FARMING FOR NATURE

THE ROLE OF RESULTS-BASED PAYMENTS

EDITED BY

EILEEN O'ROