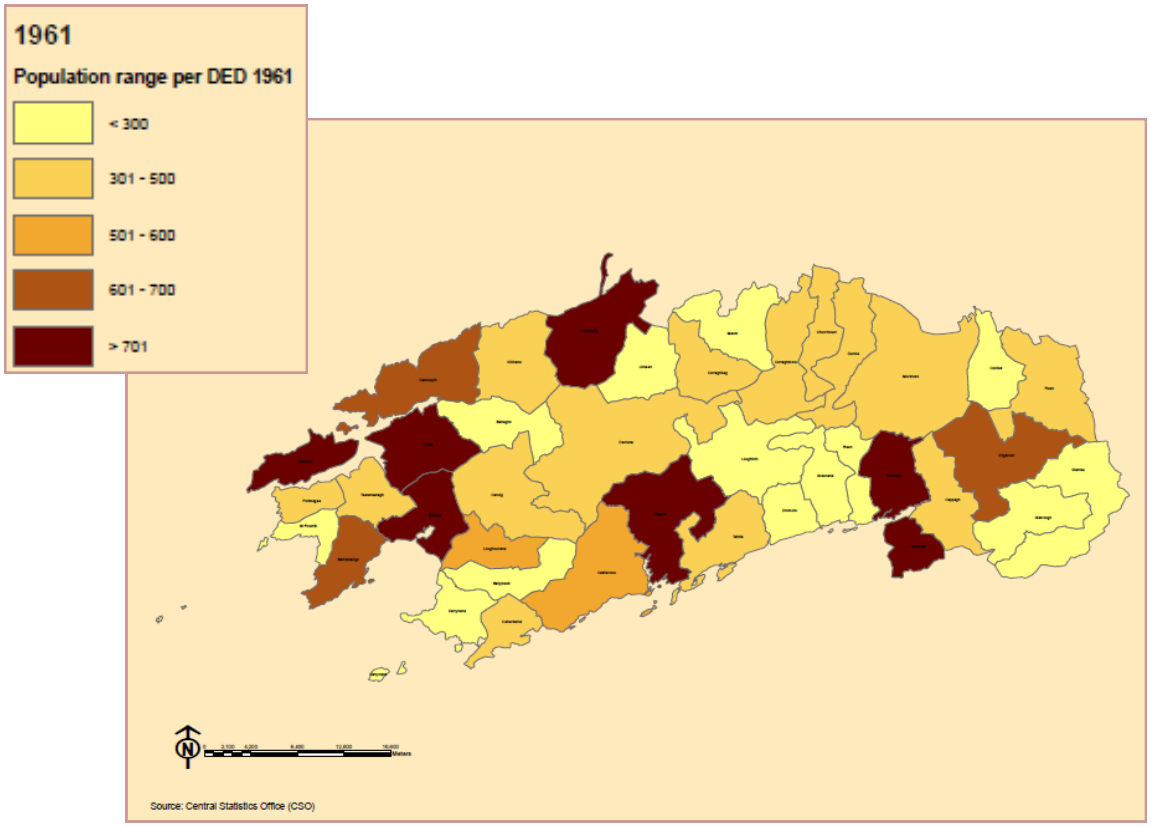


People

Similar to other western counties in the Republic of Ireland, Iveragh went through considerable demographic and employment changes over the last century. Successive waves of out-migration that have occurred ever since the mid-nineteenth century, have left their marks on the peninsula's socio-cultural and economic structure.

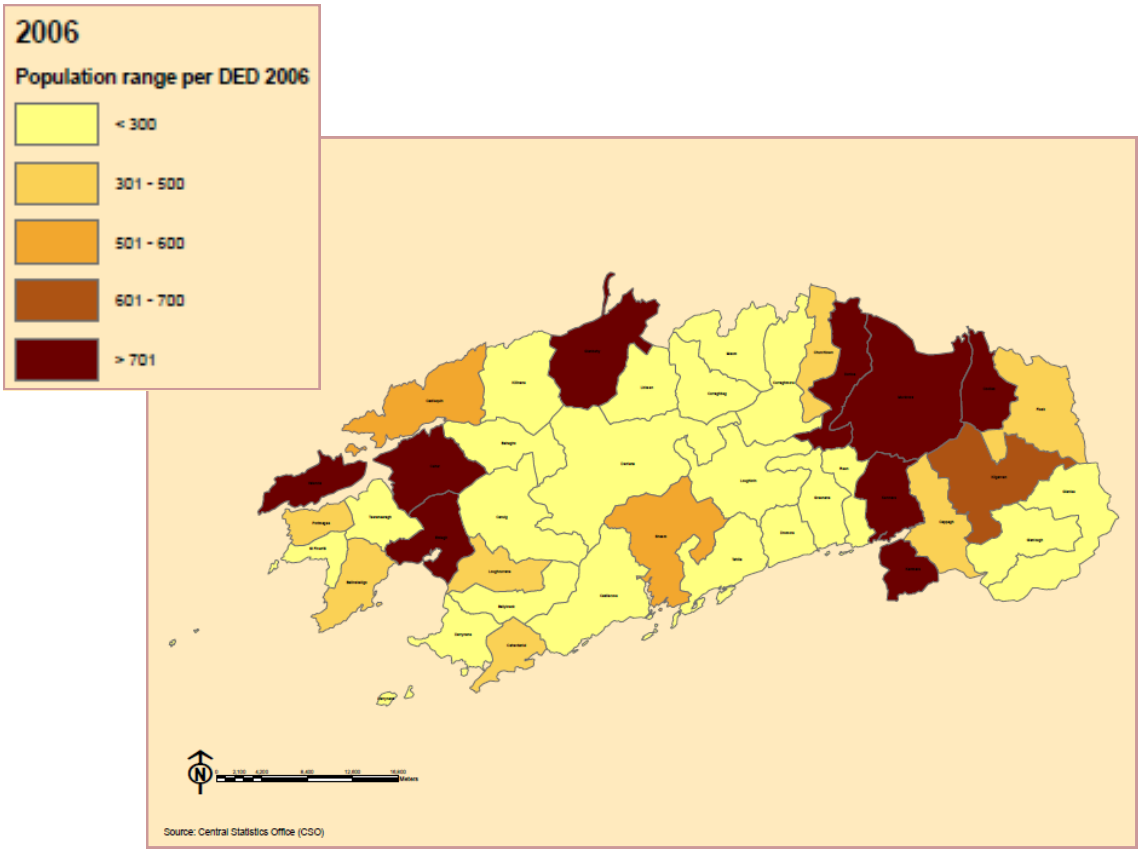
Between 1926 and 2006, Iveragh's population fell by more than one third, a trend that Power and O'Connor (2009) describe as part of a cycle of demographic and economic decline that is linked to the region's peripherality. A closer look at the distributional pattern of population decline afforded by the maps below, shows that the DEDs experiencing greatest population loss are internal and upland areas that are heavily dependent on the primary sector, typically turf-cutting or farming. These are areas where attempts at diversifying the economic base either failed or had an insufficient impact to retain a sustainable population base.

The urban Killarney area, against this, gained slightly in recent years. Fifty-three percent of Iveragh's inhabitants now live in the more densely populated District Electoral Divisions (DED) around the peninsula's main urban centres of Caherciveen and Waterville, Glenbeigh, Kenmare and Killarney that are connected by the Ring of Kerry. The latter are also popular locations for holiday and retirement homes. It must therefore be assumed that in these areas a certain amount of population replacement, whereby farm families are being succeeded by newcomers, has taken place.



Farming the Iveragh Uplands





Iveragh's total population dependency rate of fifty three percent lies considerably above the national average of 46%, indicating an ageing population, largely as a result of out-migration. Power and O'Connor (2009) comment that:

'*While Iveragh's aesthetic qualities – remoteness and dramatic landscapes – are arguably unrivalled in an Irish context, it is perhaps these very characteristics which make it difficult to develop and sustain a viable economy that can support livelihoods in the area. The consequent haemorrhaging of population through migration to urban centres within Ireland and beyond reduces the critical mass of population required to sustain facilities and services, and to develop infrastructure.*'

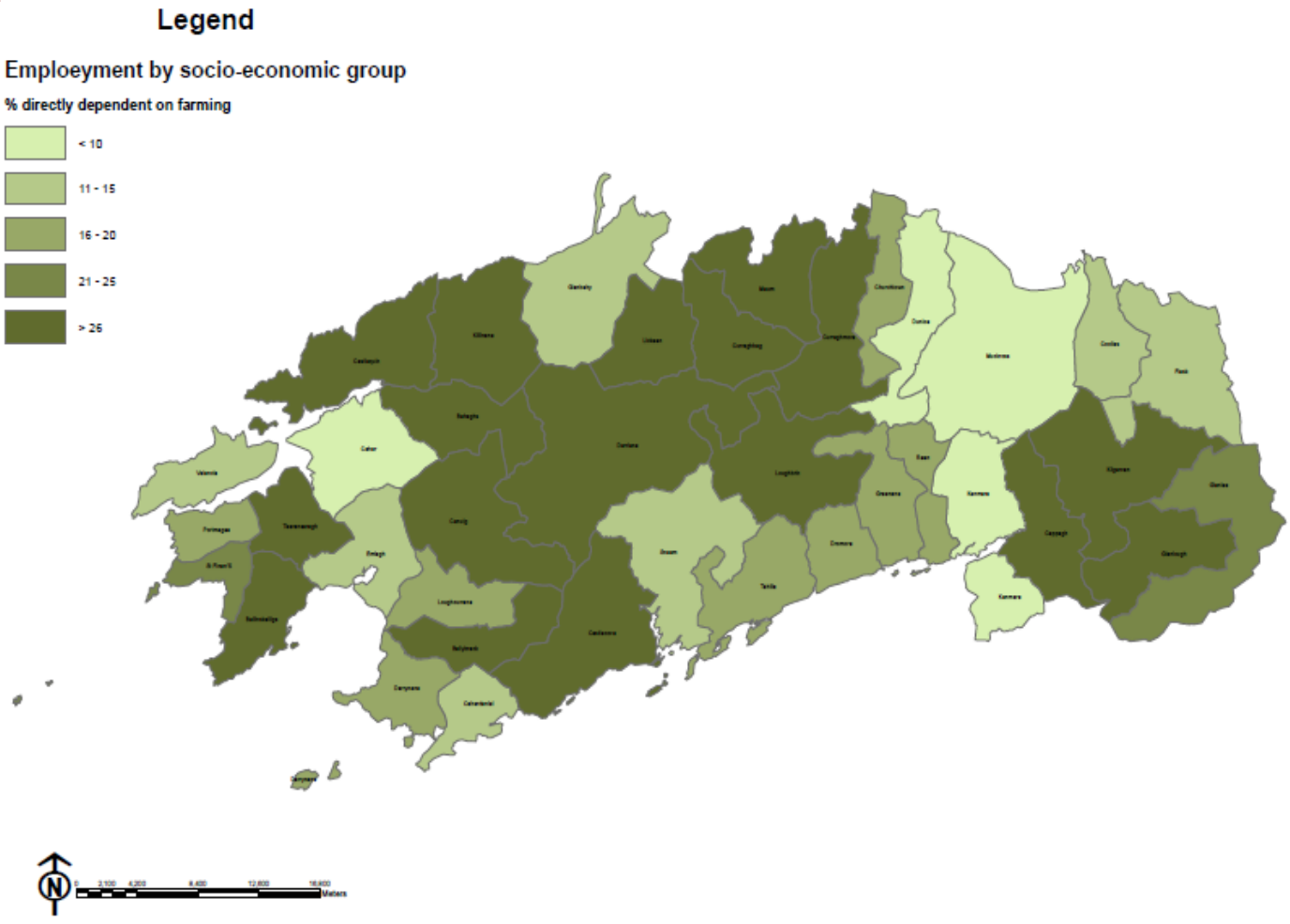


Economy

Historically, Iveragh's economy was based predominantly on the primary sector with urban areas developing mainly as market centres for produce. The peninsula's rich mackerel stocks, in particular, were the basis of the thriving fishing industry that formed a vital component of the area's economy between the 1920s and early 1950s, but now provides only limited employment opportunities.

From the 1960s onwards farming began to surpass fishing in importance, an effect that was amplified after Ireland joined the EEC in 1973. The Common Agricultural Policy (CAP), then in its productivist phase, encouraged farmers to specialise and intensify production. While this provided benefits in the form of higher yields and farm incomes on a national scale, the mechanisation that went hand in hand with it was also responsible for reducing the demand for farm labour and consequently the ongoing loss of primary sector jobs. At the same time, farmers in western counties were at a comparative disadvantage as the quality of their land, as well as the size and fragmented structure of holdings, made it difficult for them to modernise their farming systems.

At present, eleven percent of jobs on Iveragh are directly related to the primary sector, compared to only four percent nationally. The fact that this figure rises to over twenty-six percent in ten District Electoral Divisions (DED), further highlights the area's dependence on this economic sector.

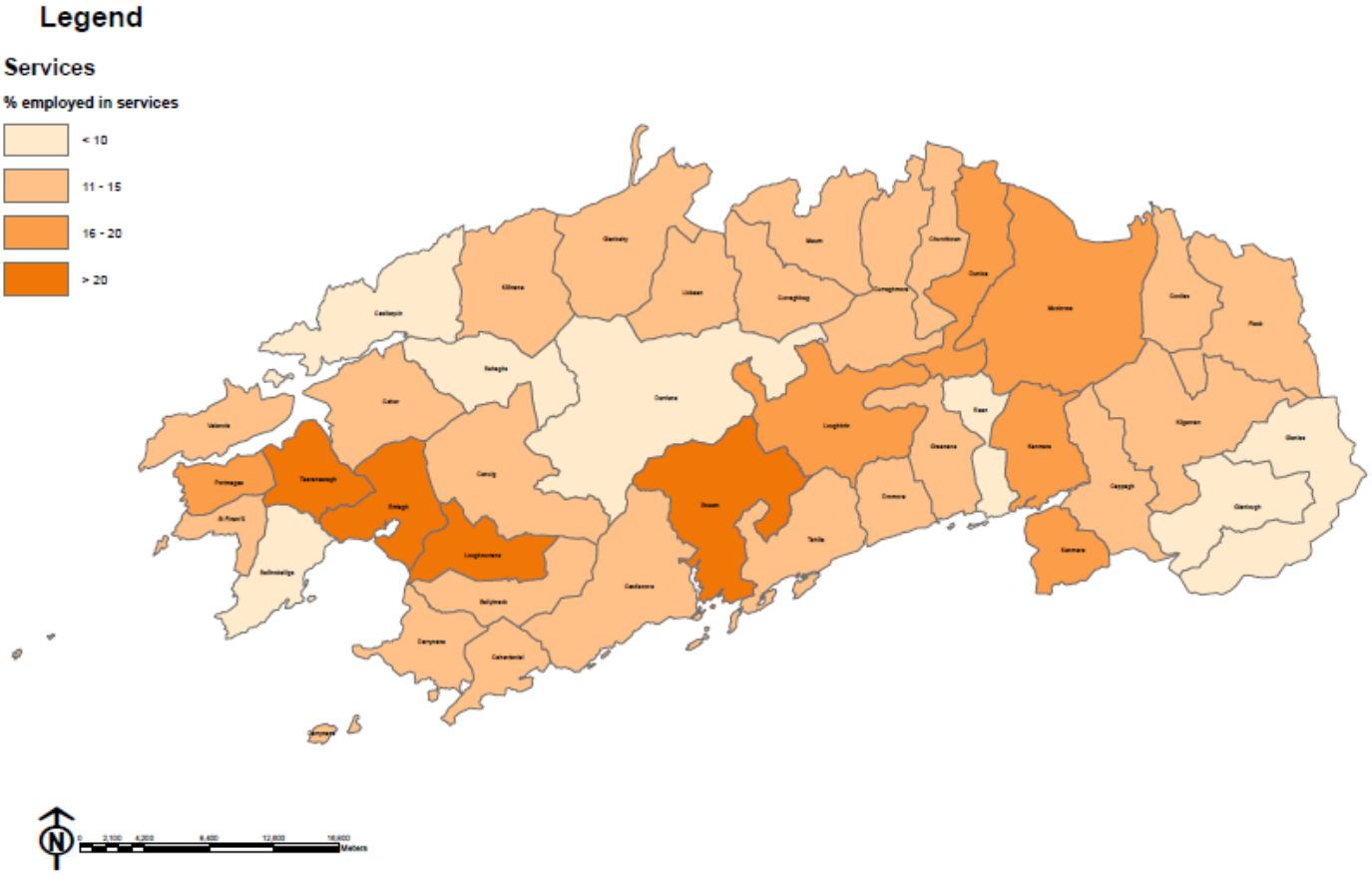


Farming the Iveragh Uplands



The same DEDs that have the highest dependency on farming contain some of the most difficult terrain in the country and have experienced the highest level of depopulation. In contrast, the importance of employment provided by the service sector in these areas declines to less than one third of the peninsula average of fifteen percent, suggesting that the tourist trade plays a rather modest role in these disadvantaged areas.

Far from being a coincidence, the above statistics mirror the hardship of living and working in upland areas where remoteness, quality of the land and underdeveloped infrastructure act as constraints for economic diversification. This disadvantage, however, is also one of the area's greatest strengths because Iveragh's positive image as a region of dramatic landscapes and rich heritage has only survived as a result of its remoteness, lack of infrastructure and low levels of economic development.



Farming the Iveragh Uplands



Power and O'Connor (2009) describe the opportunities arising from this as follows:

> *'With the continued imagination and determination that its voluntary companies have demonstrated over recent years, Iveragh can capitalise on its positive image to create particular competitive advantages for the development of indigenous enterprise. To do this, the region needs to foster an even stronger identity in order to distribute tourism and other economic activities more evenly west of Killarney and throughout the peninsula.'*

Farm families and the landscape they maintain, are the most important component of this, a fact that has been recognised by recent reform packages to the CAP, in particular the so called Second Pillar, emphasising a shift away from intensive agriculture toward the protection of the rural environment and the diversification of activities to enhance the standard of living for farm families and keep them on the land.



4. Farming on Iveragh

The farming and land management system

Farming on Iveragh is dominated by pasture based activities. This is a reflection of the area's mountainous topography, climate, and shallow soils that are waterlogged throughout much of the year, an environment which limits the potential for arable cultivation. The entire peninsula is designated as severely handicapped under the EU's Less Favoured Areas Directive (75/268), with disadvantaged area payments making up around 17 percent of farm incomes (CSO, 2004).

Dairying was prominent in the past, but is now of minor importance. The number of dairy farms in the area declined steadily since the early 1970s, an effect of general structural change accelerated by the introduction of milk quotas in the 1980s; small dairy farms were unable to provide adequate returns due to restrictions on expansion, or due to the difficulty of raising the investments necessary to comply with increasingly stringent quality requirements.



Field system in the Bridia Valley, Glencar

At present, extensive sheep systems - frequently combined with small-scale management of suckler cows or beef cattle - form the basis of production. Farm size follows a clear pattern with very small holdings occurring along the coast in the south-western part of the peninsula where land is relatively level and suitable for agriculture. In combination with the local availability of seaweed which acted as a valuable fertiliser, this meant that past generations of farmers could survive on very little land.

Agricultural holdings get progressively larger when travelling east towards the centre of Iveragh where the land is of higher elevation and generally poorer quality. In these parts, farms had to be significantly larger to be viable.



Traditional hill farms

A traditional hill farm on Iveragh is comprised of varying proportions of good quality greenland, higher enclosed land and open mountain. The first is almost always privately owned and consists of a number of stock-proof fields located on low lying ground near the farmstead. While being of comparatively low species diversity, it is a key factor determining the sheep stocking capacity on a traditional hill farm as it provides important grazing land for the out-wintering of stock and for use around lambing time when pregnant and lactating ewes have higher nutritional requirements. As a result, greenland tends to be stocked rather intensively and is fertilised with inorganic manure or farmyard slurry as it is also used for cutting of silage or, more rarely, hay as winter fodder.



Reclaimed green land near farmyard

The higher enclosed land, located on the foothills to the sides of the valleys, represents the transition between lowland and upland and is made up of rough grazing. These areas are too steep to be intensively used, but manual application of chemical fertiliser is common.

The open mountain is characterised by the predominance of semi-natural vegetation. Unsuitable for other farm enterprises, it provides extensive areas of summer grazing for sheep and can be either privately used or held in commonage, with a combination of both frequently occurring. Because of the high altitude and harsh climatic conditions, the agricultural productivity of this type of land is very limited and it is managed extensively for summer grazing at low stocking rate, although in most places some animals, mostly dry sheep, are also left out during the winter.

In a few cases the focus of past agricultural policy on intensification has encouraged farmers to reclaim mountain land through re-seeding and long term fertilizer application. This process typically involves the complete disappearance of semi-natural vegetation.

Farming the Iveragh Uplands



Livestock husbandry

Iveragh hill farmers aim for the lambing period to coincide with the beginning of the vegetation growth period between late March and early April, but the low quality of the upland grazing prior to and during the mating period in November leads to poor body condition, reduces fertility and results in rather low average breeding success rates of 0.8 lambs per ewe compared to 1.4 for lowland producers, a figure that tends to be even lower after a harsh winter and wet spring.

In the past, sheep offered for sale were mainly 2-3 year old wethers and cull ewes. Lambs were rarely sold with ewe lambs being retained for breeding and wethers kept for their wool. As a result of a gradual erosion of the wool price over the years, this system changed. While the majority of ewe lambs are still kept as replacements, wethers are now sold off as finished lambs to butchers or meat factories, or are sold on as stores to lowland producers who fatten them on grass or concentrates.



Twin lambs, resting in green field

Female replacements stay on the Greenland, or may be housed during the first winter, and in the Spring follow the ewes up the hill where they get used to surviving in the open in all weathers by developing a resistance to the climate on their hill and learn to forage on scrubby vegetation and heather with little or no supplementary feeding over the winter. Young lambs also learn to maintain a certain, well-defined home range or '*heft*' while avoiding indiscriminate mixing with sheep from adjacent flocks on unenclosed land.

Traditional hill farming is also associated, if to a lesser degree, with co-operative social practices that played an important role in the past. Gathering of sheep on commonage land, shearing, dipping and hay cutting are all examples of activities that were carried out with neighbourly help and contributed significantly to the area's culture and identity.

In the past, Iveragh hill farming involved a mixed livestock system, with the non-selective feeding behaviour of cattle helping to maintain the quality of the grazing resource by browsing on vegetation too rough for sheep to eat, by clearing bracken through trampling and by keeping swards low and sweet. Hardy local livestock breeds accustomed to the rugged terrain such as Scottish Blackface and Wicklow Cheviot sheep as well as the rustic Kerry cow were the main grazing animals of the uplands.



Changes to the farming system

On account of the hardiness of the mountain breeds, the small returns and the relatively small amount of capital involved, extensive upland farming was traditionally a low cost system. Wool contributed very substantially to the output from sheep. While its price dropped steadily since 1960, the price for meat did not increase to compensate with the result that the returns from sheep farming have declined over the years (Dineen *et al*., 1972).

Progressive changes to the farming sector since Ireland's accession to the EEC in 1973 have resulted in dramatic transformations of the previously prevailing farming system. Past agricultural policy favouring sheep production over cattle under the European Mountain Lamb and Hogget Scheme (Directive 75/268) and the European Ewe Premium (Regulation 1837/80) led to a shift away from traditional mixed livestock systems towards a more simplified management system dominated by sheep, a trend that was paralleled by steep increases in hill sheep numbers.

The resulting decline in the number of bovines is held responsible for the spread of less desirable vegetation types such as Common gorse *(Ulex europaeus)*, Hard rush *(Juncus inflexus)* and Bracken *(Pteridium aquilinum)* that are more effectively controlled by cattle than by sheep.



Kerry cattle in nature reserve in Glengariff, West Cork

Although the scenic landscape and diversity of habitats have supported the sector to some extent by giving farmers the opportunity to diversify into tourism and recreation based industries as well as joining the agri-environmental scheme REPS (Rural Environment Protection Scheme), traditional hill farming on Iveragh operates at the margin of financial viability and remains heavily dependent on agricultural subsidies.

Farming the Iveragh Uplands



Commonage

An intrinsic characteristic of Iveragh hill farms – and Irish hill farms more generally – is the presence of commonage or extensive grazing lands that are used jointly by a number of right holders who own farms in the surrounding townlands with each farm being allocated a commonage quota (Lyall, 2000). The holding of land in common ownership has long disappeared from the lowlands (apart from some coastal areas or 'Machair'), yet it has persisted in the uplands where it continues to be an integral component of many farms to the present day.

While typically consisting of unimproved mountain land of varying quality, Hegarty (2000) reminds us that 'commonage is not a tangible land use (…) nor is it a discrete landscape; instead it encompasses a range of habitat types', a definition which 'supports a myriad of intricacies in terms of unclear boundaries, absent shareholders and an out of time multi-ownership system, atypical in a country with one of the highest levels of owner-occupancy in the EU', all contributing to its complexity (Lafferty *et al*., 1999).



Sheep grazing on vast stretch of commonage land in Curravaha

Kelly (1997) describes the origins of the Irish commonage as dating back before the Anglo-Norman era when most land was held by kinship groups or 'fine'. In the past, commonage use was negotiated between right-holders, a process that facilitated co-operation through informal local institutions to ensure the equitable and sustainable use of common resources.

The earliest evidence of such co-operation is thought to be the 'rundale' system under which mountain land was grazed in common by kinship groups who lived together in a clachán, with the head of the group dividing land into units of differing quality and assigning them to individual families for cultivation or grazing which would be periodically redistributed, both for the purpose of crop rotation, and in accordance to needs, the aim being to ensure the sustenance of smallholder kingroups (McCourt, 1950; O'Loughlin, 1987; Whelan, 1999; Di Falco and van Rensburg, 2004).



During this time and up until the mid-18th century, commonages were used for cultivation, livestock production and hunting, giving rise to what Aitchison and Gadsden (1992), writing about the English and Welsh Commons, term an inherently complex system of property rights consisting of a combination of private property, multiple right holders and public interest placing them in the position of being arguably the most pronounced example of multifunctional land use (Short, 1998). Having thus existed for many centuries, most commonages were formalised during the period of land reform between the late 19th Century and the 1980s when the Land Commission was set up to oversee the transfer of freehold land purchased by the Irish government from English landlords to tenants on fair terms, among the aims being the enlargement of uneconomic holdings and the reduction of farm fragmentation (Lafferty *et al.,* 1999).

Commonage Framework Plans and agri-environment programmes

Over the past decades, the functioning of the Irish commonage has changed significantly. Traditionally, as described by O'Rourke (2009), a farmer's share in an upland commonage was defined with reference to how much low land he owned privately and calculated in terms of a 'collop', a term referring to the grazing equivalent of one cow. The land's carrying capacity was determined by the nutritional value of the land with supplementary feeding being of minor importance. The 'collop' can therefore be seen as a system of 'checks and balances' (Kissling-Naef *et al*., 2002) ensuring that no farmer kept more livestock than his private land could support during the critical months of slow vegetation growth on the mountain.



Feeding site near Kells

Disagreement among commonage farmers was and continues to be the order of the day, yet collective action in the form of stock management, protection of the commonage from nonrightholders, enforcement of grazing rules and vegetation management by small scale, controlled burning of heather was common and played a critical role in ensuring the sustained supply of important collective and public goods from the commonage (Di Falco and van Rensburg, 2004). As such, it can be seen as the 'expression of the strong dependency of a society whose fate is bound up with mountain agriculture, for better or for worse' (Kissling-Naef, 2002).



This relationship weakened with demographic transition and social change occurring in the wake of Ireland's rapid economic development, as well as accession to the EU and the subsequent introduction of livestock headage payments in 1975 and the inclusion of sheep meat in the Common market regime in 1980. After this, the total number of sheep in Ireland almost tripled. The dual process of farm modernisation and intensification inspired by CAP subsidies artificially inflated the land's carrying capacity through the import of feedstuff and nutrients, and drove many farmers to rent improved agricultural land.

This, in combination with the onset of the 'Celtic Tiger' phenomenon, characterised by high levels of foreign investment and a concurrent boom in the construction industry that brought relative affluence even into marginal areas, started a process of rapid social change and marked the end of existential dependence on traditional commonage institutions that hence ceased to function. The result was in many instances one of poor management and land degradation, in the past through severe overgrazing (Bleasdale, 1995; Bleasdale and Sheehy-Skeffington, 1995).



Mat grass growing on severely poached ground

Increased stock numbers and corresponding changes to the traditional farm management system had severe impacts on the ecology of the uplands where it resulted in widespread damage to heather and bare peat from overgrazing as well as species change and nutrient enrichment from supplementary feeding (Bleasdale, 1995; Bleasdale and Sheehy-Skeffington, 1995). Largely in response to the passing of a series of European directives, including the Birds and Habitats Directive and the Agri-Environmental Regulation, serious efforts were made from the mid-1990s to reduce the problem using two instruments.

Farming the Iveragh Uplands



The Rural Environment Protection Scheme (REPS) was launched in 1994 to encourage farmers to adopt more environmentally-friendly practices in exchange for financial compensation. Since REPS is a voluntary measure, however, and its initial uptake by farmers was slow, the Irish government introduced Commonage Framework Plans (CFP) in 1998 to address the special problems that were found to be facing commonage areas by quantifying the extent of overgrazing and prescribing de-stocking where necessary in an attempt to 'manage sites, not just designate them' (Bleasdale, 2000). To prevent further damage to upland habitats, a compulsory sheep cull of thirty percent was enforced on all commonages as an interim measure until detailed plans with de-stocking calculations based on vegetation state, stocking rate and commonage share at individual farm level were drawn up, the aim being to match more closely the sustainable carrying capacity of upland areas.



Heather and gorse communities on Farraniaragh, Caherdaniel

The BioUp farm survey

A comprehensive agricultural policy review was agreed in the Agenda 2000 reform package to the Common Agricultural Policy (CAP). Agreed in 1999 and deepened in 2003, it attempts to redress the balance between the economic, social and environmental objectives of farming.

The economic challenge involved in this lies in providing consumers with stable and secure supplies of healthy food and non-food products while strengthening the viability of the European farming sector. Socially, the main concern is one of reducing regional disparities and improving living conditions in remote rural areas of the EU by upgrading infrastructure, economy and employment. The environmental aim, finally, is to maintain and enhance farmed landscapes by safeguarding traditional management practices.

Farming the Iveragh Uplands



The principal instrument of the thus reviewed CAP was the introduction of Single Farm Payments (SFP) for EU farmers from January 2005. Replacing production-oriented price support systems, the aim of the SFP is to encourage a more market-oriented farming sector by giving farmers the freedom to produce what is demanded by the market, both in terms of agricultural and environmental goods. European farmers are therefore becoming increasingly exposed to market fluctuations what may lead to cycles of price changes with land being taken in and out of production. This is likely to have severe consequences for high nature value (HNV) farmland managed through traditional practices.



The longer term consequences of removing the obligation to produce remain to be seen, yet there are fears that de-coupling involves a greater risk of abandonment in marginal areas characterised by physical disadvantage, low yields and high transport and labour costs.

And while agri-environment schemes provide important assistance for the maintenance of traditional cultural landscapes and their guardians, concerns are being raised about the negative effects that agricultural restructuring will have on HNV farming in disadvantaged areas where there will be no economic incentive to produce for farm prices below production costs (Coordination Paysanne Europeenne, 2003).

Since there is no reason to assume that the pressure from market forces on traditional farmers will come to a standstill, it is of paramount importance to take a closer look at the present-day situation of farming on Iveragh, one of Europe's most beautiful and fragile landscapes. To this end, a detailed survey was designed and administered to 80 farm households in the area in 2007-2008.

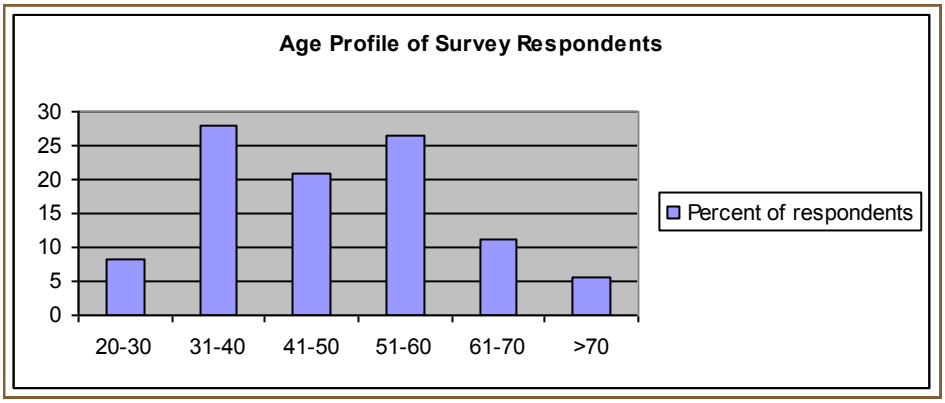
This survey yielded a wealth of information not only on agricultural and environmental issues, but also to farm families' perceptions of changes in social and economic circumstances what is hoped to contribute to better informed discussions and, ultimately, more relevant policy responses.

5. Survey results: farm and household

The farm family

97% of farm managers interviewed for the survey were male. This notwithstanding, women play an important role in the farm family, notably on the increasing number of holdings where either the manager or his wife has an off-farm income and where responsibility for farm and family are shared (Dunford, 2001).

The average age of farm managers interviewed was 48.13 years. 73% of respondents were married with an average of 1.06 children living on the farm. Total average number of farm dependents was 2.85 persons. Equal numbers of respondents (43.1%) had completed either national or secondary school, with 8.3% and 5.6% having attended technical school or university respectively. The table below illustrates the age groups of survey respondents which show an ageing profile, a finding that is confirmed by a survey carried out by the Institute of Technology, Tralee (2006).



Source: BioUp - Kramm (2009)

More than half of all farmers interviewed (52.8%) had had no formal agricultural training. Of the remainder, 27.8% held a farming certificate or had completed a 20 hour REPS course in farming. This notwithstanding, the vast majority of farmers described their farming skills as having been handed down and learned from their parents (77.8%), confirming the strong tradition of family farming in the area.

The latter is further validated by the fact that farms have, on average, been in the same family for 4.32 generations. Only half of the respondents were, however, confident that the farm would stay in the family in the next generation, even though 48.6% of the latter could not name a definitive successor. The person seen as most likely to take over the farm was the son (36.1%), followed by other relatives (8.3%).

The succession of holdings was therefore seen as a key problem on Iveragh hill farms. *'There is a widespread feeling of uselessness',* is how a respondent described the situation. *'Why maintain the farm if the children don't want it? This is a very contradictory feeling. On the one hand, older farmers thoroughly understand their children's wish for a better life and are proud if they achieve it. But on the other hand they want them to stay on the land.'*

Farming the Iveragh Uplands



Farmers across the board reported that a declining number of young people were willing or able to take over the family farm on a full-time basis. The reasons most frequently given for this were the low and declining profitability of mountain farming and the long working hours compared to economic gain. *'My son is the seventh generation of the family farming here, but he has less and less interest in the farm',* an informant stated. *'I had a great interest when I was a young man. I loved it. I sometimes even stayed up there with the sheep. Hail, rain or snow… I'd be out with the dog. But the young people have no interest. There is no money, there is no interest.'*



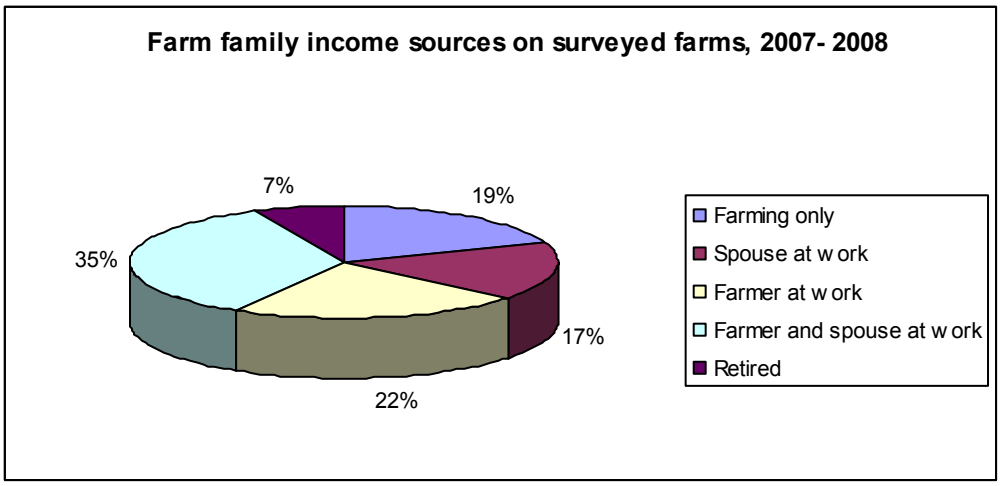
A well trained sheep dog is becoming an increasingly rare sight

At present, only 19.4% of the farm household surveyed were solely dependent on their farms for a living. In the remaining cases, the farm manager (22.2%), the spouse (16.7%) or both (34.7%) had an additional income. 6.9% of interviewees were retired.

In contrast, a 2000 study carried out by Dunford (2001) in a HNV farming area in the Burren, County Clare, found more than twice as many farm families (44.6%) to be fully dependent on their farms as their only income source, a reminder of the very marginal nature of farming on Iveragh. Nearly half of the Iveragh farm managers who had an off-farm job, worked full-time (45.5%), with the remainder working part-time (40.9%) or taking advantage of seasonal employment (13.6%).

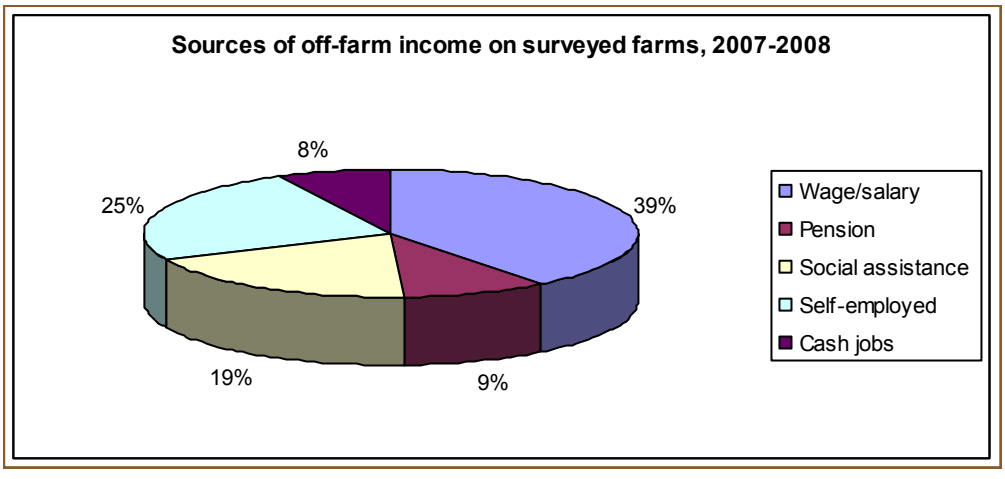
According to the most recent National Farm Survey (2007), on 58% of farms in the country either the farmer, the spouse or both had off-farm employment compared to 64% on Iveragh. However, while the rate of off-farm employment is therefore higher in the study area, the incidence of the farm manager working away from the farm is at 35%, lower than the 41% recorded nationally. The availability of employment in the tourism related service sector on the peninsula is a likely contributory factor to the higher levels of women having an additional income on Iveragh.





Source: BioUp - Kramm (2009)

The figure below illustrates the sources of off-farm income on Iveragh, where nearly half of all off-farm incomes were derived from a wage or salary. 25% of respondents were self-employed while nearly one in five was in receipt of some form of social assistance.

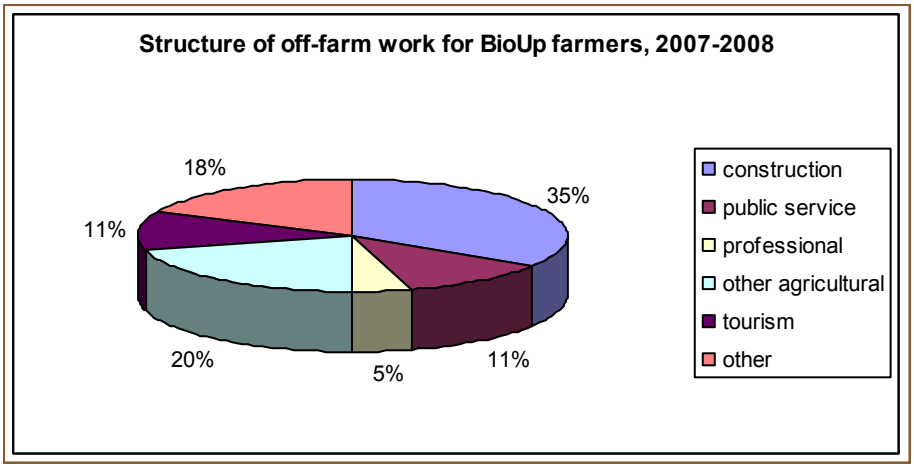


Source: BioUp - Kramm (2009)

Farming the Iveragh Uplands



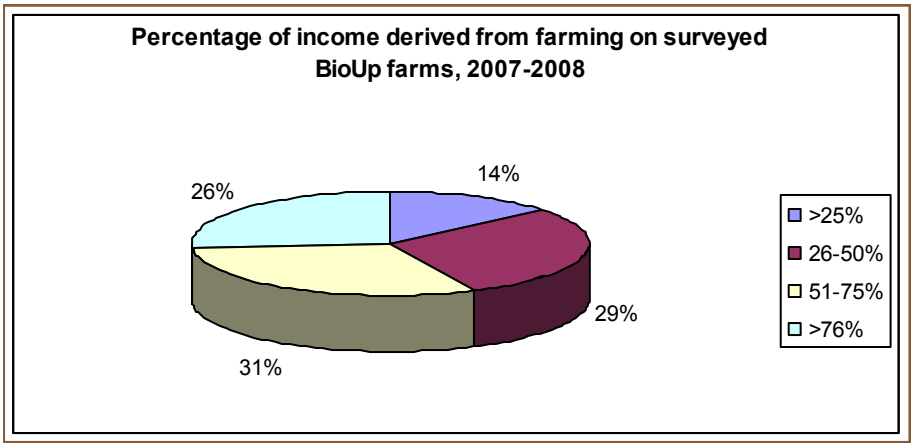
The single most important economic sector that respondents worked in was construction where 35% of all those with an off-farm job were working. In contrast, only 13% of Iveragh's entire working population was employed in construction in 2006. Nationally, this figure was even lower (9%) which stresses a striking dependence of Iveragh farmers on a single economic sector, that has since declined since 2008.



Source: BioUp - Kramm (2009)

The relative proportion of farm income to total farm family income, however, shows that farm incomes still make an important contribution to farm family livelihoods with an average of 61.44 percent of farm family income on Iveragh being derived from farming, including farm subsidies. More than a quarter of all survey respondents described the contribution from farming to total income as very significant (i.e. over 76%). A further 31% of farmers cited their income from the farm as between 51 and 75% of total household income, while the remaining 43% of interviewees described their farm income as being less than half of total family income.

The average Family Farm Income (FFI) (excluding off-farm work) on the eighty hill sheep farms surveyed was €22,140. That income essentially consists of the Single Farm Payment (68%) and agri-environmental payments. The 2008, Teagasc National Farm Survey, found that nationally the average Family Farm Income from mainly sheep systems on REPS farms was €13,431 (www.teagasc.ie).



Source: BioUp - Kramm (2009)

Farming the Iveragh Uplands



Despite the relative economic importance of off-farm work, 82% of respondents continued to perceive their primary economic activity as farming. Less than 10% saw their identity as being defined through their off-farm work, whereas 8% stated that they no longer knew as to how they saw themselves.

This notwithstanding, all interviewed farmers expressed the wish to stay farming. Most respondents found it important to maintain the family tradition. *'When I was young, it was important to keep the farm productive to put us children through college. I would not really see myself as a farmer now, but it is a very important part of my life and the tradition of my family. I can't ever see myself giving it up, although it will never be more than a part-time thing.'*

Many respondents also expressed the wish to honour the labour put into the farm by their ancestors and felt a strong sense of duty to take care of the land until they passed it on to the next generation. *'The land has been in the family for so many generations. You don't want to be the one to sell. You are born on the land and want to look after it. Our ancestors worked so hard to keep the fields green'.*



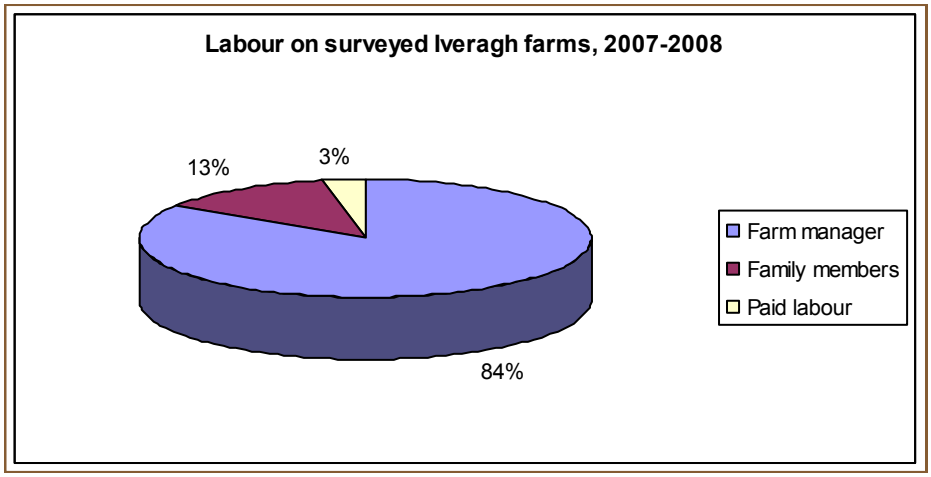
Evening sun settling on Lough Cloon where fields on which hay used to be saved by hand are slowly getting overgrown by rushes



Labour

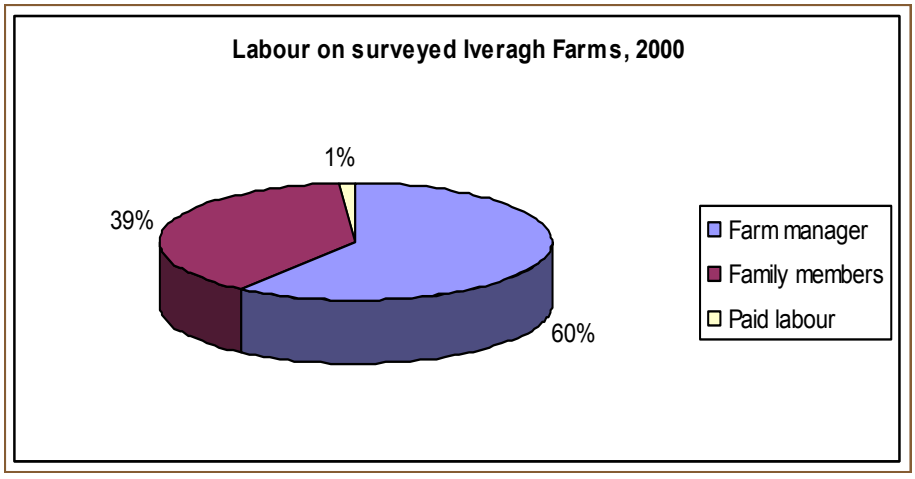
The importance of off-farm employment, referred to in the previous section, is also reflected in the amount of labour used on farms which had decreased significantly on more than half of all survey farms (58.3%) over the last few years.

On average, the total amount of labour on farms was 0.94 Annual Work Units (1 AWU = 1800 hours of labour per person per annum,). Of this, an average of 84% was contributed by the farm manager, 13% by other family members and 3% by paid labour.



Source: BioUp - Kramm (2009)

Comparing this to the CSO census of agriculture figures for 2000, shows a significant change in the allocation of labour on farms with the input of members of the farm family having been replaced by labour contributed by the farm manager him-or herself. This is an important indicator of formerly family-run farms becoming single-person operations as the spouse is increasingly working away from the land to supplement the farm income.



Source: Central Statistics Office (CSO), 2000



Farm viability and the future of the farm

Only one in four farmers interviewed believed that the farm alone could provide an acceptable standard of living for themselves and their families, a clear indicator of the economic marginality of Iveragh farms. At the same time, however, very few farmers could picture themselves as giving up their farms and leaving the land with 88% being confident that they would still actively farm in ten year's time. Old age was the only reason cited by respondents for giving up the farm in the foreseeable future. This strong connection between traditional farmers and their land was also confirmed in a Burren study (Dunford, 2001) that found 84% of farmers being likely to continue despite challenging times.

Closely related to this, the majority of Iveragh farmers described their main personal aim in running the farm as the wish to maintain the family tradition and wanting to improve the farm for the generations after them (71%). Only 21% described themselves as income maximisers and a mere 8% asserted to hold on to their land due to its asset value and the subsidies that were linked to it.

Overall, however, 37% of respondents believed that the number of hill farms in the area was decreasing. Again, this was mostly ascribed to old age and the lack of successors (61%), but 29% thought it was due to the sector's low and declining profitability. The price for farmland and the overall availability of land for purchase was another factor frequently raised by respondents as compromising farm viability.



Good handling facilities save time and labour, but few farmers can invest in them during these challenging times

53% of farmers expressed a wish to expand their holdings to render them more viable, yet farmers considered the current price for farmland as either unrealistic, given the economic returns from farming (53%), or stated that there was no market for farmland in their area (36%). The reason for this was most often described as due the fact that area-based subsidy schemes (such as REPS) had greatly enhanced the value of even marginal farmland and made owners hold on to it even though they used it only very extensively.

Farming the Iveragh Uplands



The land resource

The average surface area of the Iveragh upland farms visited was 138 hectares, of which an average of 91.32 % was owned by farm operators (including commonage shares) with the remainder being rented in. Mean size of the upland area of holdings was 98.7 hectares, thus corresponding to 59% of the total area farmed. The remainder was made up of 20% green land and 21% rough land.

According to the most recent National Farm Survey, the average farm size in Ireland was 35.6 hectares in 2007, thus significantly smaller than the sample of farms visited on the Iveragh peninsula. As argued by Dunford (2001: 194), however, 'the extensive scale of this acreage belies its limited agricultural potential'.



Iveragh hill farms are large, but only have a limited amount of green land

For those farms that had a share in a commonage (69% of the farms visited), commonage land made up an average of 31.74 % of the area farmed, pointing to its important role in the farming system to the present day.

The average number of shareholders involved in a commonage was stated to be 3.48, yet on average only 2 individuals actively used their share. While on 33.3% of commonages the number of active right holders had decreased in the last five years, nearly all commonage farmers stated a sharp decline in sheep numbers over the same period. More than half reported that they had been affected by de-stocking measures under the commonage framework plans (CFP), with average de-stocking being 19.19%.

It was often pointed out that sheep tended to wander more if stock numbers are low and the inconvenience of walking from one side of a large commonage to another to collect missing animals was high when compared to the benefits of using commonage areas. At the same time, commonage farming remains an integral part of the culture of mountain farming. Many respondents expressed fear that if the culture of the commonages died, the culture of mountain sheep would die with it. '*In the past, collecting the sheep on the commonage was such a social thing*', a farmer recollected. *'There were always people standing by the side of the road, roaring and waving the sheep on. That's nearly gone now.'*



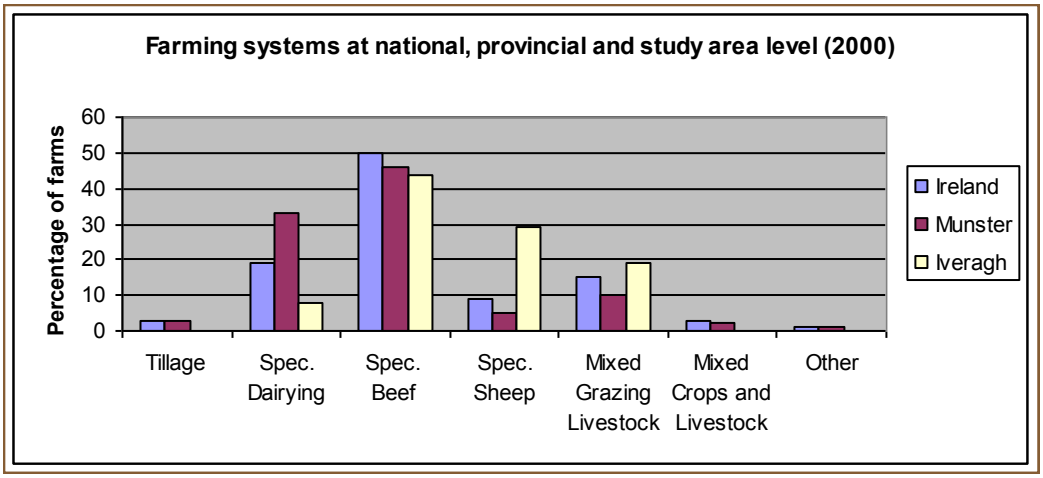
Farming systems

Agricultural Census data from 2000 (CSO) indicate that the three numerically most significant farming systems in the Republic of Ireland to be Specialist Beef Production (50% of all farmers), Specialist Dairying (19%) and Mixed Grazing Livestock (15%). 9% of farmers are Specialist Sheep producers whereas only 3% are classified as Tillage or Mixed Crops and Livestock, respectively.

This information provides an interesting backdrop against which to describe farming systems on Iveragh. In 2000, no farm on the peninsula was listed as Tillage, Mixed Crops and Livestock, or other. The area contains roughly half the national average of Specialist Dairy farms and 10% less Specialist Beef producers.

The percentage of Mixed Grazing Livestock, however, lies at 19%, well above the national average, while the proportion of Specialist Sheep production is more than three times the national figure, a reflection of the importance of these farming systems to livelihoods and landscape in the study area.

As the method used for classifying farming systems for agricultural census purposes reported above is based on the EU farm typology, as set out in Commission Decision 78/463, where farm types are defined according to the economic contribution of enterprises, it is not directly comparable to the findings of the survey conducted for this study in 2007-2008, that refers to dominant farm enterprises.



Source: CSO (2000)

54.2% of the hill farms visited on the Iveragh peninsula operated a mixed farming system combining cattle with sheep farming, whereas 33.3% and 5.6% were specialist sheep and specialist beef producers respectively. 7% of households combined a small-scale dairying enterprise, with an average number of 3.39 dairy cows with another enterprise.

Suckler cow enterprises were found to be the most popular beef production system in the study area with an average herd size of 11.13 animals. The majority of calves are sold as weanlings, whereas only a small number of farmers disposed of them as yearlings or stores.

Farming the Iveragh Uplands



Sheep systems in the area consisted mainly of store lambs (71%) with less than one third of all farmers interviewed finishing their lambs. The majority (60%) disposed of their lambs in the mid-season from the end of May through to October. 37% stated to sell their lambs between the end of October and Christmas while only 3% of respondents reported that they aimed to maintain a supply throughout the year.

The average flock size recorded was 216 animals with a flock replacement rate of 15.93%, and a reproductive success of 0.86 lambs weaned per ewe mated. The average ration of ewes to ram was 43.31 to 1. Traditional breed ewes made up an average of 58.06% of flocks.

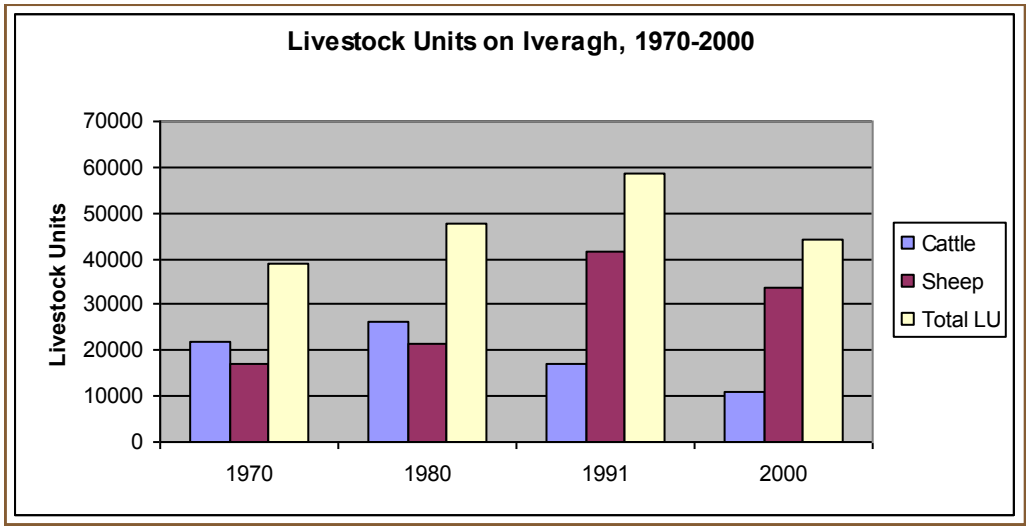


Most cattle are now continental breeds



Changes in stocking densities

Changes in livestock numbers over the past decades are collected in the form of census of agriculture data. They show a steady increase in total Livestock Units (LU) on Iveragh between 1970 and 1991, after which a decreasing trend has been noted. The initial increase was mainly due to a near doubling of sheep LU in this time period, whereas the increase in cattle numbers was much less marked and of shorter duration.



Source: BioUp - Kramm (2009)

To visually represent stocking densities for sheep and cattle, respectively, the number of LU in each DED of the study area were divided by the total area of the DED. Although this does not reflect the stocking density with complete accuracy, it is a good indicator of grazing pressure and allows comparisons over time to be made (see also Coulter *et al*., 1998).

The stocking densities thus derived at are represented in the chart above which reveals an increase in the total stocking rate from 0.25 LU per hectare in 1970 to 0.32 in 1980, representing an increase of almost 30%. Even though sheep numbers still rose in the following decade, an increase in the overall stocking rate was offset by the decline in cattle numbers and remained stable before decreasing significantly by the year 2000.

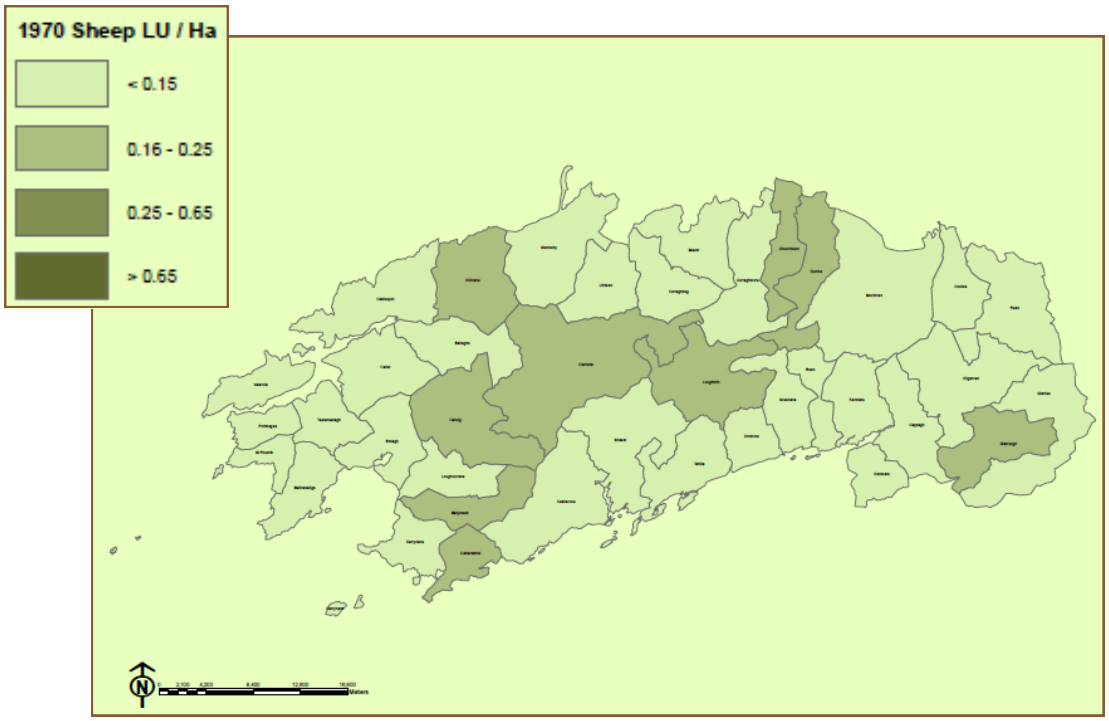
The same can also be visually represented using a Geographical Information System (GIS). The maps on the following page clearly show that the rise in sheep numbers between 1970 and 1980, a reflection of the establishment of a common market in sheep meat, was particularly pronounced in the peninsula's internal mountain areas where some District Electoral Divisions (DED) experienced a 2 to 3 fold increase in sheep stocking rates.

This divergence between upland and lowland areas can be ascribed to the existence of the Mountain Sheep Subsidy Scheme initiated in 1966, while there was no European support for lowland sheep production during the first 8 years of Ireland's EEC membership.

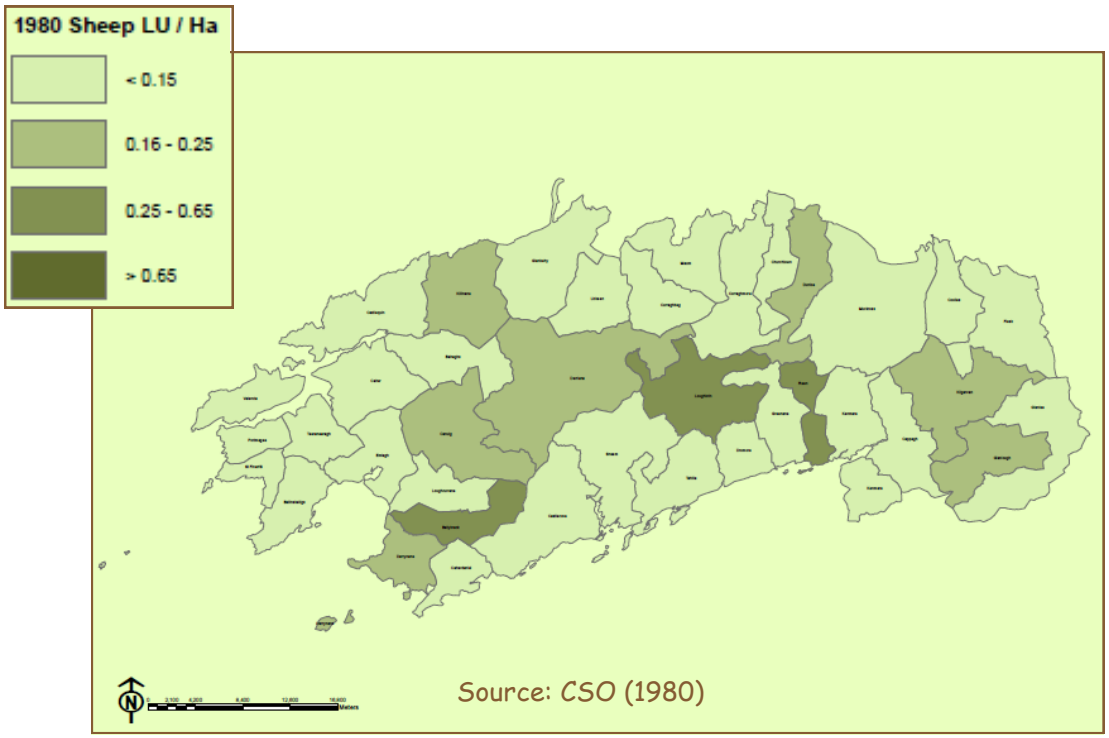
Farming the Iveragh Uplands



The trend of increasing sheep stocking rates intensified over the 1980-1991 period, but spread to most areas of the peninsula, a result of the increased profitability of sheep farming after the introduction of EU support via ewe premia in 1981. The decrease to be observed in the subsequent time period, 1991-2000, was brought about both by compulsory de-stocking under CFP and by the introduction of REPS in 1994, both of which exerted a downward pressure on sheep livestock numbers.



Source: CSO (1970)



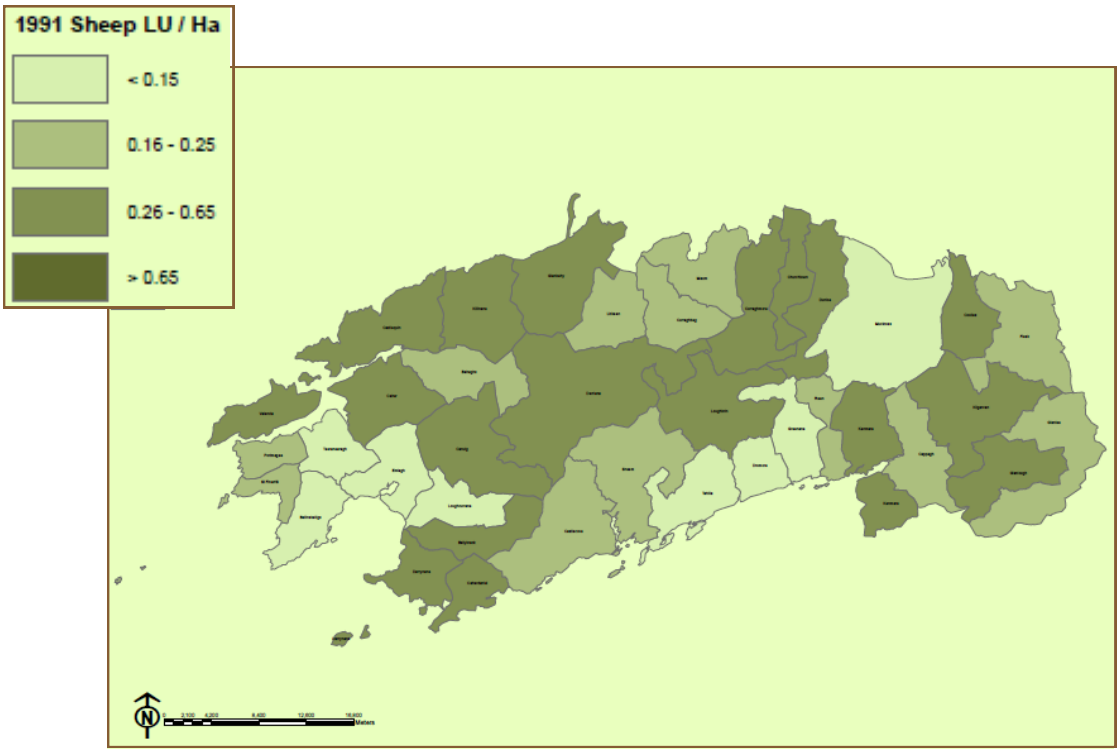
Source: CSO (1980)



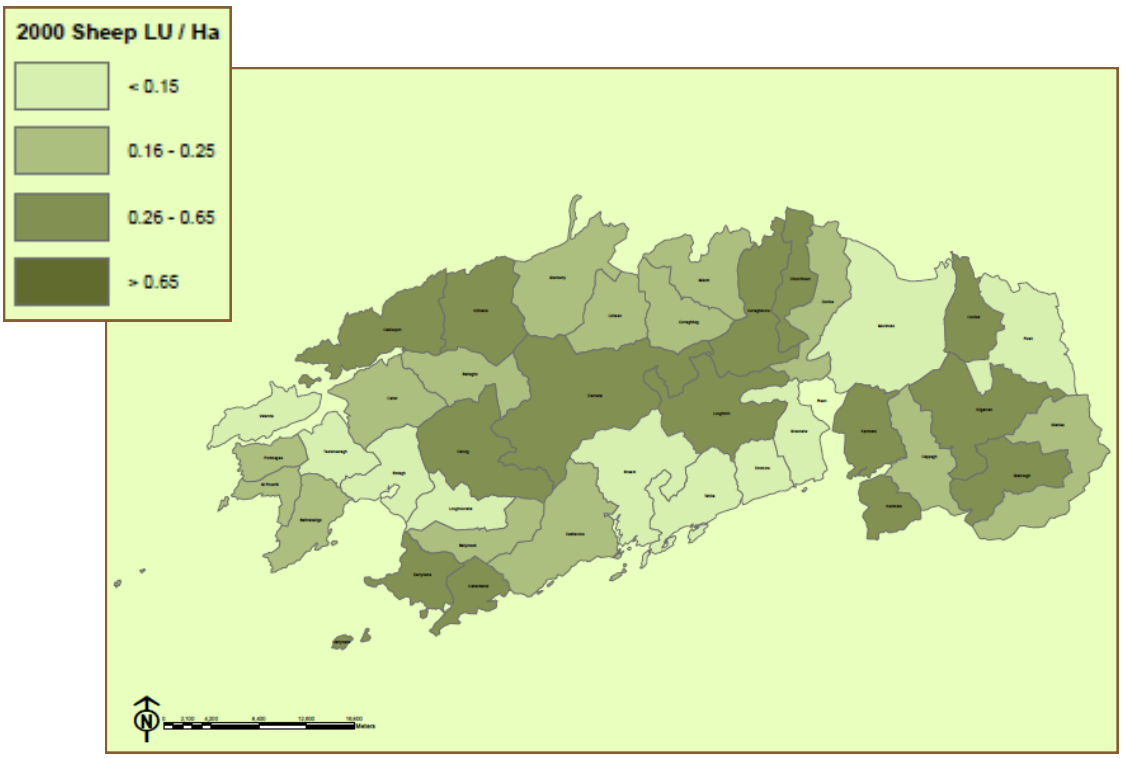

N
Flesk
Glanlee
Glanlough
Coolies
Kilgarvan
Cappagh
Muckross
Kenmare
Kenmare
Dunloe
Reen
Churchtown
Greenane
Curraghmore
Dromore
Maum
Loughbrin
Tahilla
Curraghbeg
Sneem
Lickeen
Derriana
Castlecove
Glanbehy
Killinane
Bahaghs
Canuig
Loughcurrane
Ballybrack
Caherdaniel
Darrynane
Emlagh
Castlequin
Caher
Teeranearagh
Ballinskelligs
Valencia
Portmagee
St Finan's
0
10 Km

Farming the Iveragh Uplands





Source: CSO (1991)

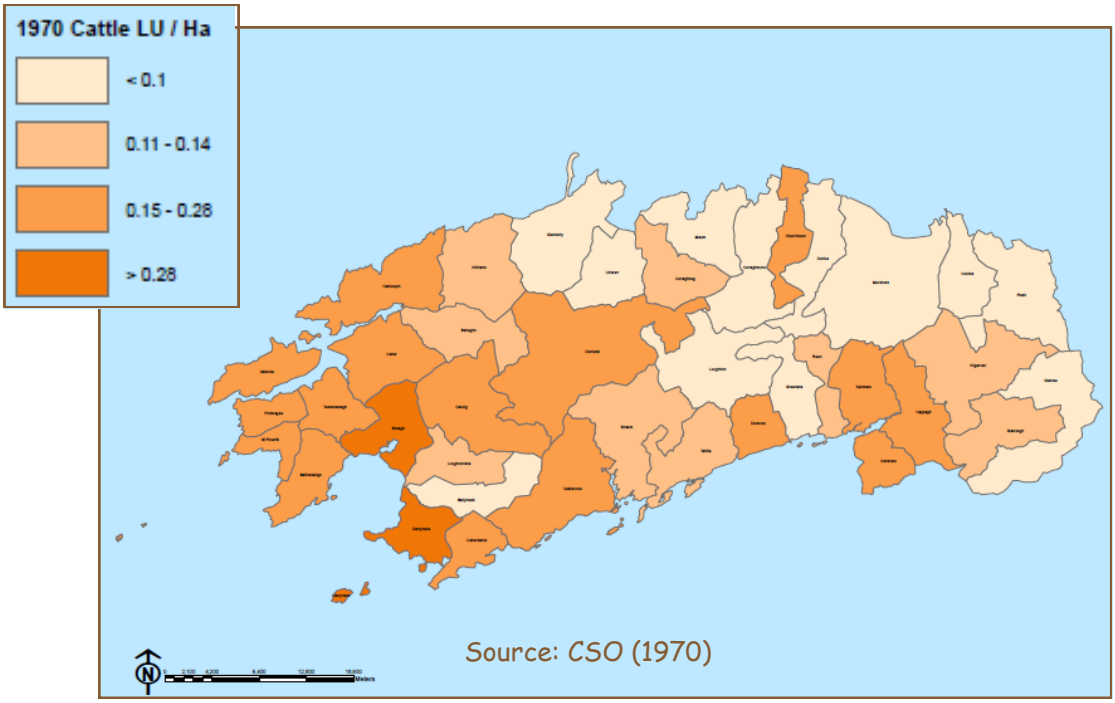


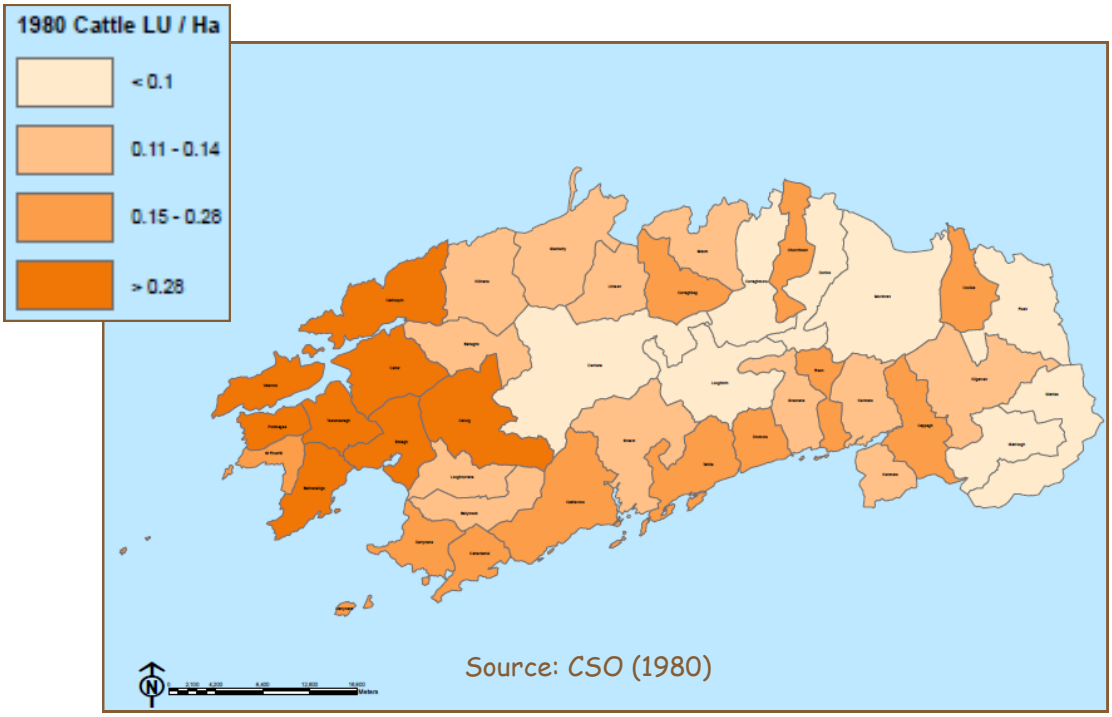
Source: CSO (2000)

Farming the Iveragh Uplands



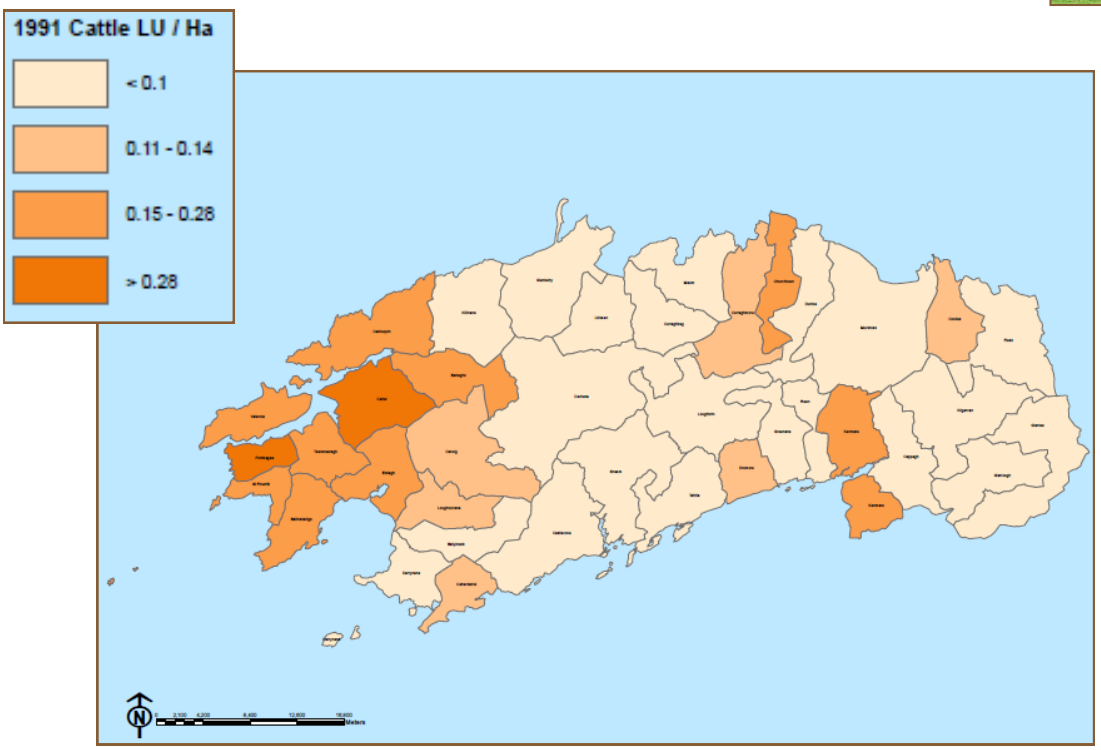
Cattle stocking densities in the same census periods are shown below. Here, a trend contrary to the development in the sheep sector is evident as the concentration of cattle at first increases along the peninsula's coastal areas, but declines sharply in the internal upland DEDs between 1970 and 1980. A trend that continued in the next time period where it also spread to the coastal areas and continued until the year 2000. The gradual loss of cattle on the peninsula during the survey time reported may reflect the substitution of beef production by more lucrative sheep enterprises, yet also resulted from non-viability of small-scale beef enterprises under increasingly stringent regulations imposed by agri-environmental schemes, poor facilities and demographic factors.



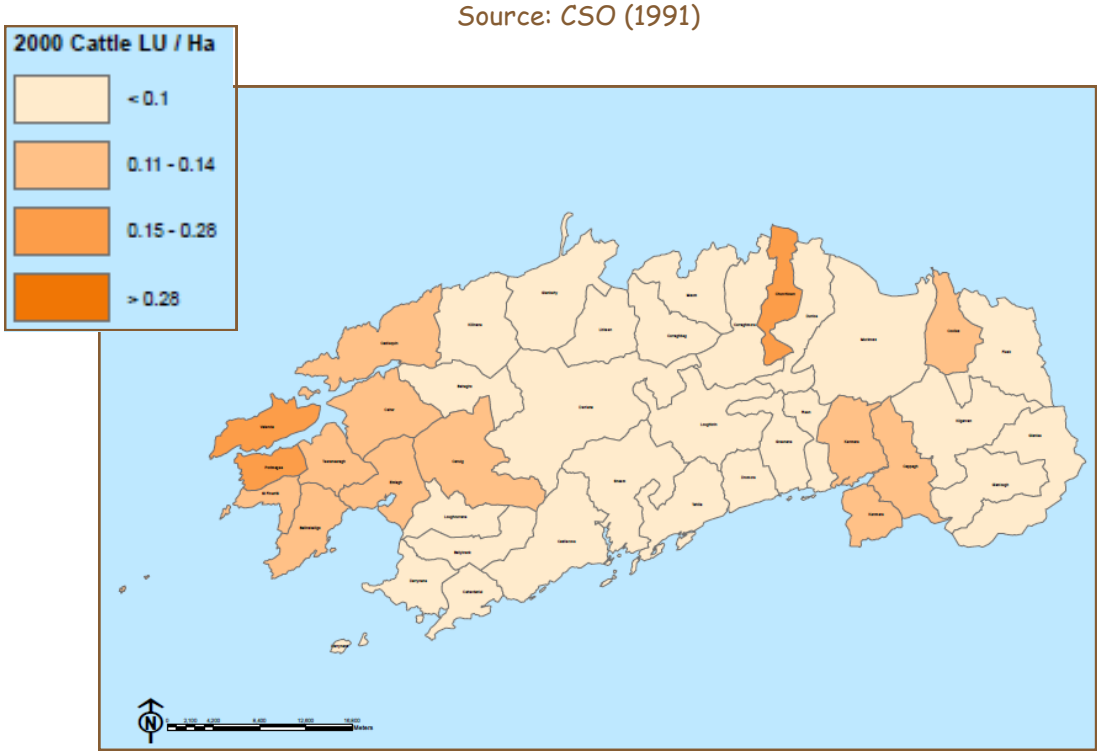


Farming the Iveragh Uplands





Source: CSO (1991)



Source: CSO (2000)

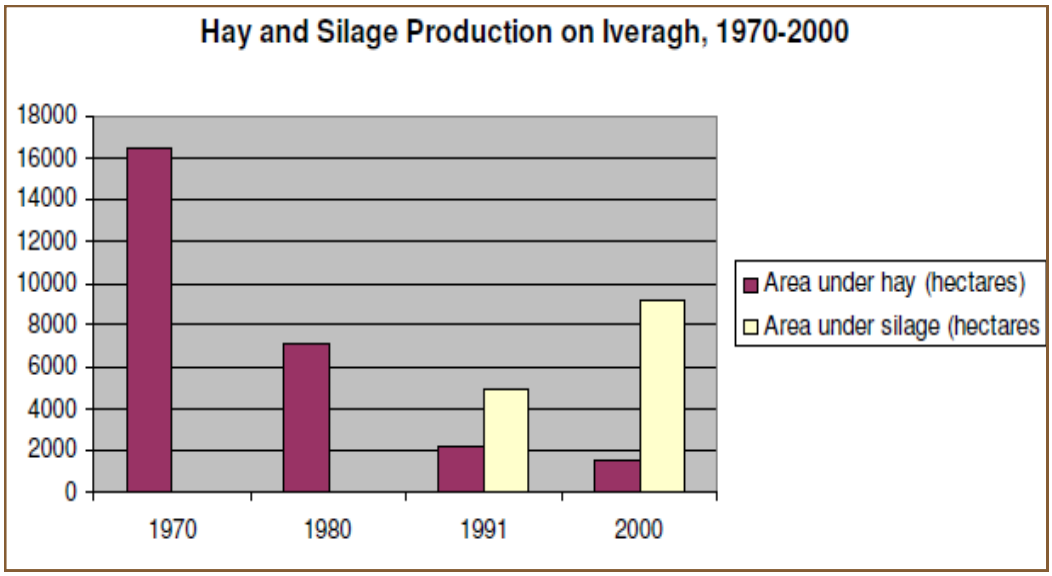
It is important to note that the above stocking rates, though showing a dramatic increase in the last decades, are still very low when compared to more intensively farmed regions in Ireland or elsewhere in Europe; a clear reflection of the nature of farming and the limited agricultural potential of the land



Feeding and livestock husbandry

On 71% of the farms surveyed livestock was housed and supplementary fed in winter and early spring, on average for 80.83 days. 58% of the farms produced their own fodder, mostly in the form of wrapped round bales of silage; yet of these, only 38% stated that they were completely self-sufficient in fodder. No farmer in the sample relied solely on the natural feeding capacity of their land.

In the 2000 Agricultural Census, 1580 hectares on the Iveragh peninsula were used for hay, a significant reduction from the 2262 hectares used in 1991, 7041 hectares used in 1980 and 16500 hectares used in 1970. In contrast, silage production increased from 4959 hectares in 1991 to 9180 hectares in 2000.



Source: CSO (2000)

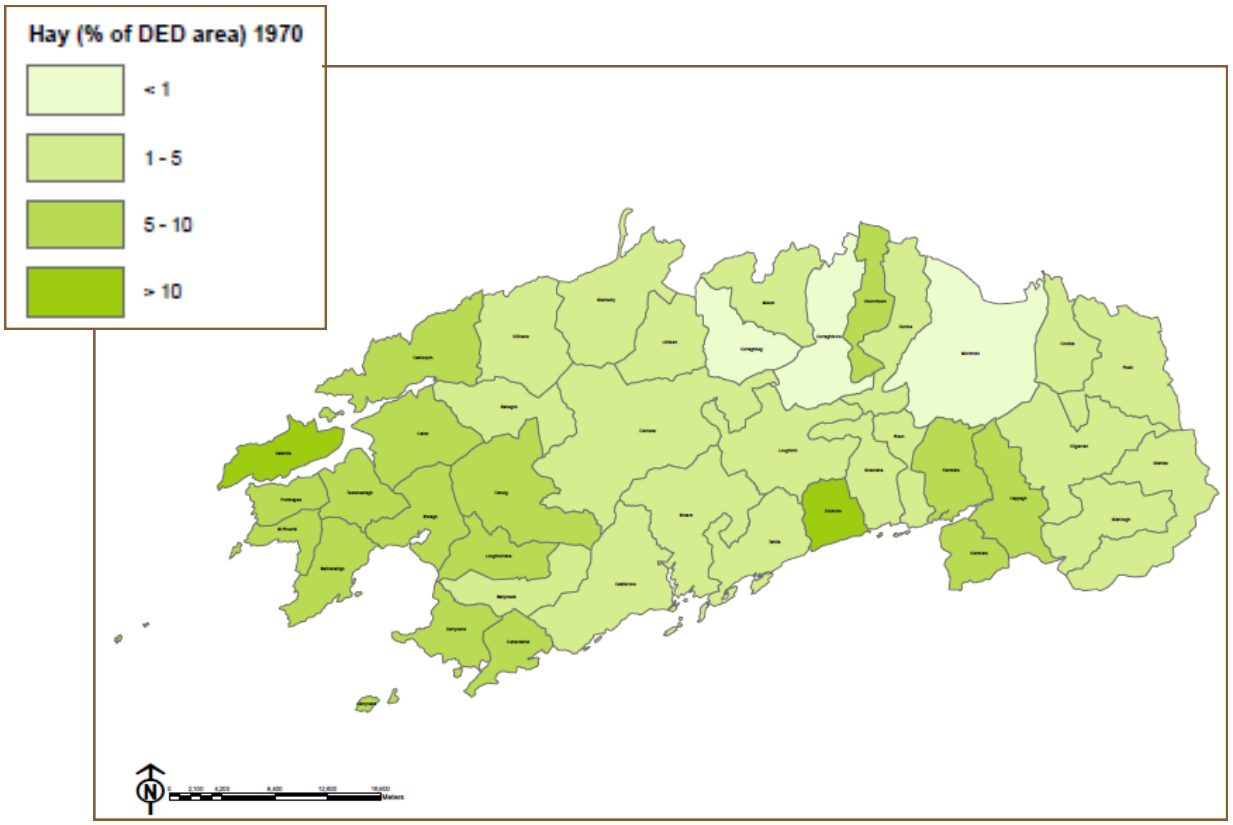
The following maps further illustrate that the loss of hay meadows – frequently associated with the spread of rushes on green land - was mainly incurred on the peninsula's internal upland areas where steep terrain rendered mechanical harvesting difficult.



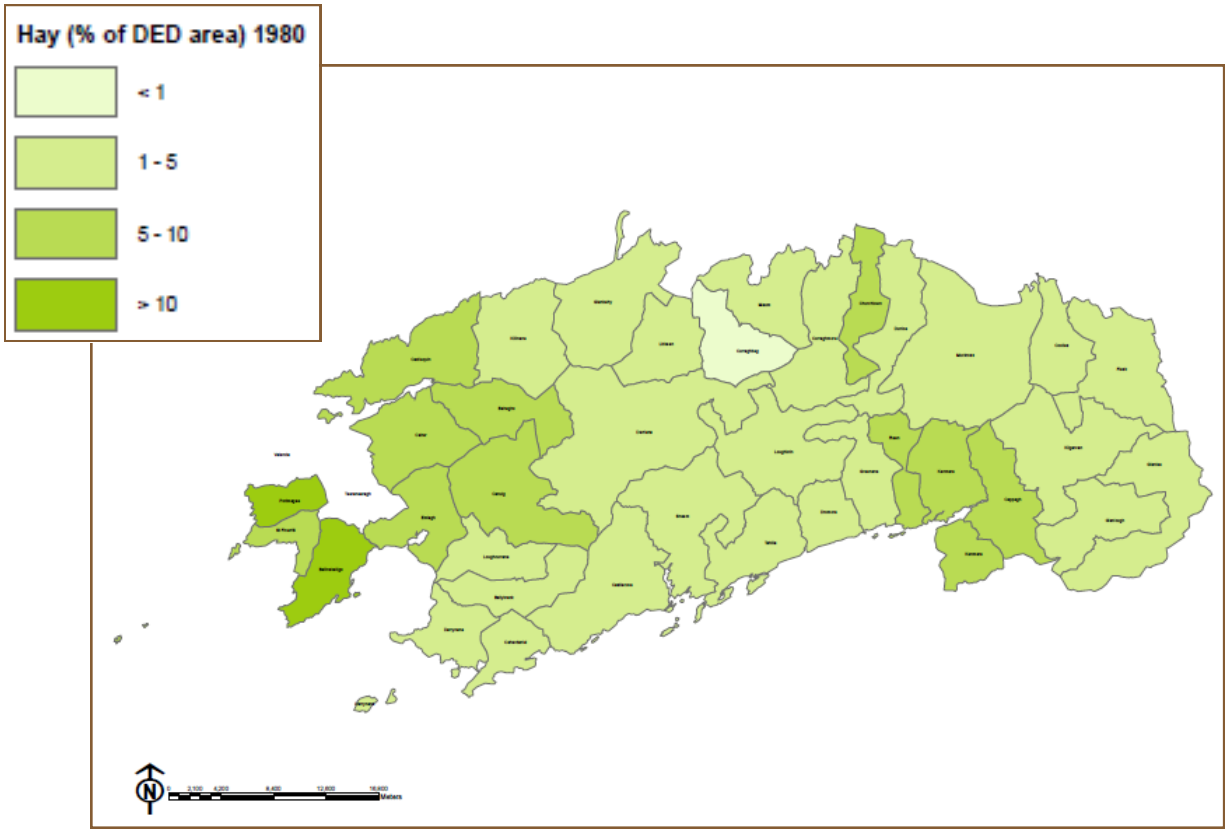
A problem: rushes spreading on green fields

Farming the Iveragh Uplands



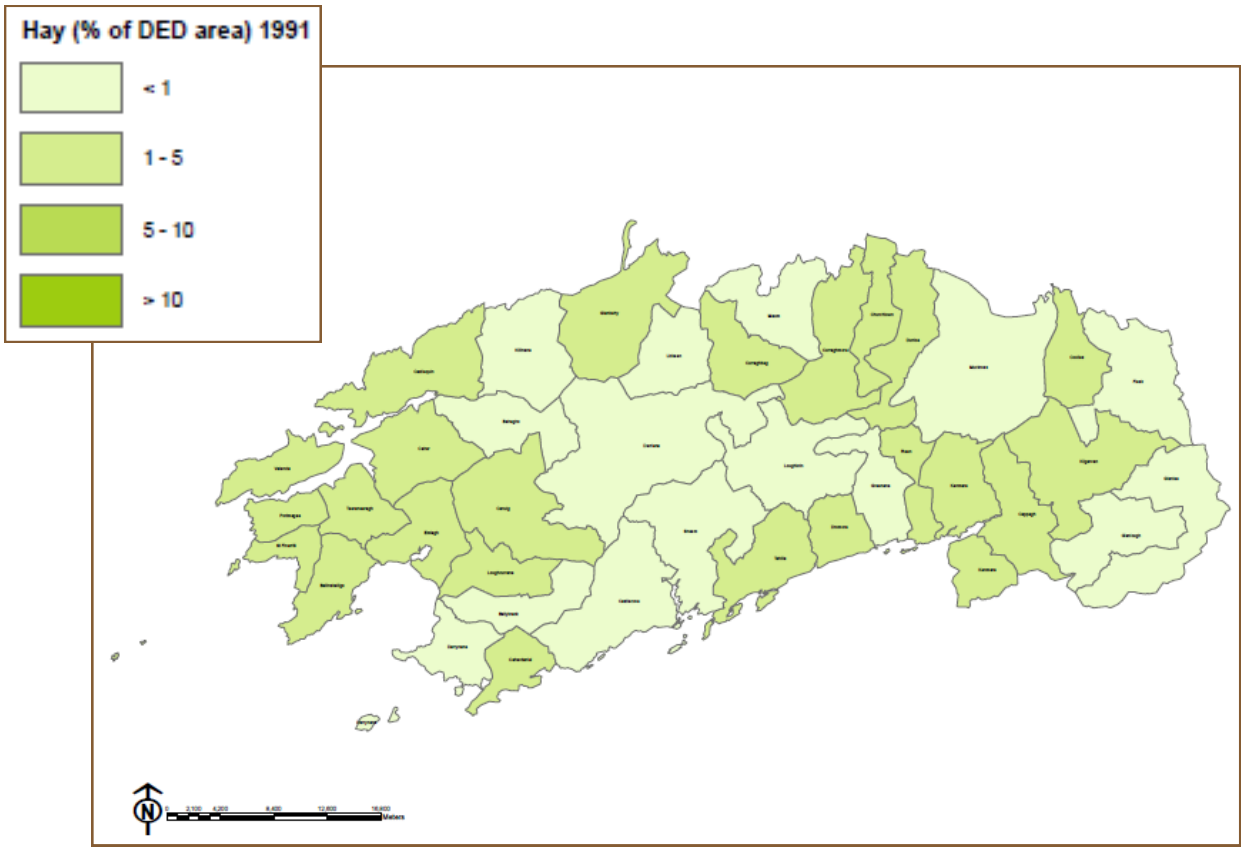


Source: CSO (1970)

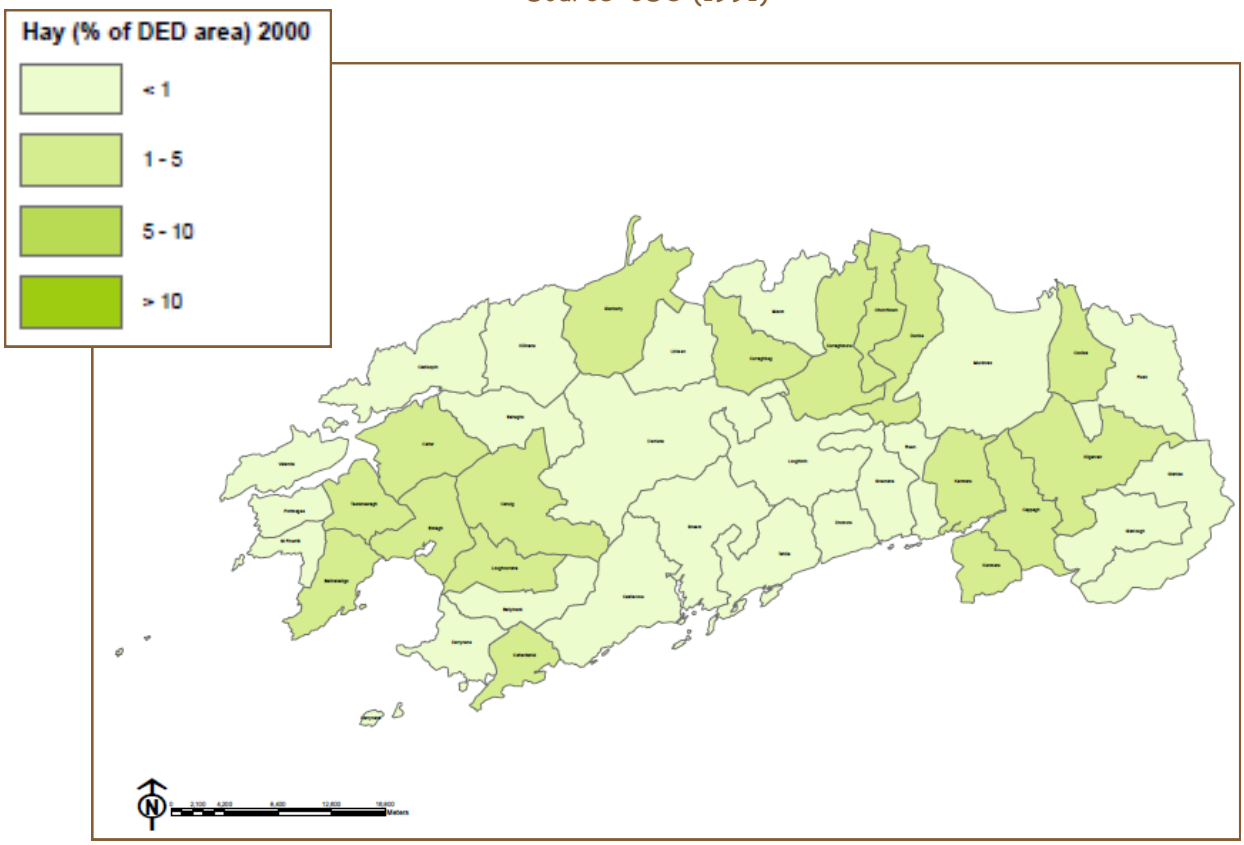


Source: CSO (1980)





Source: CSO (1991)



Source: CSO (2000)

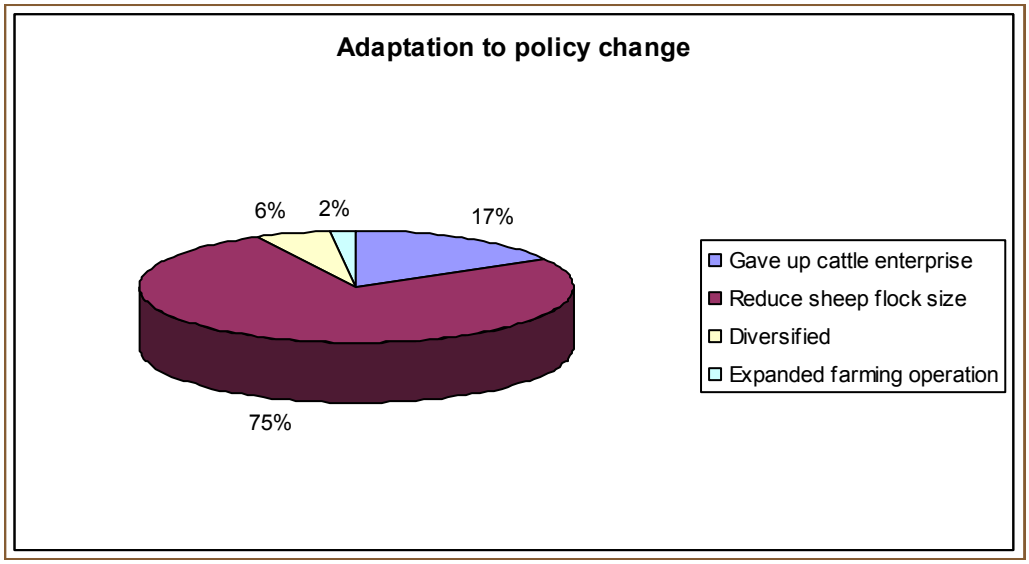


Policy change

When asked how they had been affected by the recent reforms to the Common Agricultural Policy (CAP), 43.1% of farmers stated that it had had a profound impact on how they operated their farms. 37.5% of respondents described the impact as slight and only 19.4% felt that nothing had changed.

In the vast majority of cases (75%), farmers had reduced the size of their sheep flocks significantly in order to adapt to the introduction of the single farm payment (SFP), the most important aspect of the new CAP. A further 17% of farmers gave up their cattle enterprises to cope with the impacts of policy reform. 6% of interviewees reported having diversified their income base either through taking on off-farm work or establishing another farm-based enterprise.

Irrespective of the type of adaptation chosen by the different households, it involved a considerable reduction in the amount of labour used on the farm, as stated by 60% of respondents.



Source: BioUp - Kramm (2009)

6. Survey results: upland management

Use of upland grazing areas

The vast majority of farm households surveyed both owned and actively used an upland grazing area. 3% of the farmers interviewed owned an upland area, but had never used it; while on another 3% of farms all land was improved. 6% of respondents stated that they had recently given up use of their upland grazing, sold it or rented it out.

Livestock spent an average of 221.32 days grazing the uplands , a significant reduction to the former practice of year round grazing, that reflects the trend towards the dual process of lowland intensification and upland marginalisation, also described elsewhere in the literature (e.g. MacDonald *et al*., 2000).

All survey respondents were asked to estimate sheep stocking rates on their upland grazing area, yet this figure – the most frequently used indicator of grazing pressure – was difficult to obtain. As reasons for this farmers reported the enormous variation within the often extensive upland grazing areas, as well as the fact that stock were often moved on or off upland grazing areas as in several stages as they approached lambing or were brought to the mart. Prevailing weather conditions and the availability of grass and forage also varied greatly between years and complicated the computation of an accurate figure.



Mountain sheep in Scarteen

Farming the Iveragh Uplands



This notwithstanding, the average stocking density of Iveragh upland grazing areas was estimated to be 0.48 Livestock Units (LU) per hectare (ha) during the grazing season or 0.29 LU/ha throughout the year. This is very similar to the figures reported elsewhere for low intensity farming systems.

Only 19% of farmers in the sample kept cattle on their upland grazing areas for part of the year, usually a few weeks in late summer after weaning of the calves, at a very low stocking rate, averaging 0.02 LU/ha. Overall, however, the grazing of cattle on upland areas is an increasingly rare practice that many farmers hold responsible for the spread of less desirable vegetation types (e.g. gorse).



Gorse spreading on hillside, Glencar

On 17.6% of farms visited livestock were supplementary fed on upland grazing areas, a practice that used to be more widespread under former productivist times when it effectively inflated the carrying capacity of upland areas and led to widespread problems of overgrazing, poaching and the invasion of alien plant or weed species around feeding sites. Under today's new agricultural policy environment with reduced stock numbers and agri-environment schemes, this practice as well as the application of fertiliser to upland grazing areas (still used on 12% of farms), have become increasingly irrelevant.

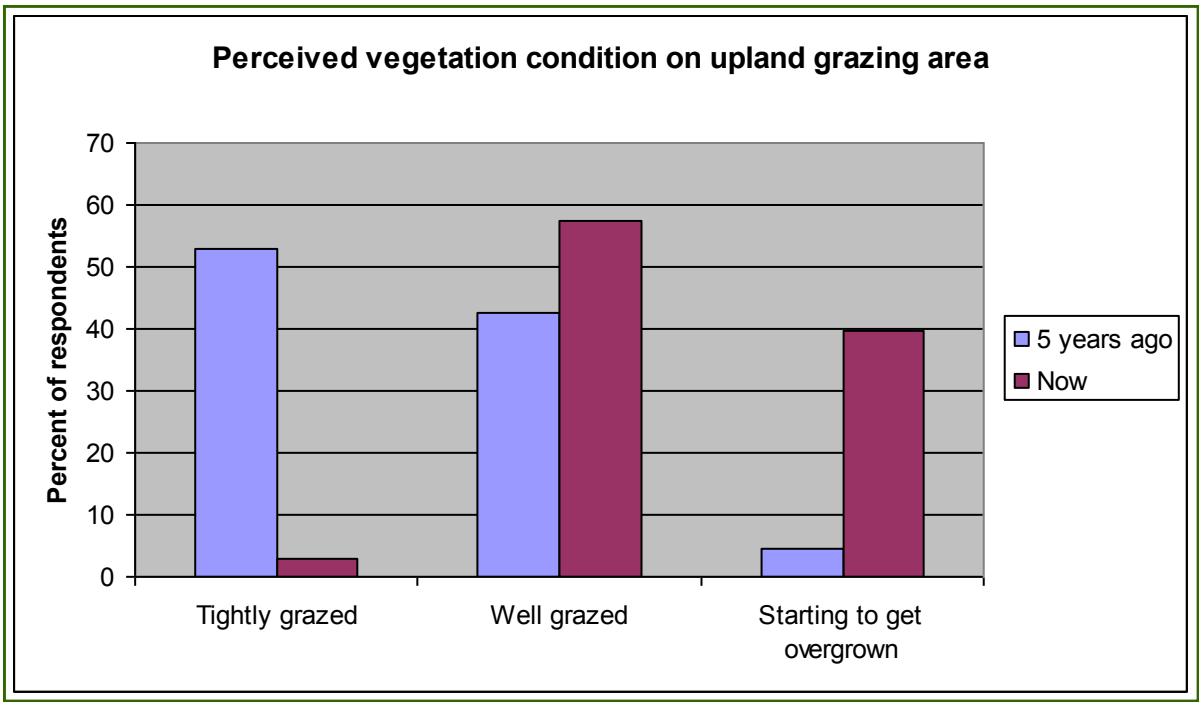


Vegetation change

The general trend in the evolution of European landscapes has been described as one of more homogeneous patterns over larger areas. The changing economic context of European farming means that, following a period of high productivism, many marginal rural landscapes are now undergoing agricultural decline along with fundamental changes in land use and production practices.

In mountainous areas, in particular, the trend is towards intensifying farming on the better agricultural locations, while use of less accessible and agriculturally unfavourable areas is extensified or abandoned. A commonly observed consequence is the encroachment of scrub and forest communities onto fields and traditionally managed pastoral areas, in some cases affecting the heritage value and attraction of old cultural landscapes.

This is also reflected in the fact that more than half of the Iveragh survey respondents (53%) reported having noticed a significant increase in scrub and unpalatable grasses on their upland grazing areas. For the remaining 47%, scrub was of no concern, a situation pertaining largely to farmers whose land was either located at very high altitudes or exposed to maritime influences, or still recovering from serious overgrazing in the past. Interestingly, as also noted by Dunford (2001), while scrub encroachment is generally seen as a slow and gradual process, most farmers interviewed reported a major increase in scrub vegetation over the past few years. The figure below illustrates the differences in how respondents perceive the condition of their upland grazing areas at the time of the survey and 5 years previously.



Source: BioUp - Kramm (2009)

Farming the Iveragh Uplands



Most survey respondents associated scrub encroachment on upland grazing areas with a reduction in grazing pressure and the cessation of traditional management practices over recent years. They referred primarily to the reduction of sheep numbers since the introduction of REPS and CFP as well as after the de-coupling of payments. Another factor frequently referred to was the cessation of traditional cattle grazing on the uplands, as brought about by REPS. A number of respondents, however, also pointed out the impact of the climate on scrub growth, in particular the milder winters and wetter summers encountered over recent years.

Another frequently mentioned factor held responsible for the scrub encroachment was the decline in the traditional practice of controlled burning on upland grazing areas. The importance of burning for keeping semi-natural vegetation in good condition and bringing over-grown land back into productive use was emphasised during the surveys, as were the restrictions imposed on this practice by the shortened burning season.

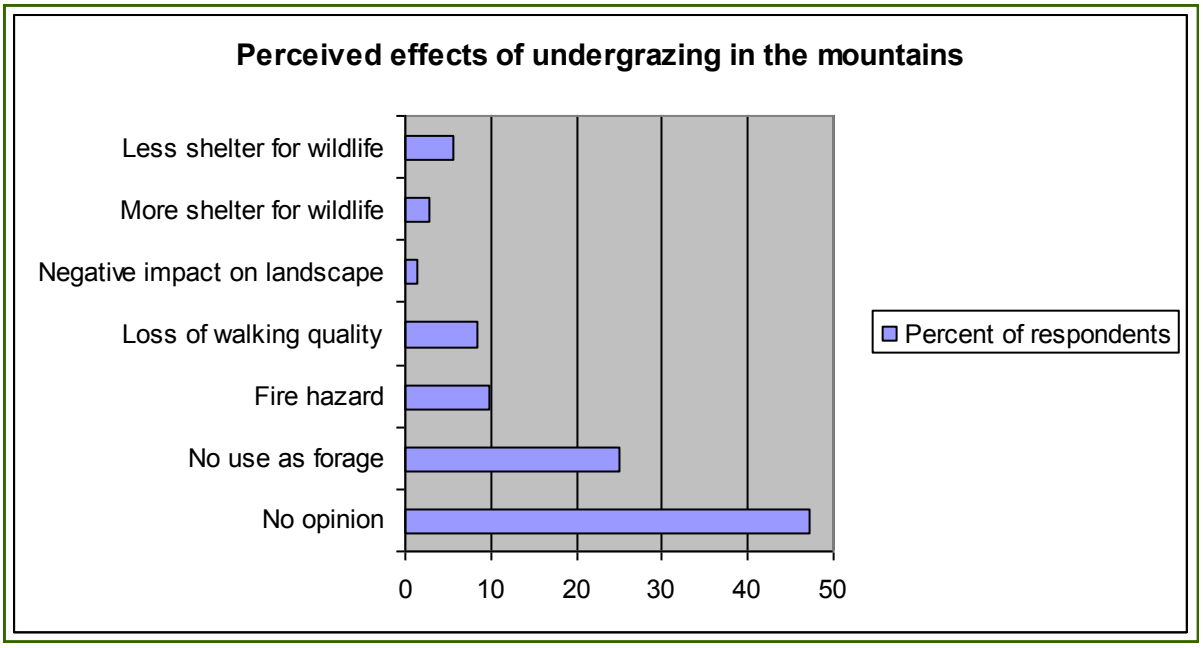


Controlled burning near Mangerton Mountain

Only 9.7% of respondents stated that burning between the 1st of September and the last day of February suited them; whereas 40.3% felt that it was impossible to burn vegetation in this period in most years due to wet weather conditions. On 50% of all farms, however, no burning took place irrespective of these dates. The most commonly cited reason for this was the lack of manpower, often combined with the fear that fires might get out of control. In this respect, all respondents stressed the need for preserving the traditional management knowledge based on experience accumulated throughout several generations, a knowledge that farmers felt would be impossible to replace or re-create once lost.



While the most likely cause of scrub and unpalatable grass expansion is a combination of the above factors, farmers' opinion of the effects was divided. Nearly half of all respondents had no knowledge of the effects of undergrazing in the mountains (47%). Of those who expressed an opinion, reasons relating to the productive use of upland grazing areas dominated with 25% stating that undergrazed land was of no use as livestock forage. Nearly 10% of respondents were afraid of the increased fire hazard posed by high vegetation and 8% cited diminished walking quality as their key concern. Wildlife and landscape character, against this, were least often referred to.

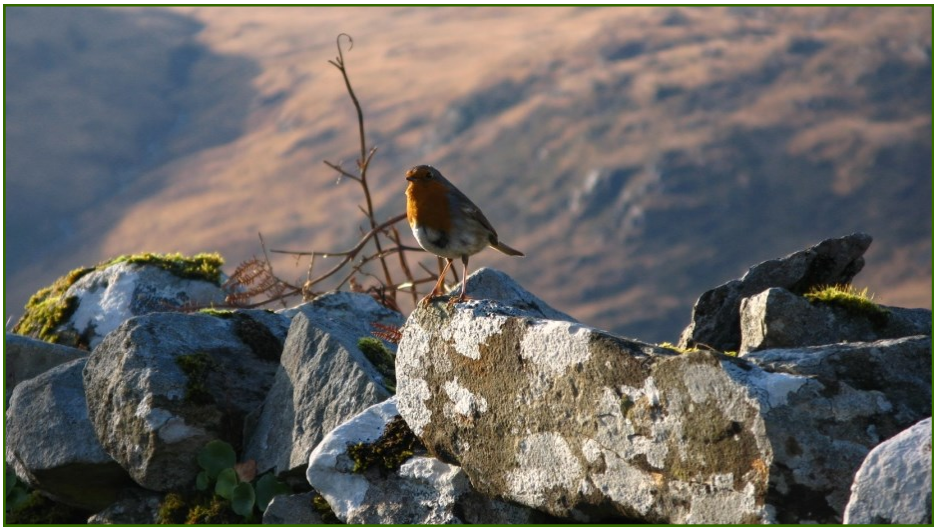


Source: BioUp - Kramm (2009)



Farming and nature conservation in the Iveragh uplands

An average of 87.39 hectares or 52.5 percent of holdings on the farms visited was designated as Special Area of Conservation (SAC) under the European Habitats Directive. In order to ascertain how farmers valued this as well as nature conservation more generally, they were asked about their attitude towards the scheme. Almost 63% of respondents expressed a very favourable attitude with only 18% having a negative opinion of the scheme and the remainder (19.4%) being indifferent. The vast majority of interviewees were in favour of nature being conserved, although surprisingly few believed that their own holdings had features that were unique or preservation worthy. If a farmer could name a special, conservation-worthy feature on his land, it was most commonly an old building, old farm machinery and occasionally large trees that provided shelter for farmhouse and livestock. No mention was made of flora or fauna.



Robin sitting on stone wall, Old Kenmare Road

To ascertain farmers' attitudes towards wildlife as more commonly perceived by nature conservationists, they were also asked to express a view about the recently reintroduced white tailed sea-eagle. Most respondents (44.4%) held no opinion and felt they were not affected by the re-introduction. 13.9% were in favour of the re-introduction and looked forward to seeing the birds, while also being able to see the benefits of the project for attracting visitors to the area. 11.1% had adopted what is best described as a 'wait-and-see position', denoting a certain fear that lambs might be preyed upon, yet rejecting the outright negative stance taking by a further 30.6%.

Common across all respondents, however, was the criticism that no consultation process had taken place prior to the re-introduction, with farmers feeling that the sometimes obscure objectives of nature conservation were given precedence over local concerns. This is also reflected by the fact that 70.8% of all survey respondents felt that they were not sufficiently involved in country side management issues and decisions that concerned their families and land. More than half of respondents also indicated a willingness to actively participate in countryside management issues.



REPS and farming for countryside management

Environmental protection is a relatively recent aspect of agricultural land use that became an important feature of the Common Agricultural Policy (CAP). Introduced in 1994 under Council Regulation EEC 2078/92, the Rural Environment Protection Scheme (REPS) is the main policy instrument designed to reward farmers for farming in an environmentally friendly manner and to deliver sustainable agriculture in the Republic of Ireland.

To qualify for participation in the scheme, a farmer must own or have leased for five years at least three hectares of utilisable agricultural land and undertake to follow an individual agri-environmental plan drawn up by an approved planner for five years. Being universally available as opposed to being restricted to specific areas of particular environmental value, REPS has been described as a uniquely comprehensive approach to securing agri-environmental objectives, with Emerson and Gilmore (1999: 244) stating that 'any scheme that secures the participation of one-quarter of all farmers within less than five years of its commencement suggests considerable success'.



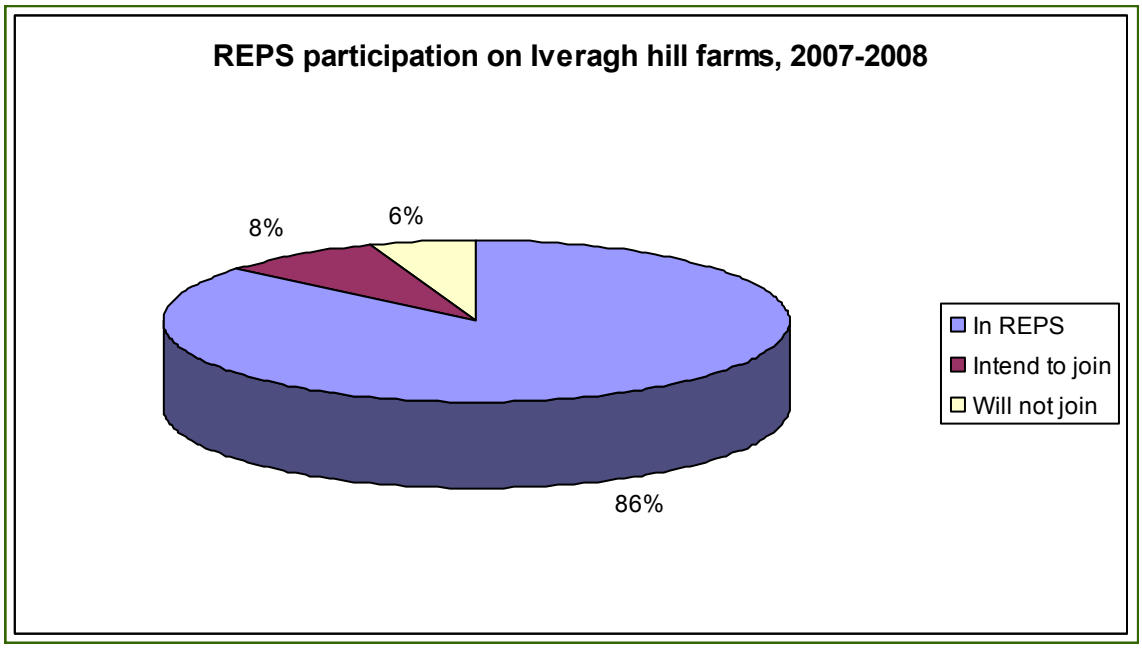
Fencing is an important aspect of REPS

Reviews are not without criticism, however, much of it pertaining to the absence of baseline studies undertaken prior to the scheme's inception to provide a background for monitoring its effectiveness, with the data available being largely restricted to the number of participants, the area of land involved and the money expended on the scheme. Dunford (2001: 238) further quotes an Earthwatch evaluation (Hurley, 1999) raising the question of whether or not REPS is intended to deliver environmental benefits up to, or beyond a baseline level. 'It is suggested that the Department of Agriculture appears to consider the scheme as a mechanism by which to pay farmers to reach a baseline of good farming practice. However, at European level, the desire clearly is to ensure the delivery of additional environmental benefits beyond baseline standards, for which society will be willing to pay.'



Other limitations of the scheme refer to the lack of ecological input and the agricultural bias of REPS planners, as well as the lack of professional support and motivation for farmers, and the lack of pre-plan audits and tiered payments to discourage the removal of habitats prior to entering the scheme (Hurley, 1999). Aughney (2000) hence concludes that while REPS is undeniably successful in supporting incomes, sustaining rural communities and promoting environmental awareness, in terms of its nature conservation objectives, the benefits are less clear-cut.

Many of the above factors and views are reflected in farmers' perspectives of REPS on the Iveragh peninsula that were elicited as part of the survey. Of the sample of farmers interviewed, 86.1% participated in the scheme, a further 8.3% intended to join in the near future. Only 5.6% of respondents were convinced non-members or afraid of allowing access to strangers.



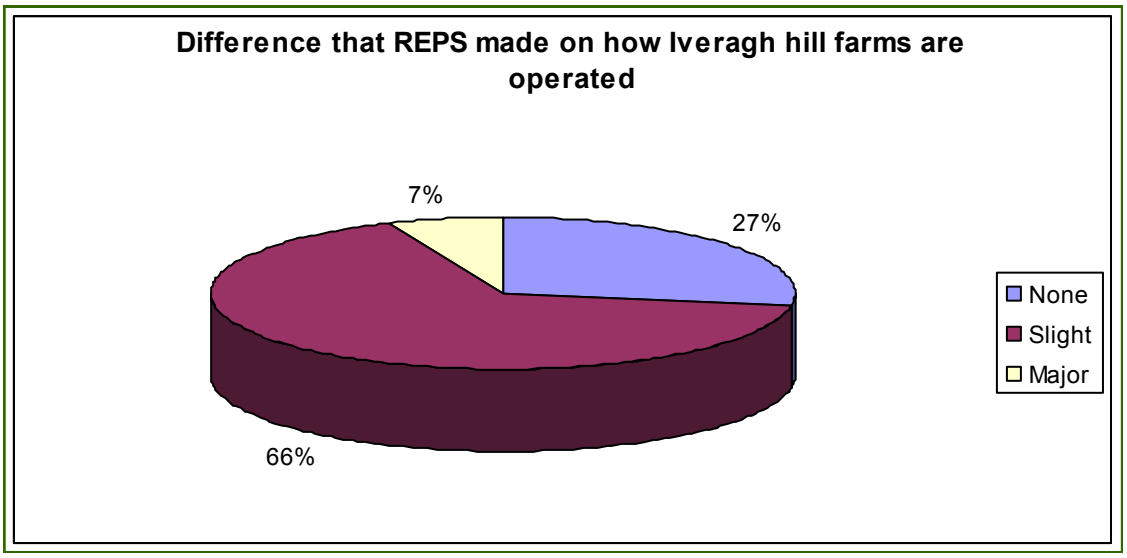
Source: BioUp - Kramm (2009)

The overall high participation rate appears to be inflated by the fact that the survey was focused on upland farms whose participation in the scheme is higher than would be the case had a general sample including more intensive farms been taken. Overall, REPS membership in the Iveragh uplands is thus clearly higher than the national average of 45% (Connolly *et al*., 2008). This is hardly surprising, given the extensive nature of farming systems that suits the objectives of the scheme, as well as the almost universal availability of supplementary payments for having part of the holding located in a Special Area of Conservation (SAC) which provides an additional financial incentive to farmers. It's also important to note that REPS 3 was discontinued in 2009 and the upcoming REPS 4 takes a more targeted approach and is set to be less lucrative.

In general terms, and confirming the findings of the larger literature, Iveragh farmers had a very positive attitude towards the scheme with 95.2% of respondents stating that they thought it had delivered benefits and 75.8% feeling that it had enhanced their awareness of environmental issues.



The vast majority of scheme participants felt that REPS had had only a slight or no impact at all on how they farmed their land with entry works being largely restricted to the farmyard, building and stone wall repair, fencing and general tidying up. While this certainly contributes to the scheme's popularity among the Iveragh farming community, it raises obvious questions as to its delivery of additional environmental benefits.



Source: BioUp - Kramm (2009)

Farmers also cited negative factors associated with REPS and more than half of all interviewed participants (52.4%) felt that changes needed to be made to the scheme to make it more workable in the Iveragh uplands. Foremost among the negative impacts associated with REPS was the feeling that measures should allow farmers more freedom in how they manage their land. Many farmers found it distressing to ask permission to undertake traditional practices that had been successfully applied for generations.

Many respondents held REPS largely responsible for the spread of scrub and rushes in the area, as they felt the scheme provided a strong disincentive to farm properly and had reduced farming intensity excessively on many farms. The scheme was also held accountable for the loss of cattle in the area, which most farmers felt was bad for the land as sheep alone are unable to control scrub growth and also thrive better in mixed grazing situations.

A sizeable number of farmers also expressed the desire to undertake minor reclamation works, particularly related to the small-scale clearance of fields from scrub and rushes. The latter would provide more grazing land for livestock during the months of slow vegetation growth on the mountain, and would help to improve the viability of marginal farms as less costly fodder would have to be imported to feed animals during the winter. 73.6% of survey respondents had undertaken land reclamation activities in their time as farm managers and all of them thought that that had been very much worthwhile from a farming point of view and had helped them stay on the land.

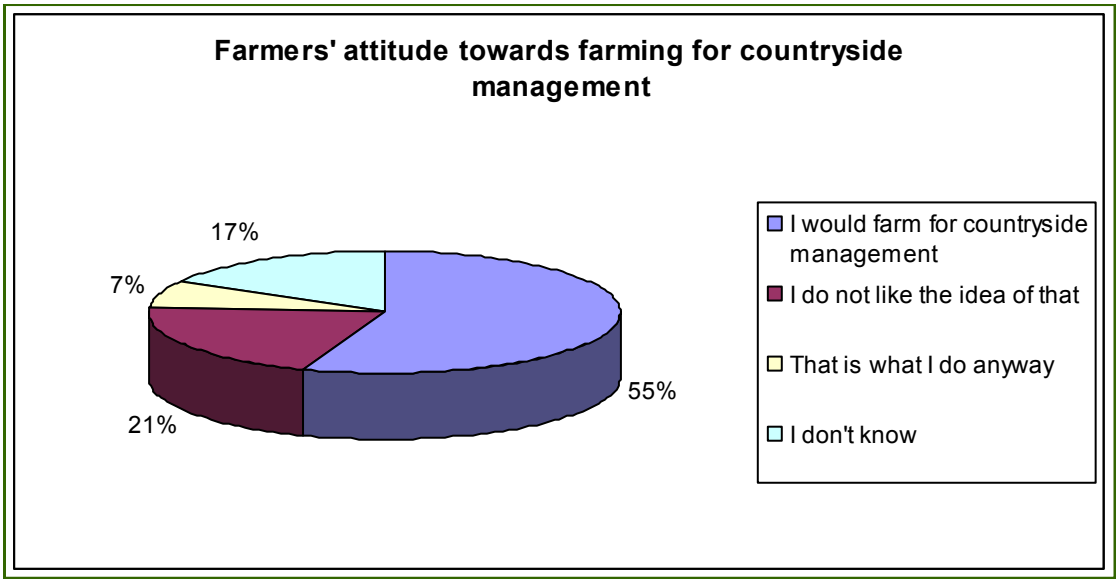
Farming the Iveragh Uplands



A further point that farmers made reference to was the feeling that REPS had contributed towards the inflation of land prices in the area and therefore prevented a healthy land market from developing.

Overall, when asked what the main impacts of REPS had been so far in the Iveragh uplands, only 9% of respondents believed that it had delivered ecological benefits, while 23% thought it had been of a mainly income supporting nature. Most respondents (49%) found that it had greatly helped to improve the appearance of farms by requiring participants to tidy up farm yards and rebuild stone walls, a fact that was much appreciated by the farming community as it was felt to promote a positive public image and helped to attract visitors to the area.

When asked to express their attitude towards the concept of farming for nature conservation, 55.6% of respondents thought this to be positive, with a further 6.9% believing this to be what they did anyway. Only one in five interviewees (20.8%) did not like the idea, and associated with it further loss of control over their farm and land, a concern that was expressed by most respondents.



Source: BioUp - Kramm (2009)

7. Grazing management and upland ecology

Introduction—upland grazing and biodiversity

The uplands may be defined as any area above a certain altitude (e.g. 200m) or above the upper limit of enclosed farmland.



Upland and lowland habitats

Traditionally upland farming was of low intensity and mixed grazing of sheep and cattle on the hills was commonplace, lending itself nicely to the creation of semi-natural fairly diverse habitats. However EU policy changes over the years initiated first an increase and more recently a decrease in sheep numbers on the hills. Ecologically a continual decline in agriculture in the uplands will lead to scrub encroachment in many areas accompanied by a decrease in the overall biodiversity.

The biological diversity or biodiversity of species consists of two components: 1) the number of species present (species richness) and 2) the abundance of individuals within each species. Measures of diversity are often seen as indicators of the wellbeing of ecological systems as many studies have shown that the more variability we find in a region, the greater the chance that the region will be able to cope with change and disturbance. Diversity creates a certain amount of stability. Indicator species can also be used to gauge environmental degradation and are particularly valuable when employed in conjunction with measures of diversity.

Farming the Iveragh Uplands







Biodiversity: a wheatear (*Oenanthe oenanthe*) by Isabelle Kozlik and heath milkwort (*Polygala serpyllifolia*), two species often recorded in Iveragh

The environmental implications of overgrazing and undergrazing are serious and well documented. Overgrazed land becomes too degraded for animals to graze further leading to, among other things, soil erosion, while undergrazing increases scrub cover and competitive grasses, through rapid succession, with an overall reduction in species richness (Caraveli, 2000). It is widely accepted that low-intensity grazing can act as a viable conservation tool for upland areas by maintaining biodiversity, nutrient cycling and productivity. Heterogeneity (variety of different stages or vegetation types) in vegetation structure and composition provides a diverse mosaic of habitats suitable for supporting a variety of species, many of which play a vital role in upland food webs.

Undergrazing may be defined as a situation *'Where there is evidence of the annual growth not being fully utilised, or where scrub or coarse vegetation is becoming evident and such changes are detrimental to the environmental interest of the site.'* **Overgrazing** is '*Grazing land with livestock in such numbers as to adversely affect the growth, quality or species composition of vegetation on that land to a significant degree.'* While **sustainable grazing** involves *'Adopting different stock types and varieties at a level that do not compromise the quality of the vegetation for future grazing use'…'that is economically viable'…* supports *'a typical range of plants'…*provides *'habitat for good populations of locally characteristic birds'…* supports *'other animals such as invertebrates that also provide food for birds and other animals'* [Department for Environment, Food and Rural Affairs in UK (DEFRA)].





Tall bracken in the foreground gives way to scrub and trees, typical of an undergrazed area



Closely grazed gorse and very short mat grass, common on overgrazed sites

Overgrazing and undergrazing rank number one in the major pressures reported in the assessment of habitats in Ireland as part of the EU Habitats Directive (O'Keeffe *et al*., 2008). However, as we have already heard, something to bear in mind while reading this chapter is the concept of High Nature Value (HNV) farming and its dependence upon not only conservation goals but also, critically, the continuation of traditional land uses.







A reduction in good forage is undesirable while too much scrub and bracken (*Pteridium aquilinum)* may inhibit the movement of livestock and reduce nutritious forage.



Grazing mammals

Many factors may cause variation in the distribution and extent of the impact of grazing upon the environment such as shepherding, breed of animal, supplementary feeding and time of year (Welch, 1998, Midmore *et al*., 1998). Fuller (1996) has noted that average stocking density provides no indication of the density of feeding or what vegetation the animals are grazing upon. In fact many believe it is the decline in shepherding which has put heavier pressure on some upland areas, as grazing is no longer confined to certain areas at certain times of the year (MacDonald *et al*., 2000). A flock which has been long established on a hill will have developed hefts and will know where to go to find shelter or food during adverse weather conditions. However when a hillside has lain bare for several sheep generations, sheep will have to be encouraged to heft again by placing feed in sheltered areas and by shepherding. Local differences may also exist, for example, the same stocking rate may cause one area to become ecologically damaged and yet leave another almost undisturbed. Grazing controls, therefore, should be locally-specific in order to make best use of the land and cause the least damage. Suggested sheep stocking levels are typically 0.5 to 1 ewe/ha for restoring a degraded habitat and 1.5 ewes/ha for maintenance (Critchley *et al*., 2007), however a habitat specific stocking rate may be of more use. An increase in sheep numbers on the hills has seen the expansion of species such as purple moor-grass, mat-grass, heath rush and bracken (*Pteridium aquilinum)*. The deposition of dung and urine will also influence soil fertility.

The sheep diet is very selective, particularly when preferred forage is abundant and overlaps to a large extent with that of the Irish hare (*Lepus timidus hibernicus)* and red deer (*Cervus elaphus*) and to a lesser extent with that of feral goats. Sheep also graze flowers which may affect seed production. Cattle are more generalist in their grazing and due to this difference in feeding and trampling behaviour, the adoption of a mixed grazing regime of sheep and cattle is an effective mechanism in the control of the unpalatable mat grass (*Nardus stricta),* and cattle are able to break up accumulated plant litter. Mixed grazing has also been shown to encourage ground beetle species richness. Some studies have also shown that a sheep and cattle mixture can sometimes give a higher meat yield than either species separately (Newman, 2000).

A decrease in sheep numbers will generally lead to a rise in the number of deer using the same ground due to diet overlap (Clutton-Brock and McIntyre, 1999). However, in a heather/grassland mosaic sheep concentrate their grazing on grass patches while red deer will make use of all forage (Hester *et al*., 1999; Oom and Hester, 1999). Although sheep consume more heather in winter when there is a lack of digestible forage, they tend to avoid heather growing in blanket bog or wet heath to prevent getting their feet wet!

Vegetation—grazing and habitats

An imperative link between the ecological and socio-economic components of the BioUp Project involved the collection of plant and environmental data. As the study of other upland species ultimately depends on plants this data will be used to tease out differences in plant diversity, species cover or influence of habitat between sites subject to various levels of grazing intensity. Then, in conjunction with ground beetle and bird data we can inform future management strategies.

Farming the Iveragh Uplands



Plant species composition may reveal much about past or present management (Benton *et al*. 2003), environmental conditions, soils, habitat and the surrounding vegetation. Studies have shown that the effects of grazing treatments lasting only two years persisted for the next 25 years. This is not surprising given that many individual plants may be decades old. The process of vegetation change is also much slower on acidic soils. Changes in composition may take many years to occur whereas changes in sward structure, such as height, can be observed within a growing season. The application of a suite of grazing impact criteria to quantify the state will perhaps explain the situation to a greater degree.

It is now widely accepted that the complete removal of grazing will, in most cases, lead to the growth of a small number of dominant but less productive plant species, such as gorse and bracken, which in turn will attract fewer invertebrate and bird species, thus leading to an overall decline in biodiversity. This suggests that an intermediate level of grazing should provide the greatest species diversity (Grime, 1973, 1979).

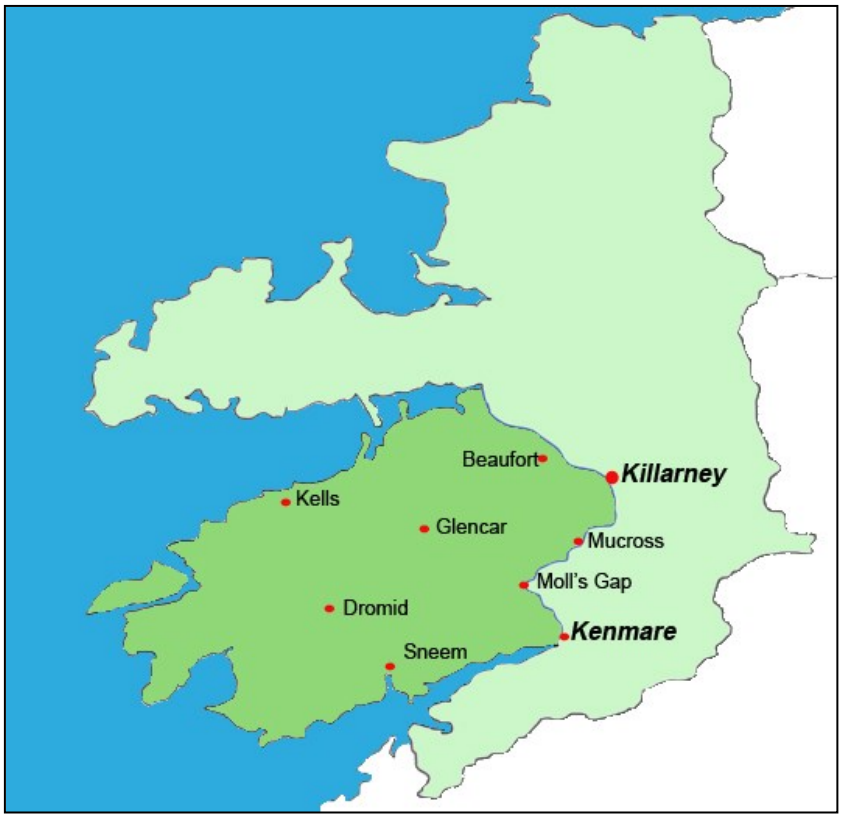
Upland vegetation on the Iveragh is immensely variable and tends to be dominated by semi-natural grasslands, bogs and wet heaths in contrast to the agriculturally improved pasture of the lowlands. In well grazed, drained or burnt areas grasslands dominated by mat grass and heath rush often flourish. Lowland blanket bog is dominated by grass species, while heathers define the drier upland blanket bog. Blanket bog is an important habitat in its own right and is also home to many globally threatened bird species such as the skylark (*Alauda arvensis*) or golden plover (*Pluvialis apricaria*) (both listed in Annex 1 of the EU Birds Directive) or those in decline such as the meadow pipit (*Anthus pratensis*).

Ireland is one of Europe's last strongholds for blanket bog and although much of the vast coverage (one million ha) remains intact, large areas have been drained for grazing, cut away or afforested resulting in widespread fragmentation (Cross, 1989). Intensive grazing of bog will see the transition to grassland, as sheep remove over 40% of the current season's heather growth (Miles, 1988; Thompson *et al*., 1995). While burning will result in the transition of bog to heath as it dries out the peat. Once stocking density declines and grazing pressure is inadequate to prevent the growth of ling, burning may be the only solution. Sheep show a strong preference for the fresh shoots on newly burnt heather and fresh grass will grow alongside. However it is important that this is kept to the burning season which will prevent the destruction of many nesting birds in spring.

BioUp Ecological Survey

In 2007 four main study areas on the Iveragh – Beaufort, Glencar, Kells and Sneem – were selected as being representative of upland grazing conditions on the peninsula as a whole (see map). Within each of these sites three hill farms subject to grazing regimes of varying intensity, from under to overgrazed, were selected for intensive ecological field work. All the ecological data was gathered from this sub-set of twelve farms. In 2008 additional field data was collected on the vegetation and birds from a further nine farms in Mucross, Moll's Gap and Dromid. Almost all 21 farms reach altitudes of between 400 and 800m, although total farm sizes were generally less than 250ha.





Showing County Kerry in pale green and the Iveragh Peninsula in bright green (map by Richard Condon)

State Classification

Allocating a level of grazing intensity or 'state' to each farm was inherently difficult as most farms generally consist of some overgrazed areas, some undergrazed and others in a more sustainable condition. The variety or mosaic of habitats also reflects the underlying soil, which only serves to increase the difficulty in assigning a general farm grazing state. When the factor of scale (from field to farm to landscape) is then added it becomes clear why this is a complicated task! Sometimes, however, it is evident that grazing management is the cause of the observed changes in the landscape. Areas on either side of a fence line will experience the same climatic conditions and exhibit the same soil type and geology so differences in management must be the answer.

Farming the Iveragh Uplands





The vegetation on the right of the fence line shows undergrazed heather cover with very little else in between and on the left we see the removal of heather in favour of grasses through overgrazing



Habitat mosaic at landscape scale (blanket bog, heath, improved and acid grassland and forestry)





A heather-grassland mosaic at the local scale

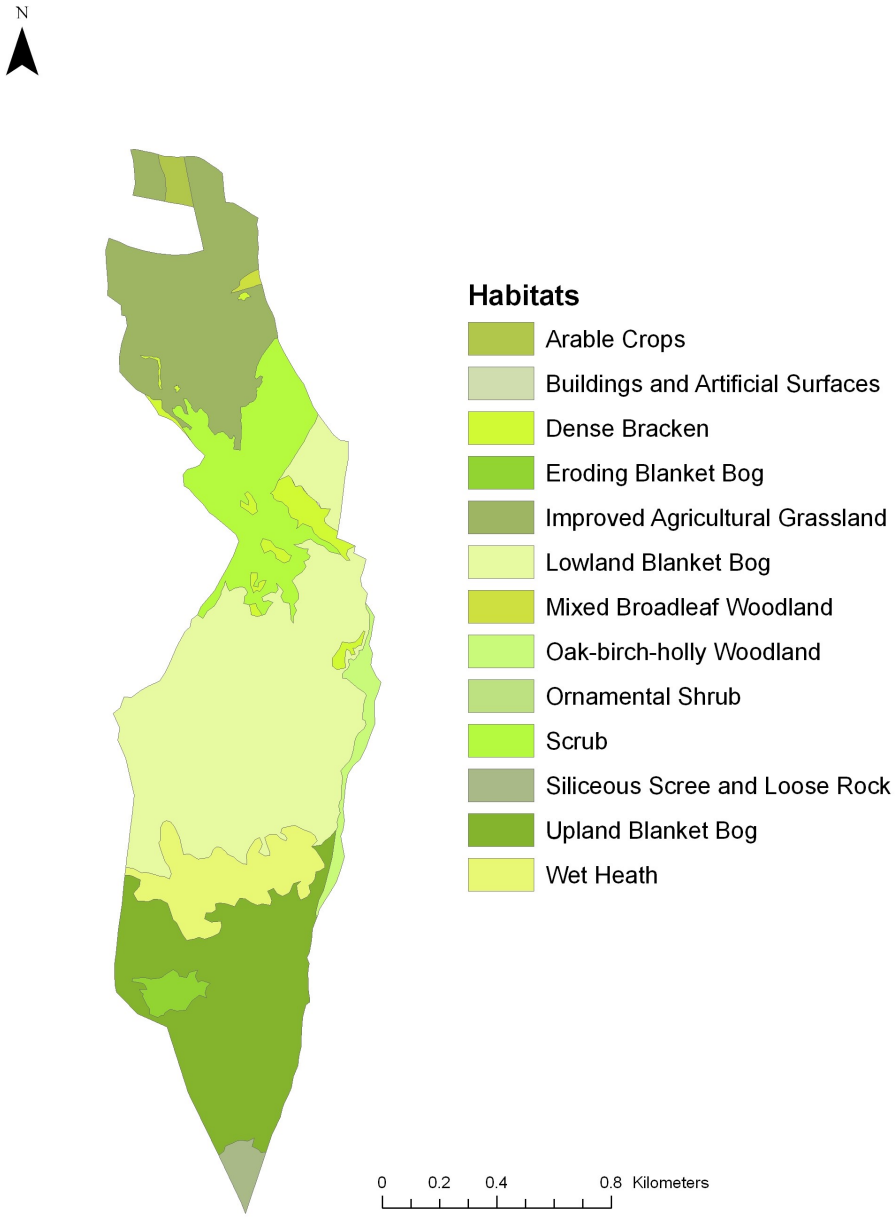


Grazing is now focused on the improved grasslands of the lowlands allowing bracken, gorse and heather to dominate the uplands

Farming the Iveragh Uplands



After an initial farm visit, all habitats were mapped (Fossitt, 2000) (see map below) and twelve quadrats were randomly placed within the four largest habitats on each farm to provide a representative sample of grazing state and plant species throughout the farm.



Example of a farm habitat map

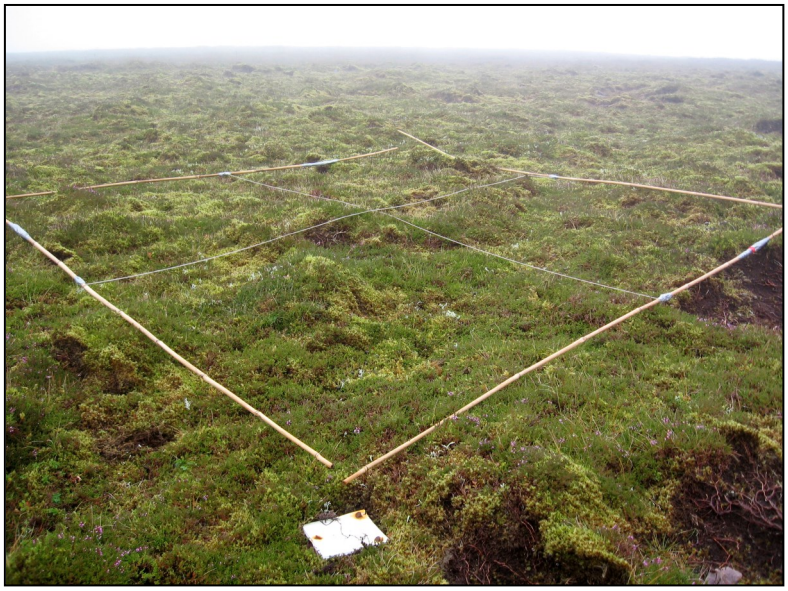


The majority of habitats sampled were improved agricultural grassland (IG), lowland blanket bog (LBB), upland blanket bog (UBB) and dry-humid acid grassland (DHAG). Using habitat-specific criteria such as the extent of ling versus other heather species (*Erica spp*.) in bogs, within a sampling area of 2x2m^2 called a quadrat, as well as general criteria such as percentage of litter or dunging, a grazing impact level (high, moderate or low) was attributed to each habitat and an overall state (overgrazed, undergrazed or sustainably grazed) assigned to each farm (MacDonald *et al*., 1998). All plant species [grasses, forbs (i.e wildflowers), shrubs, sedges, rushes and mosses] and their percentage cover within the 2x2m^2 quadrat were also recorded as well as environmental data such as soil depth, pH, altitude and vegetation height.



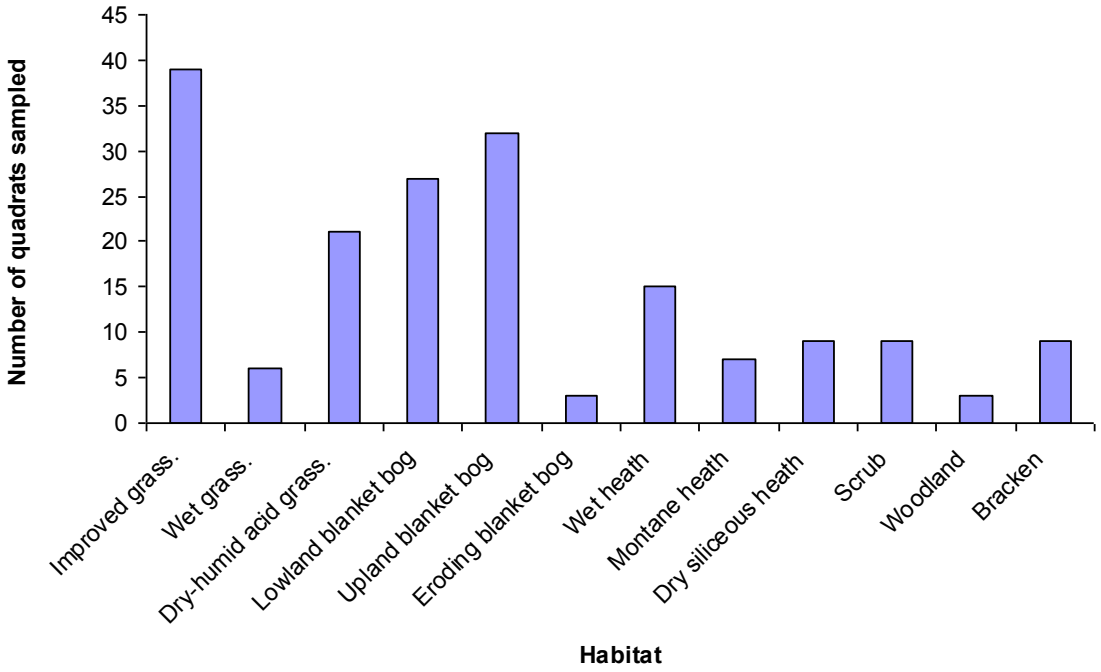
Making use of vegetation structure, a spider's web

In total 144 quadrats were sampled on twelve farms in 2007. A further 108 quadrats were sampled from an additional nine farms in 2008. 149 plant species were recorded in total.



2m^2 quadrat on montane heath





The spread of quadrats sampled throughout habitats on 21 farms. Source: BioUp – Anderson (2010)

Classification data

The grazing management of each farm sampled was first assigned to one of three broad categories for simplicity: undergrazed, sustainably grazed and overgrazed.



Showing the distribution of 21 farms into grazing states. Source: BioUp – Anderson (2010)

This reflects the present situation on hill sheep farms all over Europe, where previously it was common place to find many overgrazed farms, it is areas with reduced or no grazing which are



now widespread. Along with changes in the CAP in the last few years we have seen widespread reduction of sheep numbers on the hills. Grazing is now generally focused on the improved grasslands of the lowlands, while the uplands are becoming slowly abandoned resulting in the spread of scrub and decline of nutritious forage.

Classification and ordination programs

However, another method of analysing the BioUp field data was to use the computer program PC-Ord (McCune and Mefford, 20061999). The data was first classified using the program TWINSPAN (Two-way Indicator Species Analysis) which produces a two-way ordered table showing major divisions in the data (Kent and Coker, 1992). In this way samples can be grouped based primarily on their vegetation composition. The classification produced six groups, each differing in species and grazing management regime.

	Total	Scrub	Blanket bog	Heath	Mixed grassland	Improved agri grass (sust)	Improved agri grass (over)
No. of quadrats	n = 144	n = 11	n = 43	n = 47	n = 19	n = 15	**n = 9**
Average species per $2m^2$	11.8 ± 3.9	8.1 ± 2.2	11.4 ± 2.0	11.2 ± 3.9	15.1 ± 5.0	14.3 ± 3.9	**10.2 ± 2.9**
Deviation from average (%)	-	**- 31.3**	**- 5.1**	**- 5.2**	**+ 29.2**	**+ 16.9**	**- 10.9**

Quadrats and species spilt into six groups using TWINSPAN. Source: BioUp – Anderson (2010)

A DCA (Detrended Correspondence Analysis) was then used to help pick out the environmental factors which most strongly influence the vegetation.

Dunford and Feehan (2001) found that the TWINSPAN analysis classified their Burren data into the dominant farm management practice at each site. However, in their case study all sites were of the same habitat type (grassland). In the BioUp project we found a selection of very different habitats scattered throughout all farms, ranging from wet blanket bog to dry-humid acid grassland. As habitat type plays a large role in the plant species present, we found that TWINSPAN separated our data almost exclusively into different habitats, with the exception of two improved grassland habitats which were separated by management type.

The first group of Iveragh habitat type consists of **undergrazed scrub**. A fairly species poor, dry habitat with eight species on average per quadrat (just over 31% below average). The majority of species are grasses, sheep's fescue (*Festuca ovina)* and creeping bent (*Agrostis stolonifera*) and mosses with the forbs tormentil (*Potentilla erecta*) and heath bedstraw (*Galium saxatile)*. Bracken and common gorse (*Ulex europaeus)* are also common in this group, as are the shrubs ling, *Vaccinium myrtillus* (bilberry) and *Erica cinerea* (bell heather).





Undergrazed scrub: gorse in the foreground, patches of native trees in the background and extensive brown patches of died-back bracken (*Pteridium aquilinum*) which will flourish again in the spring

The second Iveragh habitat group is **blanket bog**. This is generally undergrazed and there are on average eleven species per quadrat. These are mostly made up of shrubs such as ling and *Erica tetralix* (cross-leaved heath), grasses such as *Molinia caerulea* (purple moorgrass), which is locally referred to as 'fionnán grass' (O'Rourke, 2009), rushes such as *Trichophorum cespitosum* (deergrass) and sedges such as *Eriophorum angustifolium* (common cottongrass). We also see the forbs tormentil, *Narthecium ossifragum* (bog asphodel) and *Drosera rotundifolia* (round-leaved sundew). Blanket bogs in general tend to be fairly species poor in comparison to grasslands.



Upland blanket bog with common cottongrass (*Eriophorum angustifolium*) and heather species by Isabelle Kozlik





Lowland blanket bog is grassy in appearance and home to species such as bog myrtle (*Myrica gale*) and black bog rush (*Schoenus nigricans*)

The third Iveragh habitat group is **heath**, generally undergrazed with rank vegetation. It also has an average of eleven species per quadrat. Mostly ling, tormentil, bent grass species, purple moor -grass, mat grass, heather species, sedges and *Ulex galli* (western gorse). It is fairly species poor as it is undergrazed but with the right level of grazing these sites could be conserved.



Undergrazed heath: a mix of heathers, bracken (*Pteridium aquilinum*) and rushes



The forth Iveragh habitat group is **mixed grassland**, generally in a sustainable condition. It is the most species rich of all the groups, with an average of fifteen species per quadrat (just over 29% above average). There are many grasses including bent and fescue species, *Holcus lanatus* (Yorkshire fog), sedges, rushes and forbs such as tormentil, *Cerastium fontanum* (common mouse-ear) and *Trifolium repens* (white clover).



Mixed grassland: in amongst the many forb and grass species here we see devil's-bit scabious (*Succisa pratensis*) and ribwort plantain (*Plantago lanceolata*)

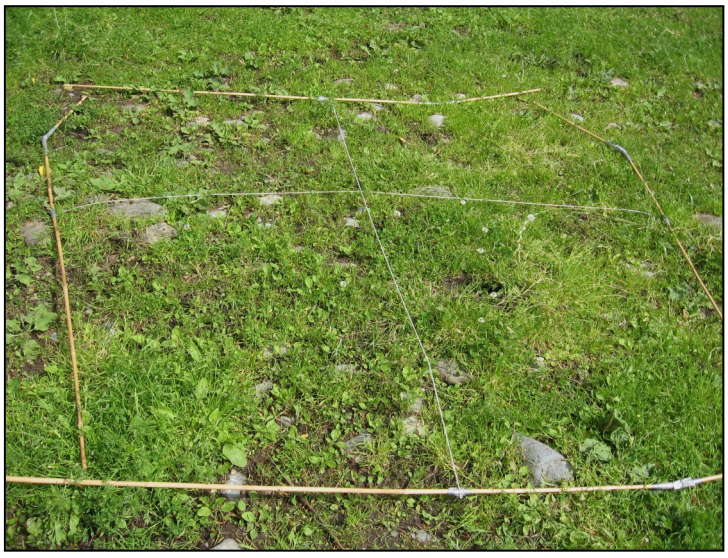
The fifth group is made up of **improved agricultural grassland**, generally *sustainable* in nature. Improved grassland is almost exclusively found in the lowlands and due to the common addition of fertilisers is often bright green in colour, hence the term 'greenlands'. It is still fairly species rich with on average fourteen species per quadrat, although the removal of grazing would probably reduce this. There are many typical improved grassland flowers such as white clover, tormentil, common mouse-ear, *Ranunculus repens* (creeping buttercup), *Leontodon autumnalis* (autumn hawkbit), *Plantago lanceolata* (ribwort plantain) and the problem weed *Cirsium arvense* (creeping thistle). Grasses and rushes are also common. The main difference between this group and the mixed grassland is that this group also contains sown native perennial species such as rye grasses. Improved agricultural grassland also contains two fast spreading weeds, *Rumex obtusifolius* (broad-leaved dock) and creeping thistle. However, with adequate grazing these species should be kept in check.





Improved grassland (sustainable): broad-leaved dock (*Rumex obtusifolius*), white clover (*Trifolium repens*) and creeping buttercup (*Ranunculus repens*)

The sixth habitat group is **overgrazed improved agricultural grassland**. It is generally species poor and there are, on average, ten species per quadrat (almost 11% below average). This is most likely as a result of treatment with fertiliser, often after reseeding, as well as high levels of dunging and urination which stimulates the growth of a few dominant and highly competitive grasses and broad-leaved forbs at the expense of other species. It is usually dominated by meadow grass species, *Lolium perenne* (perennial rye grass) and forbs such as white clover and creeping buttercup. *Juncus effusus* (soft rush) is also likely to dominate in poorly drained reseeded fields (Fossitt, 2000). The only difference between this group and the previous one is grazing state. As a result of overgrazing this group is lacking in any type of structure so is unlikely to attract many invertebrate or bird species.



Improved grassland (overgrazed): very short vegetation and frequent patches of bare ground and dung



This analysis has shown that the vegetation in a sub-set of Iveragh hill sheep farms falls into six groups based primarily on habitat and grazing management. They appear to follow a scale, running from undergrazed scrub, blanket bog and heath to quite sustainably grazed mixed grassland, ending in highly overgrazed improved grassland which is generally of little conservation value. The most sustainably grazed group in the middle of the scale (mixed grassland) displays the greatest species richness, but also demonstrates a structural mosaic of short swards to encourage seeds germination and tall swards to provide early spring cover for birds and other wildlife.

Environmental data

Habitats tend to be related to altitude, as we found, as well as soil depth. For example we see heath with soil depths of between 5 and 35cm (montane heath on mountain tops and wet and dry heath on the steeper slopes). Shallower soils (often < 2cm) see the presence of dry-humid acid grassland and improved grassland in the lowlands. Deep peaty soils of 30-150cm or more support blanket bogs and are found on flatter, waterlogged ground generally around the mid to lower altitudes. Soil pH falls as soil depth increases and can run from 4.2 (blanket bog) to 6.7 (improved grassland). Nitrogen content follows a trend in the opposite direction from 2 mg/g (improved grassland) to 26 mg/g (blanket bog). Soil pH and nitrogen content were highly correlated with vegetation groups classified by TWINSPAN as well as habitat, however they did not correlate with actual grazing state (overgrazed, undergrazed or sustainably grazed), which suggests that our groups are based more on habitat characteristics than grazing regime.

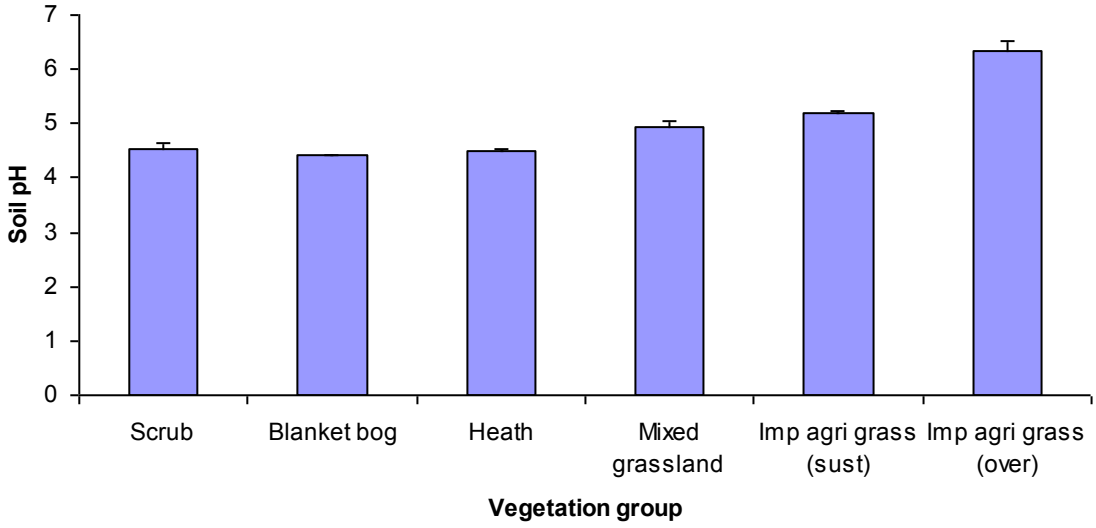
We see that shrub, moss and lichen cover is greatest on undergrazed sites, and bare ground is highest on overgrazed sites, as expected, due to poaching. Litter levels are also by far the highest on undergrazed sites and indications of grazing (bitten leaves) were highest in overgrazed areas. We tend to see more grasses and herbs on the sustainably grazed sites. Shrub biomass was greatest on undergrazed sites and lowest on overgrazed, with gorse rarely detected out with undergrazed sites. Even on the most overgrazed sites blanket bog comprised the greatest biomass, suggesting sheep avoid grazing bogs.

These findings are supported by the vegetation height data. Undergrazed farms display significantly greater vegetation heights than any other grazing regime. Any taller vegetation on overgrazed, poorly drained sites is generally rushes. Soft rush is the most widespread and is often hard to remove. It can also spread rapidly and remain viable in soil for more than twenty years. It may also reduce local diversity through shading. However it is not all bad, breeding waders such as the snipe (*Gallinago gallinago*) use it for nesting and the Irish hare for cover. Research has shown that cutting the rushes as close to the ground as possible in late July and autumn reduced their cover by 80%. Grazing by sheep has little affect, however, high stocking levels of goats can eliminate rushes in grassland, although this is dependent upon low inter-tussock pasture heights (Merchant, 1993). Cutting twice a year may also reduce bracken cover although this is more site specific (Cox *et al*., 2008).

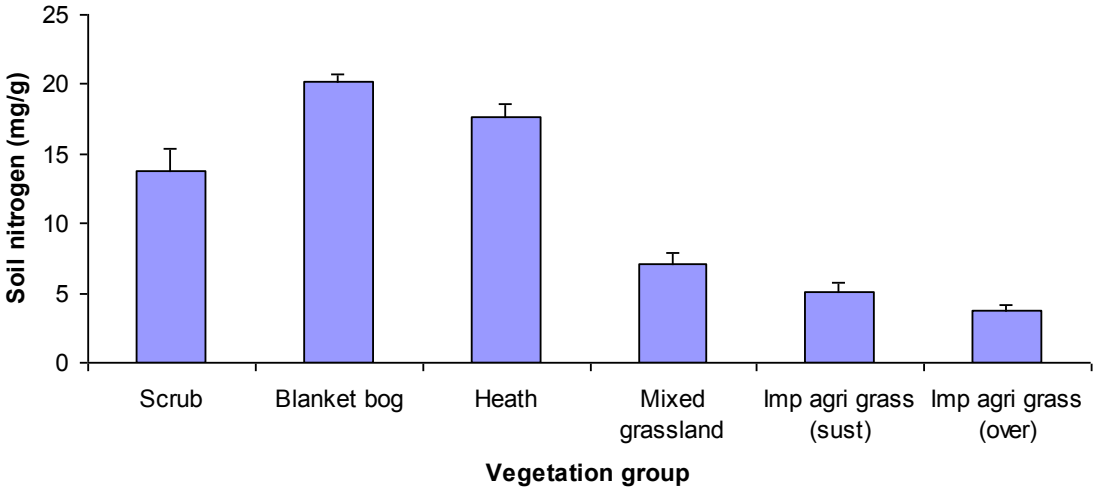
As we ascend a mountain several changes become apparent. The height of the vegetation decreases, as does the soil pH. This is probably due to a combination of nutrients leaching on steep ground, lower grazing levels, less nitrogen from sheep urine and the presence of acid-



producing plants. Grazing intensity decreases as altitude increases and plant species richness and diversity fall as the number of forb and grass species decline. This, however, could be a result of habitat and environmental changes rather than a reduction in grazing pressure. Undergrazed sites are flatter, less firm and poorly drained in comparison to other states. This would make it hard for sheep to graze. Accessibility is another factor involved in undergrazing. We also see a correlation between soil depth and soil nitrogen content and soil pH and soil nitrogen content.



TWINSPAN groups: soil pH is highest on overgrazed improved agricultural grassland. Source: BioUp – Anderson (2010)

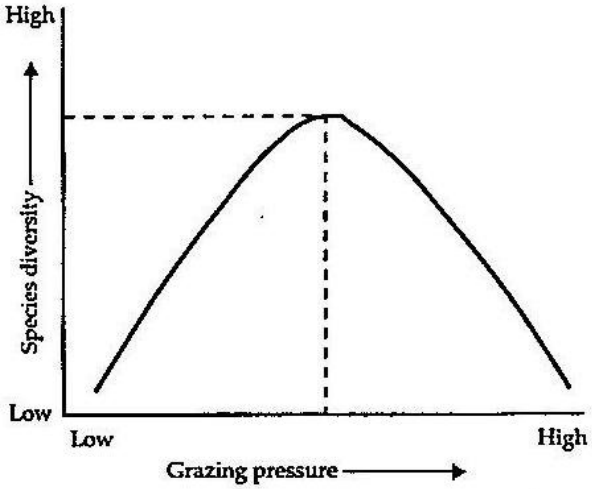


TWINSPAN groups: soil nitrogen content is highest in blanket bog. Source: BioUp – Anderson (2010)



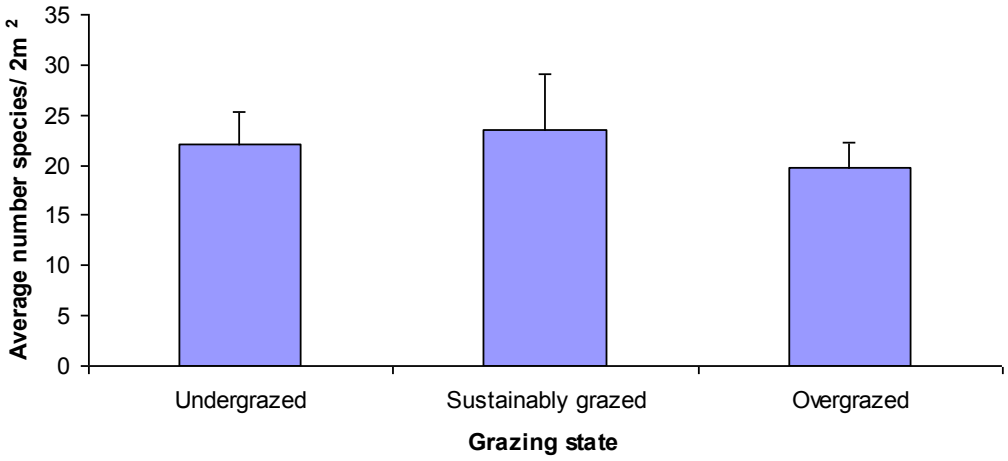
Plant diversity

We know that from previous studies the relationship between species diversity and level of disturbance in heterogeneous groups of plant communities assumes a broadly unimodal or 'hump-back' form, with an intermediate level of grazing giving rise to the highest plant diversity (Grime, 1973; Grime, 1979; Tilman, 1982). This opposed the older idea that diversity is highest in undisturbed ecosystems.



Relationship between grazing pressure by sheep and plant species diversity (Grime, 1979)

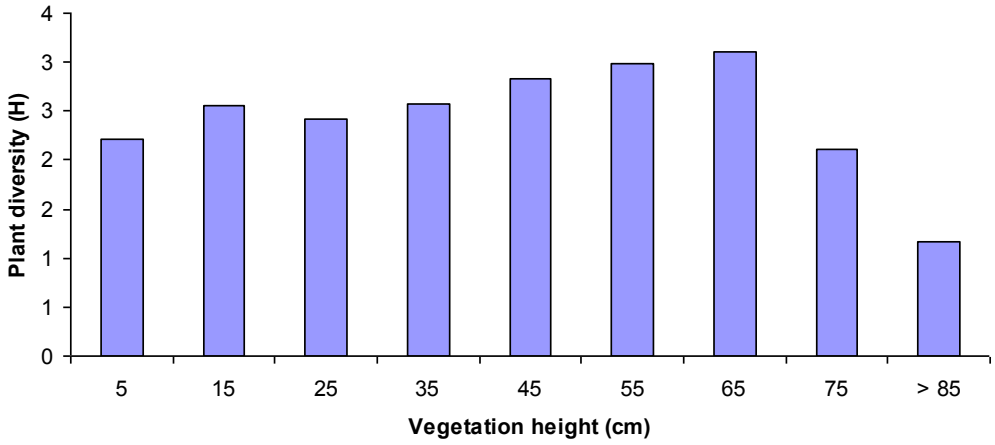
On the Iveragh we find a similar trend although the 'hump-back' relationship is less steep. This is probably as a result of the Iveragh farms fitting into the middle section of the 'hump-back', neither being completely undergrazed nor completely overgrazed.



The average number of species may also be used to indicate plant diversity. Source: BioUp – Anderson (2010)

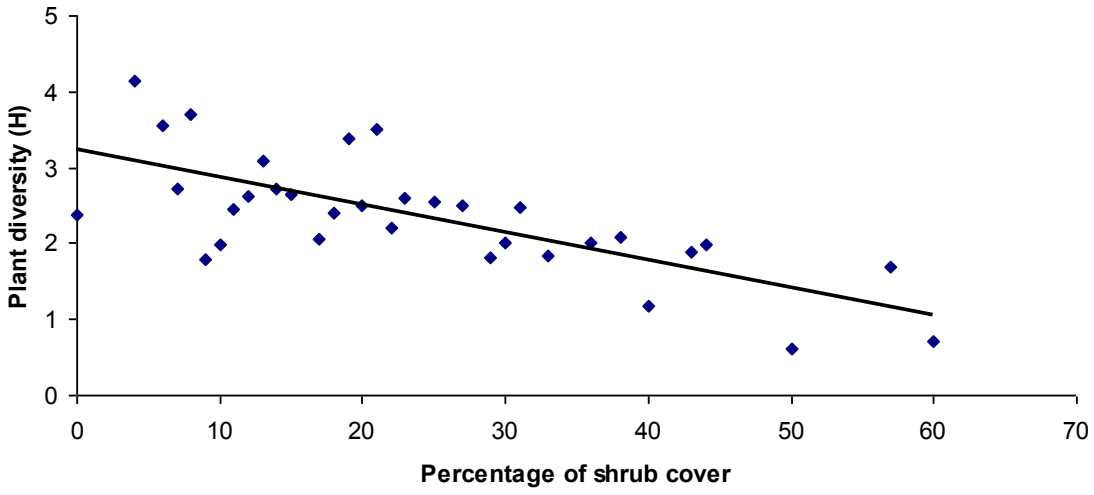


We found that plant diversity and species richness are highly correlated with habitat and TWIN-SPAN vegetation groups and almost correlated with grazing state. A south facing aspect gave rise to the greatest plant diversity. We also found a reduction in diversity in both very short and very tall vegetation.



A vegetation height of 55-65cm gives rise to the highest plant diversity. Source: BioUp – Anderson (2010)

An intermediate level of litter also resulted in the highest plant diversity. In addition we found that the higher the percentage of shrubs on a site, the lower the plant diversity.

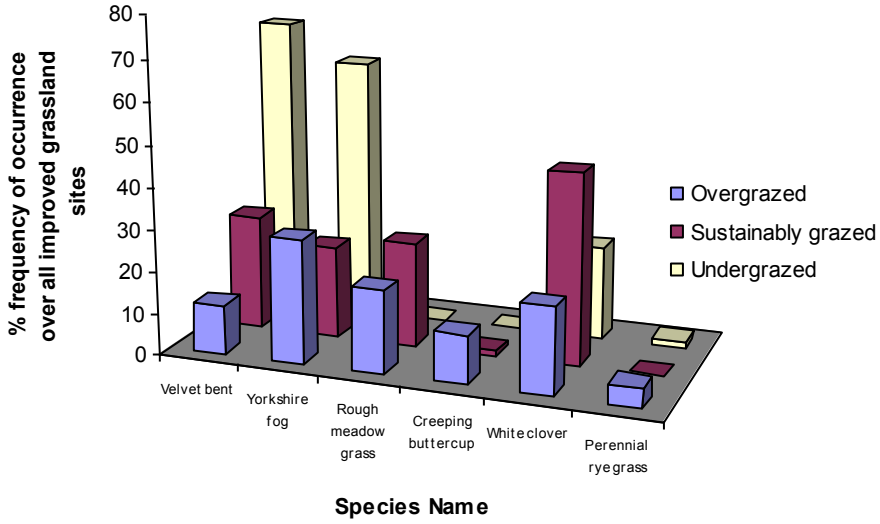


Lower shrub cover promotes higher plant diversity. Source: BioUp – Anderson (2010)



Individual plant species

We may also look at the influence of grazing management on individual species. The average percentage cover of the most common species found in improved grassland, dry-humid acid grassland, lowland blanket bog and heath are shown below for three levels of grazing pressure.



Six common species of improved agricultural grassland on Iveragh. Source: BioUp – Anderson (2010)

High levels of grazing reduce the occurrence of certain species, even in species-poor improved grassland. Overgrazed sites contain a high percentage of perennial rye grass and creeping buttercup, although *Poa trivialis* (Rough Meadow-grass) also occurs frequently. White clover appears to flourish under sustainably grazed conditions while *Agrostis canina* (Velvet Bent) and Yorkshire fog dominate under low grazing pressure.

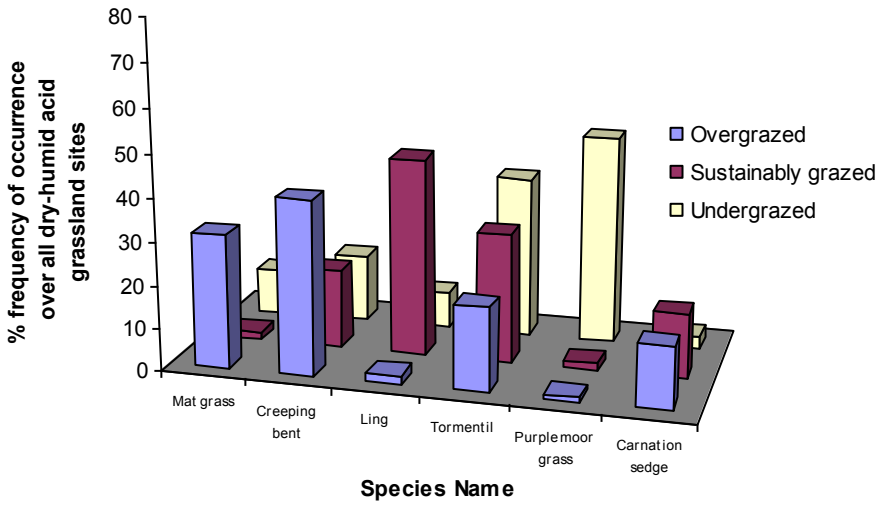


White clover (*Trifolium repens*) and Creeping buttercup (*Ranunculus repens*)





Yorkshire fog (*Holcus lanatus*)



Six common species of dry-humid acid grassland on Iveragh. Source: BioUp – Anderson (2010)

In the semi-natural dry-humid acid grassland the grasses creeping bent and mat grass dominate. The tussock forming perennial mat grass, in particular, often dominates overgrazed upland areas as it becomes hard and fibrous as the growing season progresses and therefore quite



unpalatable to livestock. Another tough species is purple moor-grass, suppressed under grazing but will quickly dominate once this pressure is removed (Hill *et al*., 1992). The forb tormentil follows a similar trend, although it appears to withstand higher grazing levels.

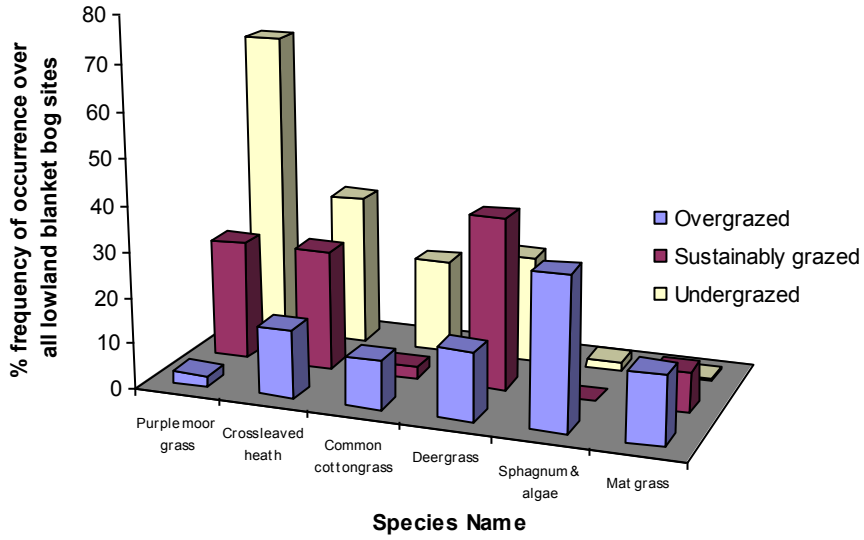


Mat grass (*Nardus stricta*) dominating an overgrazed, poached area



Tormentil (*Potentilla erecta*) by Isabelle Kozlik





Six common species of lowland blanket bog on Iveragh. Source: BioUp – Anderson (2010)

In lowland blanket bog again we find the grasses purple moor-grass and mat grass in abundance at opposite ends of the scale. *Zygogonium ericetorum* (collection of mosses and algae) increase in highly grazed sites which have lost their *Sphagnum* cover (Fossitt, 2000), while the sedge, common cottongrass, decreases substantially on sustainably grazed sites. Perhaps it may be outcompeted by species such as deergrass.

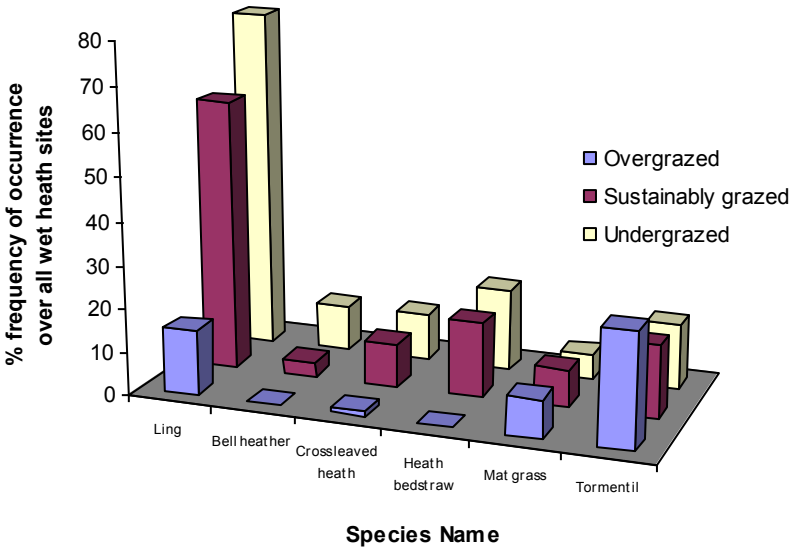


Common cottongrass (*Eriophorum angustifolium*) by Isabelle Kozlik





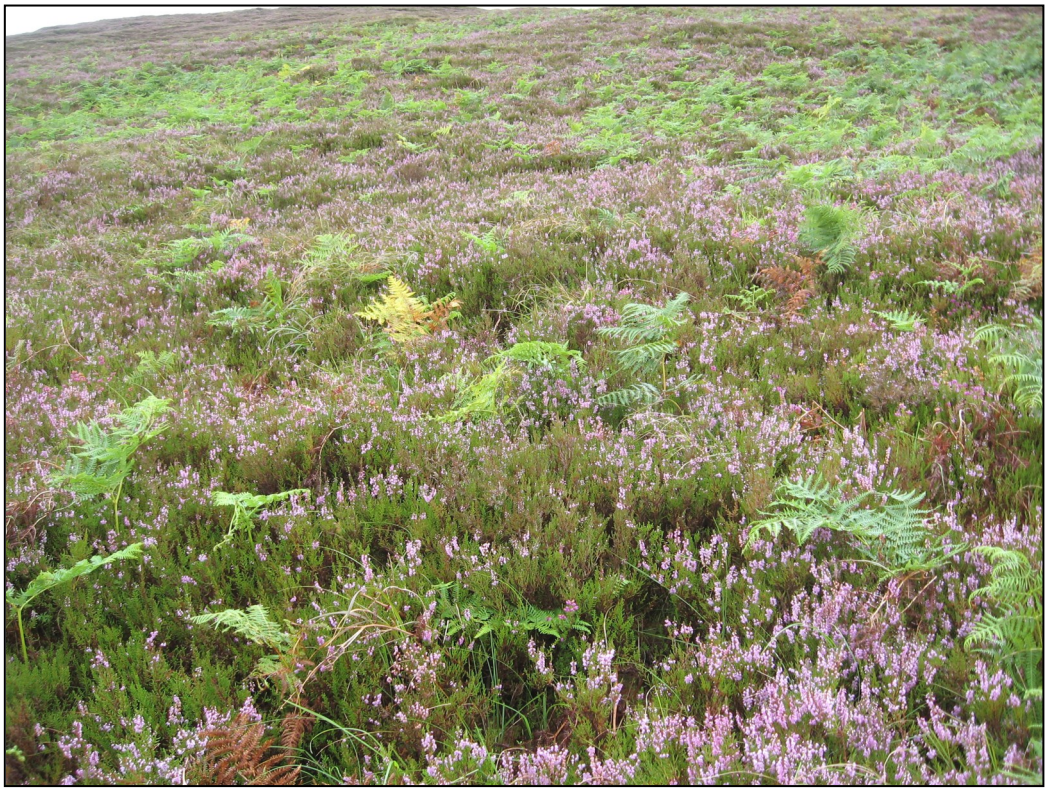
Purple moor grass (*Molinia caerulea*) dominating a site with little grazing



Six common species of heath on Iveragh. Source: BioUp – Anderson (2010)

In undergrazed and sustainably grazed wet heath we see that grass species are replaced by heathers. By far the most common being ling, followed by cross-leaved heath and bell heather, which is a species of drier habitats.









Left: Bell heather (*Erica cinerea*) and right: Cross-leaved heath (*Erica tetralix*) by Isabelle Kozlik and top: Ling (*Calluna vulgaris*)



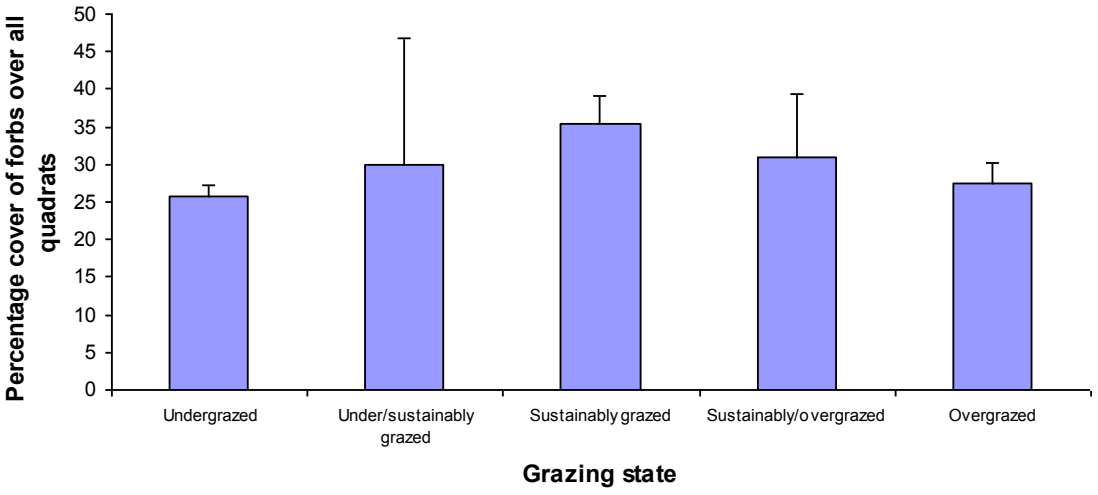
Vegetation cover—plant functional groups

As we can see by this table grazing management also has an affect on vegetation cover. Grasses, forbs, shrubs, sedges, rushes and mosses make up the majority of the vegetation present on the study sites. The remaining 2-7% (not shown here) in each grazing category consists of lichens, ferns and trees.

Grazing state	Grasses	Forbs	Shrubs	Sedges	Rushes	Mosses
Undergrazed	22.9 ± 1.2	25.6 ± 1.6	20.0 ± 1.4	10.0 ± 0.8	8.4± 0.8	**5.9 ± 0.7**
Under/Sustainably grazed	17.5 ± 1.3	29.9 ± 16.7	25.2 ± 8.5	15.0 ± 7.6	7.9 ± 1.4	**2.8 ± 2.8**
Sustainably grazed	34.1 ± 1.7	35.3 ± 3.9	9.7 ± 2.3	8.0 ± 1.6	9.6 ± 1.6	**1.3 ± 0.6**
Sustainably/Overgrazed	28.2 ± 4.5	30.9 ± 8.4	11.5 ± 5.2	10.3 ± 2.6	14.0 ± 2.5	**0**
Overgrazed	**32.9 ± 2.5**	**27.5 ± 2.8**	**10.0 ± 2.2**	**11.6 ± 0.9**	**11.5 ± 1.6**	**3.9 ± 1.2**

Percentage cover of functional vegetation groups within grazing states. Source: BioUp – Anderson (2010)

Overgrazed areas exhibit increased grass and rush cover, with a high percentage of mosses. On undergrazed sites shrubs dominate at the expense of wild flowers (forbs). They also contain a high percentage of mosses but this is most likely to be *Sphagnum* species, whereas feathered mosses tend to dominate the overgrazed areas. Sedges appear to favour the border sustainably grazed/undergrazed sites. Sustainably grazed sites seem to be subject to the highest cover of grass species., the lowest cover of shrubs as well as the highest percentage cover of forbs.



Wild flower (forb) cover is greatest on sustainably grazed sites. Source: BioUp – Anderson (2010)









Examples of bog forbs: the insectivorous round-leaved sundew (*Drosera rotundifolia* on left, digesting an unfortunate mayfly caught on the sticky hairs) by Jesús Fernández, common butterwort (*Pinguicula vulgaris*, centre) and the parasitic lousewort (*Pedicularis sylvatica*, right)







The uncommon oblong-leaved sundew (*Drosera intermedia*, centre) was also recorded, as well as the scarce great Sundew (*Drosera anglica*, right). See round-leaved sundew surrounded by *Sphagnum capillifolium* (left) for comparison by Isabelle Kozlik

Invertebrates

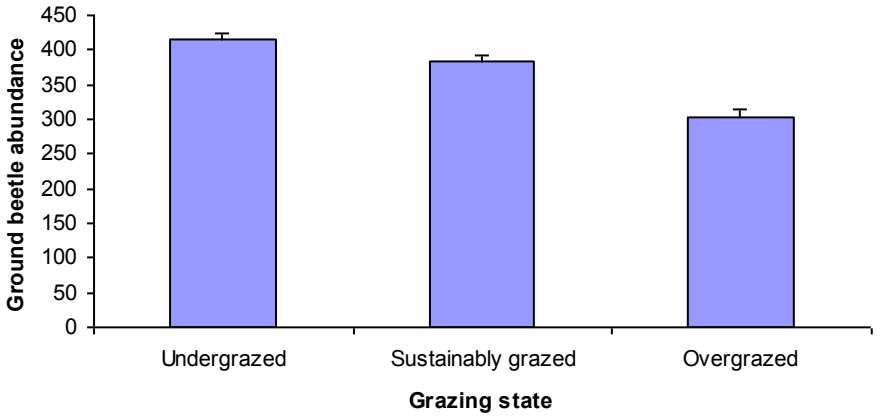
Invertebrates are animals which do not possess a backbone, such as insects. They make up 95% of the world's animal species and collectively constitute the largest group of species of any taxa in the uplands and are therefore critical to upland food webs. Studies have found species richness and abundance increase with an increase in plant species richness and greater structural heterogeneity in the vegetation (Dennis *et al*., 1998; 2003).

Ground beetles are particularly good indicators of grazing management and require a mosaic of vegetation structure and botanical composition. The diets of many upland birds also predominantly consist of ground beetles. Beetle species richness on the Iveragh was found to be substantially reduced on the most uniformly heavily grazed sites. Variation in burning, cutting and grazing of heather provides the ideal habitat for ground beetles.

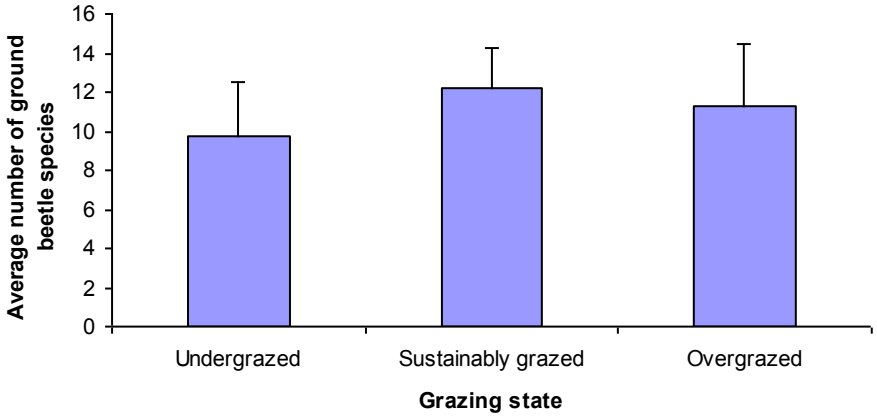


Studies have shown that height of ling and soil organic content has the greatest influence on ground beetle distribution (Gardner *et al*., 1997). Dennis *et al*. (2004) found that an increase in sward height had a more positive effect on ground beetle diversity than a reduction in stocking rate. A mosaic containing patches of short intensively grazed and tall swards which haven't been grazed for many years, perhaps containing rank grass, would provide the optimum conditions for grassland invertebrates.

This study involved the setting of 576 pitfall traps in the core twelve Iveragh study farms, and the subsequent collection of all ground beetles. 40 species were recorded in total. Looking at the data from July 2007 (2484 individuals) we see that undergrazed sites attract more individual beetles, however sustainably grazed sites exhibit a higher number of beetle species.



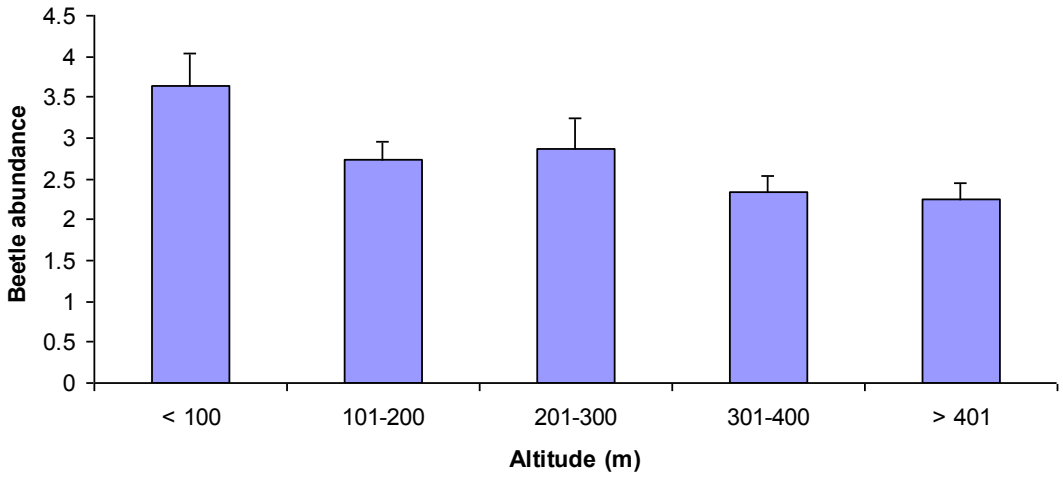
Numbers of individual ground beetles peak on undergrazed Iveragh sites. Source: BioUp – Anderson (2010)



Number of ground beetle species are highest on sustainably grazed Iveragh sites. Source: BioUp – Anderson (2010)



We then had a look at altitude as it has already been shown to have a significant effect on plant distribution. We find a general decrease in beetle numbers with an increase in altitude. There are large numbers of a few species in the uplands but the majority of species appear to be concentrated at the low to mid altitudes.



Number of ground beetles are highest in the lowlands (below 100m). Source: BioUp – Anderson (2010)





Carabus glabratus (left) and *Carabus clatratus* (right) are two ground beetle species typical of the uplands



Birds

As birds are found high up in the food chain, their presence may well indicate the state of an ecosystem. The absence of certain species which should be there may suggest that something is wrong with the local environment.

The majority of agricultural bird studies are focused on the lowlands (Marriott *et al*., 2004; Fuller and Gough, 1999). However there is evidence of a link between a high level of grazing pressure and a decline in bird populations. In a study by Thompson *et al*. (1995) on moorland birds, forty percent were found to be in decline with regards to their distribution, five of those species were thought to have been affected by grazing pressure.

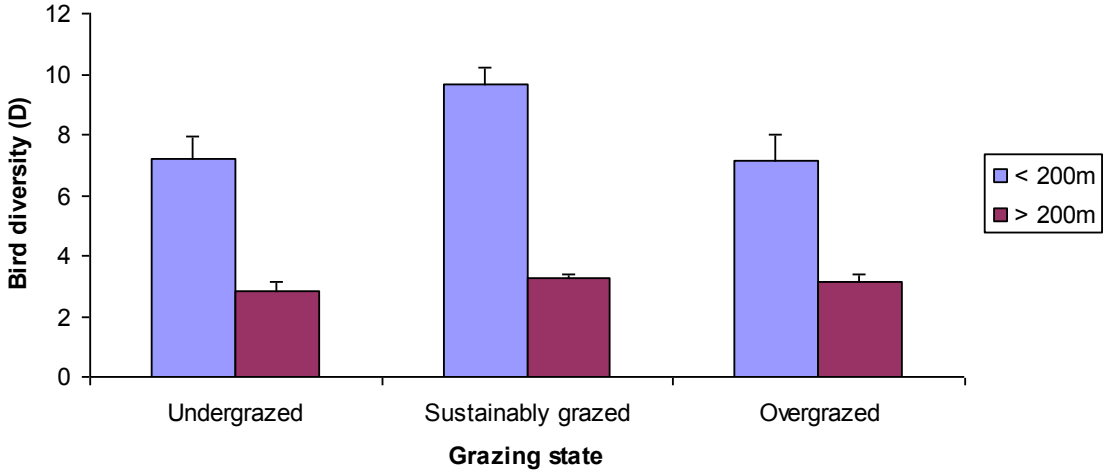
Some studies have found that a reduced level of grazing pressure doubles upland invertebrate biomass, and greatly increasing meadow pipit breeding success (Dennis, 2005; Fuller, 1996; Thompson *et al*., 1988). A structurally and compositionally heterogeneous habitat would provide short swards or bare ground for birds which feed on soil invertebrates and patches of taller vegetation for those which feed on foliar invertebrates or seeds. This would also offer high quality habitat for nesting and protection from predators.

Birds were surveyed on 21 study farms on the Iveragh during the breeding seasons of 2007 and 2008. Commencing an hour after dawn, all bird species observed and/or heard and their estimated distance to the observer were recorded. Five 200m transects (strips of ground surveyed along a gradient such as altitude or habitat) in the uplands and five in the lowlands were covered per farm. Each farm was surveyed twice, the first to record resident birds and the second to incorporate migrant species later in the year. A total of 60 species were recorded over 210 transects. The maximum count of each species (from first and second surveys) per transect was used in the analysis.

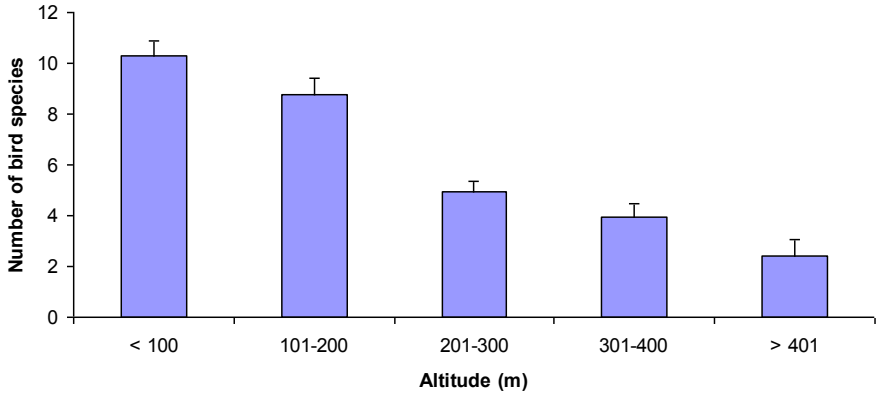
Grazing intensity and altitude

Interestingly in the Iveragh study we find the highest levels of bird diversity in areas subject to a moderate level of grazing. We also note that, as expected, overall the lowlands (<200m) contain a higher diversity of birds than the uplands (>200m). These findings are also mirrored in species richness and bird density. What is it about these sustainably grazed areas which attract more bird species? Could structural landscape features such as increased hedgerow length or a higher number of ditches or stone walls also play a significant role?





Bird diversity reaches its peak with an intermediate level of grazing, although this is only clear in the lowlands (< 200m) where overall bird diversity is greater than in the uplands (> 200m). Source: BioUp – Anderson (2010)



The number of bird species, as with beetle abundance, also falls with an increase in altitude. Source: BioUp – Anderson (2010)

Individual species

Looking at BioUp's three most common bird species we see that meadow pipits and skylarks go against the grain and are found at higher densities in the uplands than the lowlands. They are also found in highest densities on sustainably grazed sites. Wrens are found in similar densities in the uplands and lowlands, however they show a preference for undergrazed sites as they require good scrub cover.





Skylark density is greatest in the uplands and on sites adopting an intermediate level of grazing. Source: BioUp – Anderson (2010)



Wren density is similar in the uplands and lowlands but they generally prefer undergrazed sites. Source: BioUp – Anderson (2010)



Meadow pipit density is greatest in the uplands and, like skylarks, under an intermediate level of grazing. Source: BioUp – Anderson (2010)



Diet





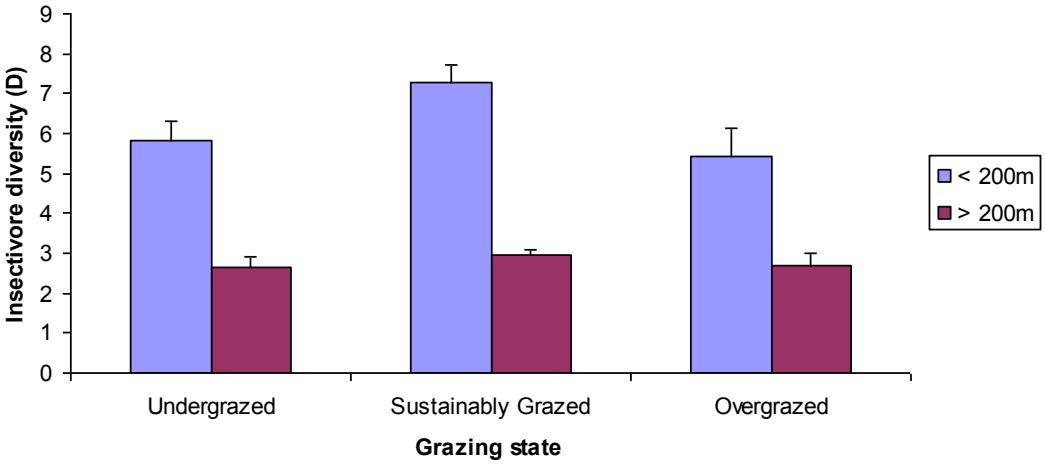




Chaffinch (*Fringilla coelebs*) feeding on seeds in dung by Isabelle Kozlik, ravens (*Corvus corax*) need short grass to find invertebrate prey, the willow warbler (*Phylloscopus trochilus*), by Isabelle Kozlik, uses scrub cover for protection from predators and birds such as the meadow pipit (*Anthus pratensis*), by Isabelle Kozlik, use posts to perch on and feed

As insectivores (insect-eating birds) make up over 60% of all the bird species recorded in the BioUp surveys I will focus on them. We see that they follow the same trend as the total bird species data, with higher diversity in the lowlands than the uplands and higher diversity in sustainably grazed sites. Granivores (birds which eat seeds and grains) make up the next highest group at almost 18%, with omnivores, scavengers, predators, frugivores and herbivores present in much lower numbers. Something which is interesting is that we don't see many granivores in the uplands but there is a much greater diversity on sustainably grazed sites in comparison to overgrazed or undergrazed.





The most common functional group of birds, the insectivores, follow the same trend as total bird diversity on Iveragh. Source: BioUp – Anderson (2010)

Linking ecological and socio-economic data

Results from our study farms show that sheep on sustainably grazed farms are grazed in the uplands for longer periods of time but at lower stocking densities than sheep on overgrazed or undergrazed farms. They also don't receive as much supplementary feeding as sheep on overgrazed or undergrazed farms. We found that overgrazed farms receive the highest Single Farm Payments per hectare, however, the direct costs of running the farm per hectare are also greater. Overgrazed farms receive similar levels of agri-environmental payments (REPS) to sustainably grazed farms, with undergrazed receiving significantly less. Farms with a higher percentage of grassland cover and low scrub cover (overgrazed) also tend to have the highest stocking densities. Vegetation height and percentage of litter also appear to be good indicators of stocking density.

We found a higher percentage of traditional ewes on sustainably grazed farms and plant diversity significantly increases as traditional ewe breed numbers rise. This supports other studies which have shown that a shift towards more traditional breeds of sheep and cattle produce greater overall plant diversity. This is because traditional breeds tend to be more general in their grazing, ranging further afield, resulting in the creation of highly heterogeneous habitat mosaics.

Bird diversity, however, actually falls slightly as the percentage of traditional ewes increases. Perhaps the high bird diversity which we see at the local (transect) scale on sustainably grazed farms does not equate to high diversity at the farm scale, or the trends may simply be too weak to enable any conclusions to be drawn. The number of grazing ewes does however have a significant effect on bird diversity which peaks on sustainably grazed sites. Although we found no significant differences in stocking rates between grazing states we did observe a trend with both bird and plant diversity increasing as stocking rates of sheep and cattle increased. This trend did not however fit the expected 'hump-back' model, most likely as a result of the stocking rates of



the 21 study farms (from which the ecological data was gathered) remaining below the suggested 1.5 ewes/ha (Critchley *et al*., 2007).

Further analysis identified 'the number of lambs weaned per ewe mated' and 'cattle stocking rate on the whole farm (LU/ha)' as important factors in explaining our data. Interestingly, in a study by Teagasc, 'lambs weaned per ewe' was also shown, along with 'stocking rate' and 'lamb prices', to be an important source of variation in profit margins (Connolly *et al*., 2008). As the number of lambs weaned per ewe and cattle stocking rates increased, so too did bird diversity while plant and habitat diversity decreased. These results may be explained by the fact that cattle are generally grazed in the lowlands, allowing the uplands of these farms to become undergrazed. High levels of rank vegetation will lead to lower plant diversity. The cattle may be providing extra dung, full of invertebrates, for insectivorous birds. The general way in which cattle feed will also create a vegetation structure more favourable to birds. It appears that species such as birds which are highly mobile will be affected to a lesser extent by localised grazing than plants for example. This also highlights the importance of choosing an appropriate scale at which to analyse the data (landscape, farm, habitat or local, e.g. quadrat).

Conclusions—Grazing & the Ecology of the Uplands

When separating the BioUp ecological data into three general grazing types we saw that the majority of our sites were classified as undergrazed, reflecting the state of the uplands at present all over Europe. Sustainably grazed sites were most difficult to quantify. They may be based on factors such as habitat, plant, beetle or bird diversity, productivity or maybe vegetation structure and level of heterogeneity. They are extremely hard to classify and to complicate matters further there are the added problems of scale and site specificity. TWINSPAN sorted the data into six groups, which were almost separated exclusively into different habitats, with the exception of two (overgrazed and sustainably grazed improved grassland) based on management regime. This suggests that the influences of habitat are so great that in order to achieve the most representative comparisons between management regimes, classifications and ordinations should be restricted to the same habitat categories. That is, analyse all grassland quadrats together and separately to heath or blanket bog.

The DCA (Detrended Correspondence Analysis) showed us that soil pH and nitrogen content, along with grazing pressure could account for the distribution of species and groups of quadrats along one axis, while altitude and vegetation height explained the other. These could potentially be used to give an indication of the plant species expected to be found in an area as well as the state of the land. We also found that as soil depth increased, pH decreased.

Some habitats and species are more susceptible to change than others and grazing certainly affects both bird and plant diversity but it is not as clear cut as one might think with factors such as altitude and soil nutrient levels playing a significant role. We saw that plant diversity and composition increased with an intermediate level of grazing, regardless of the habitat, and undergrazing appears to be as detrimental to plant diversity as overgrazing. An intermediate percentage of litter, shrubs and vegetation height also attracted the highest plant diversity. In the present study an intermediate sward height presented the highest diversity of plants. Habitat, however, generally plays a crucial role, especially when management differences are not very pronounced.





Bog asphodel (*Narthecium ossifragum*) by Isabelle Kozlik

Ground beetle abundance was greater on undergrazed sites, however beetle species richness peaked on sustainably grazed sites. We also saw a sharp decline in beetle abundance with an increase in altitude. Bird diversity also decreased with an increase in altitude. Overall bird diversity, species richness and density were greatest on sustainably grazed sites. With insectivores showing an identical trend. We also had a look at the top three most abundant bird species recorded and found that meadow pipits and skylarks are found mainly in the uplands, with the majority on sustainably grazed farms.

It is unlikely that any one management type will provide everything required for all species. Overgrazed areas present optimum conditions for dung feeders while undergrazed areas will attract decomposers of dead plant material (Newman, 2000) as well as species requiring cover from predators. It is just a matter of deciding which management is best suited to which site and whether optimum diversity, productivity, conservation of key indicator species or functional groups is the ultimate goal. We have to decide if high species diversity or high productivity is required as some studies have shown that the addition of fertilisers increases productivity but reduces diversity, with the exception of a few new weed species (Newman, 2000). The general consensus is that a mosaic of different habitats under varying levels of management will provide enough variation to attract as many different species and functional groups as possible. This is why a high level of diversity is preferable.



Heavy grazing by sheep on peat leads to a reduction in heather cover and an increase in mat grass. Grassland dominated by mat grass is regarded as having no conservation value, whereas heather communities have international conservation significance and even if they don't support a huge number of plant species, they will still provide ideal habitat for many bird species, such as grouse. Some studies have shown that low sheep numbers will help increase degraded dwarf shrub cover in moorland, although this will be accompanied by an increase in invasive grasses such as purple moor-grass. A study using Kerry cattle to graze purple moor-grass on blanket bog within Killarney National Park showed a vast reduction in cover of the grass but little effect on the frequency of occurrence (Dunne and Doyle, 1998). With very low stocking rates the area may then experience the problem of rank and woody heather, with seedlings unable to germinate unless a managed burning regime is adopted.

Overstocking during wet periods or in winter will cause the vulnerable sward to break up. Habitat-specific stocking rates such as 0.4 LSU/ha for acid grasslands would be useful (Gotts and MacKintosh, 1996). Timing of grazing is also very important. Early spring grazing is ideal for controlling coarse grasses such as mat grass which are unpalatable later in the year. Low stocking densities are particularly important in late spring to avoid trampling the eggs of ground nesting birds and reducing grazing on flowering plants. Reduced summer grazing is also beneficial to allow plants to flower and set seed. Autumn grazing will keep the sward short without affecting seed production.

Dunford and Feehan (2001) found that the ideal grazing regime for cattle in the Burren is winter grazing with, in some cases, additional light summer grazing. Although this should be site specific as winter only grazing is inappropriate in areas where purple moor-grass occurs, so management should be altered accordingly by increasing summer grazing. Historically upland grazing on the Iveragh (mixed cattle and sheep), during the winter was commonplace. However upland grazing systems between the 16th and 19th Centuries went through substantial changes and saw a reduction in cattle numbers, the disappearance of wethers (castrated rams) and an increase in breeding ewes to produce store lambs (Fenton, 1937; Roberts, 1959; King, 1962 – see Grant *et al*, 1996). Prior to this time wethers were regularly overwintered on the hill. In late winter and early spring they grazed voraciously on mat grass and *Juncus squarrousus* (heath rush), keeping them in check and allowing other plant species to flourish. Since 1900 the only grazing on the hills between October and April tends to be stray ewes.

REPS 4 recognises the importance of preventing undergrazing and controlling scrub encroachment, although burning should be avoided between 1st March and 31st August as well as burning on shallow soils to limit erosion. Grazing should not exceed one LU/ha,, although this should be site-specific and supplementary feeding should be confined to those areas where it has taken place in the past to limit poaching and dunging enrichment and should be completely avoided on steep slopes or peaty soils if possible. Adequate vegetation provides essential stability through the roots on scree so grazing and most importantly trampling must be carefully monitored on the higher slopes, as well as sheltered areas which will naturally attract heavier grazing. REPS 4 talks about providing payment for using traditional breeds or mixed grazing with cattle to maintain a habitat but not on commonage. Examples of traditional sheep breeds are the Scottish Blackface or Galway ewe and the term 'well grazed' is used rather than 'sustainably grazed'. Bogs should not be drained, ploughed or reseeded and turf cutting is only permitted on existing banks and for own use.



Reducing sheep numbers will improve individual lamb performance and ewe weaning weight which increases farm profitability in the short term. However, the gradual abandonment of the uplands, increasing rank heather and concentrating sheep grazing on areas of fine leaved grasses, will reduce animal performance and financial return in the long term.

Ideas and recommendations

A possible solution to the issues outlined in this study may involve first classifing the site using MacDonald *et al's* (1998) grazing impact criteria. A **flowchart** may then be constructed to identify the best grazing management scenario per site. The optimal balance between ecological and socio-economic factors should be achieved. Examples of flowchart information could be:

1. Identify habitat type
2. Management regime over past 10-20 years (e.g. grazing/burning)
3. Condition of surrounding habitats/fields
4. Wetness of ground (drier habitats can tolerate higher grazing/trampling levels)
5. Time of year and frequency of sheep grazing
6. Score the level of threat of scrub encroachment (Parr *et al*., 2009) along with threat of poaching at the opposite end of the scale
7. Number of sheep/stocking rate (LU/ha)
8. Altitude, soil type and nutrients

Plant species composition

Regular monitoring will then insure that the management regime is working.

Research into peat bogs and carbon sequestration has shown that one sixth of Ireland is covered in peat bog. Globally peat is estimated to store twice as much carbon as forests and is therefore a vital carbon sink, if left undamaged. Conserving the bogs may actually help limit climate change. Perhaps this may be the way forward. Bog is not as prone to scrub encroachment as many drier habitats such as acid grassland but if allowed to dry out, for example, through drainage then scrub invasion could easily become a problem and therefore grazing would be essential in order to keep the gorse or bracken at bay. However, if the bog was prevented from drying out through payments to landowners to concentrate sheep grazing on the drier areas more at risk of scrub encroachment, this would simultaneously help to keep the world's carbon stores intact, thereby limiting climate change.

So, as we can see grazing management is extremely complex. The important thing to remember is that management should be *reactive* and a monitoring system to record vegetation change should be implemented on a site by site basis in order to achieve the most accurate management regime possible (Hulme *et al*., 2002). In this way complex ecosystems such as those of the Iveragh uplands may be conserved and enjoyed and the people who live on and work the land will be able to do so for many generations to come.





Scottish Blackface ewe and lamb

8. The future

Tourism

O'Rourke (2009: 9) describes the Iveragh peninsula as being a typical example of the European dilemma of what to do with so-called 'post-productivist' rural areas that cannot compete with unfettered globalised markets. In theory, farmers on Iveragh are in an ideal position to thrive under the newly emerging agricultural model, with its emphasis on public good provision related to countryside management, environmental services, biodiversity conservation, recreation and quality food production.

With an estimated 1.8 million visitors each year, South Kerry is one of the prime tourist destinations in the country. According to a 2004 survey by the tourism steering group of Kerry County Development Board, the scenery is the area's main attraction. This was confirmed by the vast majority (84.7%) of farmers visited for the present survey who reported that their land was at least occasionally used by walkers for recreational purposes, a direct indication of the area's popularity. When asked why they thought people came to visit their land, most farmers stated that it was to see and enjoy the scenery. Few respondents cited flora and fauna as attractions.



The Kerry Way is Ireland's oldest long-distance walk way

All of the farmers that reported use of their land by walkers had a favourable attitude towards tourists and welcomed seeing them. The remaining 15.3% expressed concerns about people using their land, yet very few were hostile. In most cases, concerns pertained to accident liability, fear that gates would be left open and fences knocked down or that sheep flocks could be frightened. Some respondents were irritated by the perceived bad manners of visitors many of whom were described as arrogant and lacking courteousness.



While visitors were thus a common phenomenon on most farms, only 18.1% of respondents felt that they benefited from tourism in the area. It was commonly felt that it is the large tour operators and hoteliers in urban centres, like Killarney, that profited most. Dunford (2001) who reports similar findings for the Burren area describes this as an alarmingly low figure, particularly in the context of the high usage levels of farmland by tourists, and [it] indicates a very unequal relationship between farming and tourism in the area. It confirms that farmers are not among the prime beneficiaries from tourism, in spite of being the primary 'product' providers, and a big part of the overall attraction in their own right.'



Many tourist attractions, like this ancient hut in the Bridia Valley, are located on farmland and taken care of by farmers

The above is largely confirmed by the findings of County Kerry Tourism Research (Kerry County Development Board, 2004), according to which 49% of tourists stayed in hotels, 23% in guesthouses and only 1% opted for farmhouse accommodation.

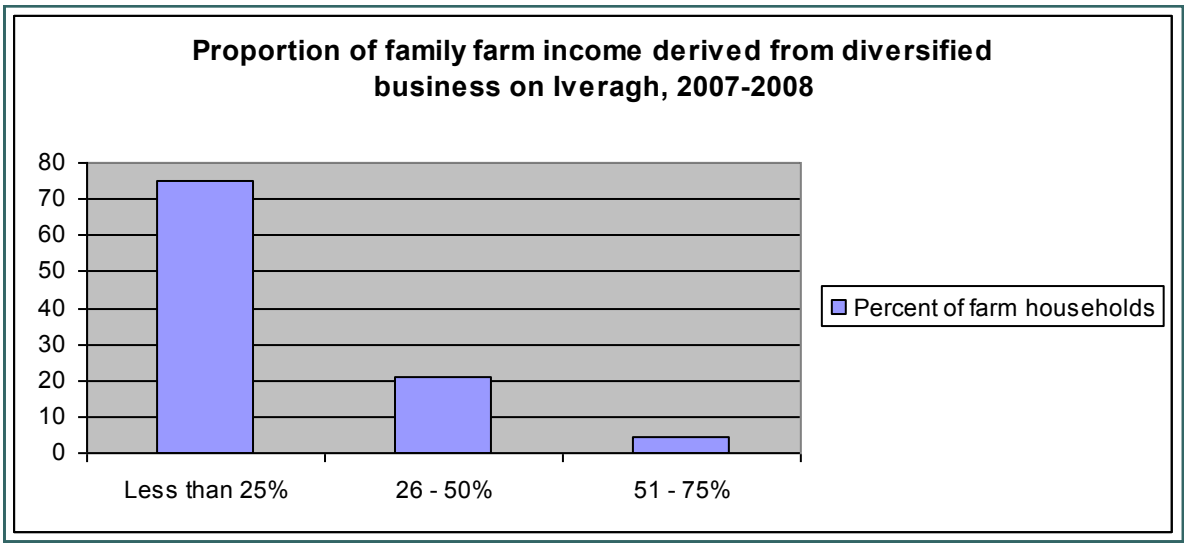
Kerry hoteliers, O'Rourke (2009: 10) notes, have benefited from a series of lucrative Government tax breaks over recent years, while the rural Bed & Breakfast business is in decline nationwide. 'Tourism experts insist that not only do farmers need to market themselves better, and make more use of the internet, but they also need some form of added value, the latest buzz word being 'bundling'. In other words, along with accommodation, proprietors of rural Bed & Breakfast establishments must offer additional services such as activity holidays (guided walks, fishing, canoeing, climbing), local culinary experiences, farm visits, etc. Many farmers, however, lack the marketing expertise and entrepreneurial mentality to branch out into another quite different business. In addition, they frequently lack access to the necessary start up capital.'



Diversifying the farm income

Uptake of other activities encouraged under the new multifunctional agricultural regime, including the direct marketing of local produce and the establishment of quality niche markets, has been relatively slow. The majority of the Iveragh upland farmers and or their spouses have opted for off-farm work rather than diversifying their income generating farm activities.

33.8% of farm households visited were involved in a farm-based enterprise, yet the vast majority of these were related to the conventional sectors of residential letting, agricultural contracting and forestry with only a minority of respondents having diversified into tourism or the processing and direct sale of farm produce. The contribution of the above activities to family income was well below 25% in the majority of households. Partly in reflection of this, only 37.5% of respondents felt that the business helped them to improve the farm. 95.8% of labour for diversified farm businesses was provided from within the farm family itself.



Source: BioUp - Kramm (2009)

Frequently cited stumbling blocks were the seasonal nature of tourism, the capital investment necessary to reach the high standards demanded of a successful new business; along with the need to be a marketing expert as well as farmer, chef and tour operator (O'Rourke and Kramm, 2009).

As regards the concept of bringing out a label to promote mountain lamb, the main agricultural product of the Iveragh uplands, almost all respondents (88.9%) perceived it as being essential to increase farm incomes. Frequently mentioned in conjunction with the above was a certain dissatisfaction with agricultural support and advisory services expressed by 59.7% of farmers interviewed. A particular shortcoming was the perceived failure of the farming organisations to provide information that was of relevance to hill farmers and farmers with small, marginal holdings.

In this respect, many respondents felt that most assistance was being targeted at larger and more efficient farms, a fact that particularly angered elderly farmers many of whom had been Teagasc clients or members of the IFA for many years, and felt let down during these challenging times. In particular, many farmers wished more information on making their farms more effi-

Farming the Iveragh Uplands



Pienkowski and Bignal (1999) stress the critical importance of 'linking the product to the environment in which it is produced'. Oates (1998) sees a need to establish 'new and sustainable systems for producing and marketing agricultural products from grazing on marginal land of nature conservation value'. A very welcome development is therefore the recent establishment of the new Ring of Kerry Quality Lamb Marketing Group, assisted by Teagasc, South Kerry Development Partnership and Bord Bia. 'A local lamb label', as noted by O'Rourke and Kramm (2009), 'would financially reward farmers for the provision of public goods and also re-legitimise hill sheep farming.'

For the time being, however, off-farm work is seen as an easier option and a critical livelihood strategy for marginal farm households on the Iveragh peninsula, with only 2.8% of survey respondents considering farm diversification as a realistic option for the future.

This lack of enthusiasm for multifunctional agriculture, O'Rourke and Kramm (2009) note further, is not solely confined to the peripheral Iveragh. A comprehensive study undertaken in France by Dufour et al. (2007), found that multifunctionality was most popular among researchers and agri-administrators, rather than among farmers on the ground, whose identity is still strongly linked with farming and producing a product, rather than selling a service or an image. Similarly, a recent study in Belgium found that only 5% of total income in the farming sector comes from diversified activity of which the major part is linked to agri-tourism and direct sales (Van Huylenbroeck *et al*. 2007).

High value agricultural products still form only a small share of food consumption, with Strijker (2005) estimating that in 2000, high value agricultural produce, including the organic sector, accounted for below 1% of the total turnover of the European agricultural sector. There is thus a very clear need for public support in helping HNV systems to better valorise and market their produce, along with their cultural and natural heritage.



It is widely acknowledged that mountain store lamb is of superior flavour compared to its lowland equivalent, but the bringing out of food labels can stumble over stringent technical and hygiene standards as well as the need for marketing expertise to promote the product



The future: adaptation and viability

Looking at the recent past, the situation on Iveragh has been one of slow adaptation rather than rapid agricultural restructuring, combined with significant extensification and changes in how labour is allocated. 80% of the farm managers interviewed stated that the decoupling of subsidies from production under the single farm payment system (SFP) had had an impact on how they ran their farms, with more than half of these saying that the impact had been major.

The most common ways in which farmers have adapted was by reducing stock numbers (76.4%), investing in new farm machinery (48.6%) and improving facilities (58.3%). The stated purpose of these activities was to fulfil environmental standards under REPS and cross-compliance measures. Equally important, however, was the reduction in labour time afforded by the above changes with many respondents reporting that they wished to make their farm easier to run.



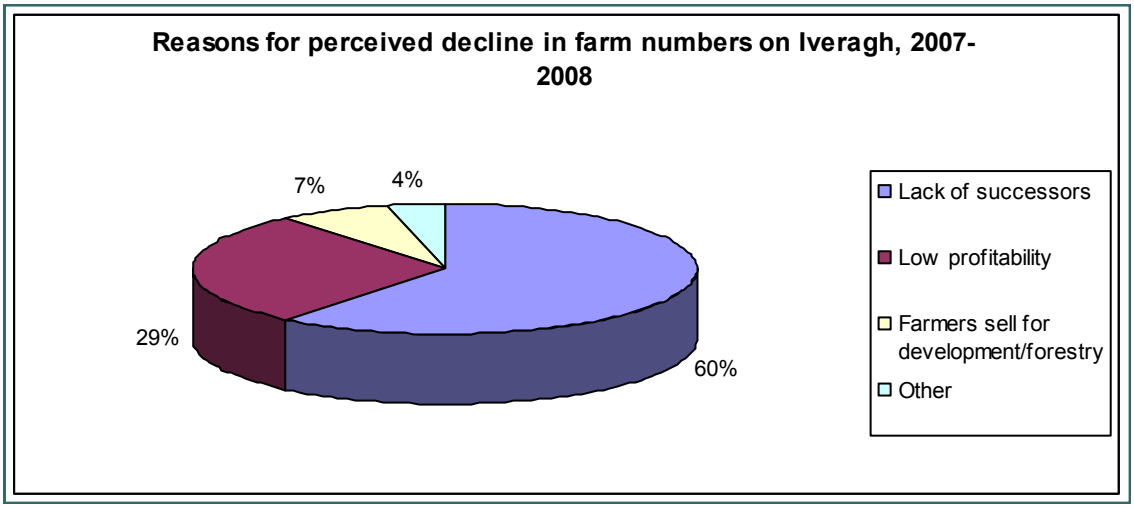
View from Carrauntoohill by Michael Daly

Increase in farm size to spread fixed costs and render operations more viable, in contrast to findings from other studies, has not occurred on Iveragh to a large extent, although 52.8% of respondents stated that they would like to expand their operation, yet could not afford to do so at current land prices.

Interestingly in the light of widespread hypotheses about land abandonment, the present survey found little evidence of abandonment either taking place or being likely to happen in the near future. Undermanagement, however, is an issue on some hill farms.

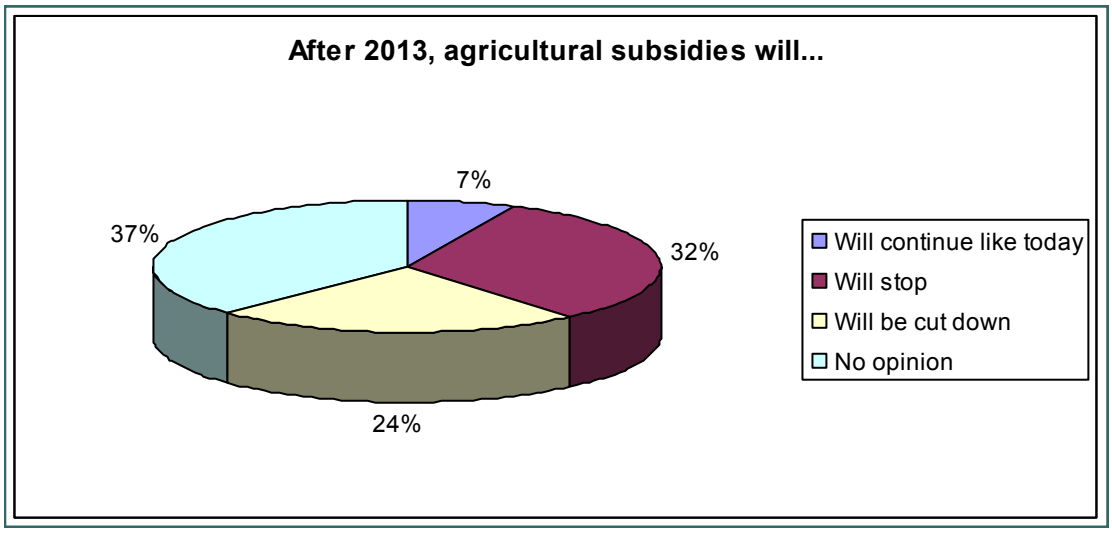


Although only 26.4% of respondents felt that farming alone could provide an acceptable standard of living for them and their families, 87.5% were confident that they would stay farming over the next decade. Old age was the only reason cited as compelling farmers to give up in the five years to come. A sizeable 37.5% of interviewees, however, felt that the overall number of farmers in the area was decreasing steadily, a trend that they ascribed largely to the lack of successors and low profitability on many farms.



Source: BioUp - Kramm (2009)

With a view to the future, only 6.9% of respondents were confident that support payments for farmers would last beyond the review of the Common Agricultural Policy (CAP) in 2013. 23.6% believed that a support mechanism would stay in place, but would provide lower payments. Nearly one in three farmers (31.9%) was certain that the subsidies would be withdrawn altogether while the remainder (37.5%) had no opinion as to what might happen.

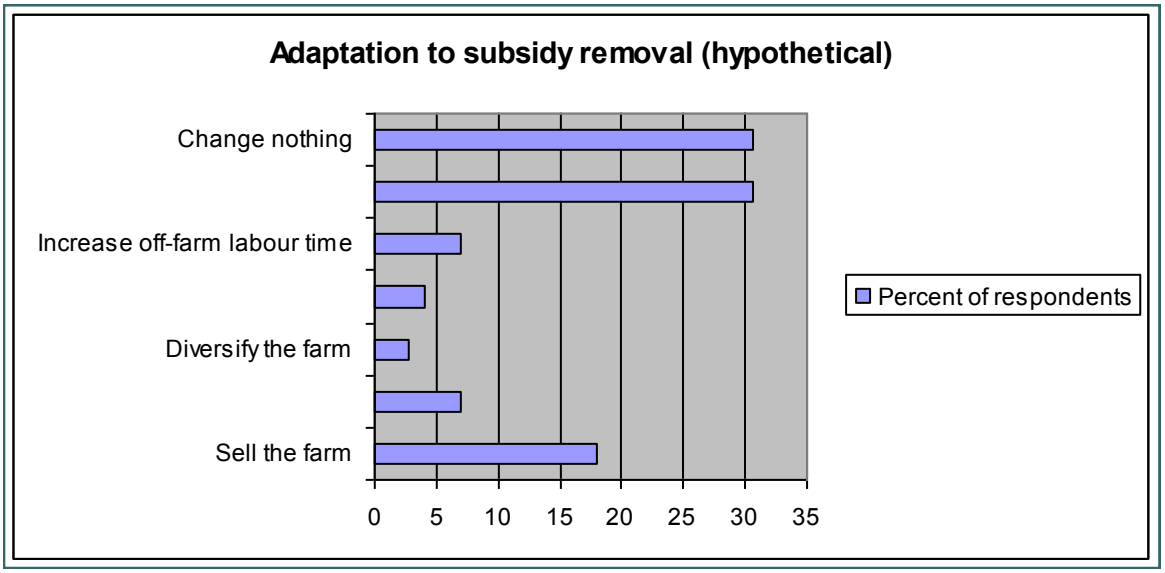


Source: BioUp - Kramm (2009)

Farming the Iveragh Uplands



When asked as to how they would adapt to the potential withdrawal of subsidies in the next round of CAP reforms in 2013, farmers gave a variety of responses. Equal proportions of farmers (30.6%) stated that they would either change nothing or further reduce the size of their operation, respectively. 6.9% thought they would increase off-farm labour time to compensate for the income loss. 4.1% hoped that the land price would drop thus allowing them to increase the size of their operation. In marked contrast to policy debates on multifunctionality, only a small minority of 2.8% saw farm diversification as an option. 6.9% believed that they would pass the farm on to the younger generation, whereas 18% could see no other option than to sell and leave the sector.



Source: BioUp - Kramm (2009)

9. Conclusions

Iveragh is an area with many faces. Throughout this book, the process of change, that the peninsula and its farming systems are currently going through, was illustrated. A critical lack of farm successors, change away from traditional management practices and an apparent polarisation of land use leading to lowland intensification and upland marginalisation were repeatedly pointed out as considerable threats to a sensitive socio-ecological system.

At the same time, it has become abundantly clear that livestock farming on Iveragh and in other areas with significant natural constraints means much more than just food production. Such areas represent about half the European farmland and have resulted from a long adaptation process that has enabled them to survive in a harsh natural environment (Rubino *et al*., 2006).



Since the 1992 CAP reform, emphasising product quality and environmental protection, public awareness of the important role of livestock farming systems has increased considerably. The benefits of ancient local breeds, forgotten products and traditional farming practices, that appeared obsolete during the post-war phase of mainstream economic development, are rapidly gaining interest.

Recognised as amongst the most urgent functions of livestock productions systems are those services attached to the maintenance of our natural resources and to preventing the loss of unique and highly valued ecosystems.

Farming the Iveragh Uplands



What is more, livestock farming has proved to be an engine of new economic development in many rural areas across Europe where the expansion of tourism has been found to be intimately connected with the aesthetic and cultural values of ancient landscapes that have been formed by centuries of farming.

Throughout this work we have aimed to demonstrate the importance of sheep farming to the preservation of Iveragh's rich cultural and natural heritage, as well as the absence of any other real alternative to it. In the same context, Rubino *et al*. (2006) argue that 'Europe cannot allow the concentration and intensification of livestock to continue in the more fertile areas with all the environmental risks associated with it, leaving about half of its territory in economic set aside. It concerns not only the durability of meat industries, but also rural life and tourism, and therefore the whole regional economy.' A powerful statement, this raises immediate questions as to what road to take in order to best assist the economically, socially and ecologically sustainable development of multifunctional hill farming systems on Iveragh.

Remarkable in the light of the many examples given in this book is the strong convergence that we found between the conditions necessary for sustaining the economic and social functions of hill sheep production and the ones for meeting nature conservation requirements. This asks for a new approach to combining modern scientific knowledge with traditional knowledge which has been accumulated over centuries and which is often based on a 'sophisticated ecological rationality' (Walter and Sinclair, 1998).



Old Church at Galway's Bridge, Black Valley

The greatest challenge associated with this appears to maintain the functional integrity of Iveragh's hill farming systems, bearing in mind that we are unlikely to find a definitive and permanent solution to the problems facing this social-ecological system. Development, Rubino *et al*. (2006) remind us, 'consists of the continuous adaptation of a changing society to a changing environment. It would therefore be a mistake to try and restore a past situation, which would lead to a false artificial solution that would be unsustainable. But it is our duty to develop new fundamentals that can support the development of sound solutions for coping with present day challenges.'

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Appreciating that the Iveragh uplands are a living and continually evolving landscape, it is evident that innovative grazing practices are needed to fulfil both environmental and productive goals. There remains, however, a critical lack of awareness among many farmers of the value of the resource that they are managing, as also noted by Dunford (2002: 97): 'Equally, many representatives of local, regional and state management bodies, visitors and even well intentioned 'conservationists', remain hopelessly oblivious to the important role that farmers play' in protecting and contributing to natural heritage and of the constraints within which farmers operate.

To encourage building this awareness, it would be useful to facilitate the exchange of experience between regions at European level whose natural constraints and challenges are similar. Apart from this, new opportunities will have to be found for Iveragh hill farmers to make a living on their land as livestock production on its own does not provide sufficient incomes for many of them.

Ultimately, the results reported in this book remind us that hill farmers are the custodians of Iveragh's biodiversity rich upland landscapes, but must also be seen as individuals that vary not only in socio-economic characteristics and farm structure, but also hold many unique combinations of goals and values. Farm diversification, off-farm work and subsidies are important to most farms, but the degree to which they play a critical role varies between households, reflecting different values, decision-finding processes and livelihood strategies that result in different land management practices.



The vast majority (83%) of hill farmers on the Iveragh peninsula case study were participants in the REPS, despite their different management styles and varied attitudes to nature conservation. At the moment it would therefore seem rather unlikely that the maintenance of biodiversity rich upland landscapes can be guaranteed by current, undifferentiated support programmes alone.

This suggests that the design of successful agricultural and agri-environmental policies would benefit from a much more targeted approach to financial support and accompanying measures that is able to take differences between farm types into account and addresses farmers' varying values and attitudes.



In this way, for the large and very traditional farms, studies need to be done on the value of local breeds and their appraisal as part of a naturally extensive production system. In addition, improving the channels for the direct marketing of local products is likely to appeal to them. For smaller, less labour-intensive farms, the branch of tourism-generating income services could be expanded, if linked to more active upland management. The more dynamic and innovative farmers against this, are likely to benefit from studies on optimal year-round grazing management to reduce the use of imported feedstuff and further improve their production system.

We would hence reiterate Brodt *et al.* (2006) who argue that we can hardly expect farmers to adopt management strategies whose values are inconsistent with their personal values. This means that, for policy to be effective, initiatives will have to consider how to best target distinct groups of farmers into agri-environmental and rural development programmes, acknowledging the very many different ways in which it is possible to be a farmer in the 21st century countryside (Lobley and Potter, 2004).





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All photographs in the book were taken either by Nadine Kramm or Roz Anderson, unless otherwise acknowledged.

Farming the Iveragh Uplands



IFA Afterword
Mr. James McCarthy

Kerry IFA is delighted to support the BioUp project on Farming in the Iveragh Uplands.

Dr. Eileen O'Rourke and her team have produced compelling research which shows the importance of farming in maintaining one of the most renowned landscapes in the world.

Hill farmers in South Kerry– as with all other farmers around the country – have had to cope with an ever changing policy regime from the EU and the Irish Government as well as the vagaries of the market place.

This book highlights what farmers perceive as a lack of consultation by policy makers over the years. This has lead to a failure to include local knowledge in dealing with environmental issues. The Compulsory Destocking of 1998 was an especially blunt way of managing overgrazing on the hills. The Commonage Framework Plans have contributed to under grazing which is now recognised as an equal threat to bio-diversity and the landscape.

IFA have always promoted sustainable farming as the best way to manage the countryside. However, farmers are now finding it increasingly difficult to make a living from the traditional practice of grazing lowland and mountain with cattle and sheep. The Single Farm Payment, REPS/ AEOS and the Disadvantaged Areas Scheme must remain as a vital support for farmers. The integrated approach adopted in other High Nature Value areas involving consultation with farmers offers a template for the future. Additional funding for farmers who undertake appropriate conservation measures combined with a viable price for farm output will help to underpin hill farming in South Kerry.

The Tourism sector, which benefits most from the Iveragh landscape, must realise that it is in their own interest to use and promote local produce. The Ring of Kerry Quality Lamb Group has shown that farmers in South Kerry can produce a high quality product on a consistent basis.

Finally, I would like to congratulate Nadine Kramm and Rosalyn Anderson on completing their studies. They have produced important research which adds to the knowledge of farming and the environment.

I hope that this document will be used as a basis for policies and structures which will support viable farming in the Iveragh Uplands.

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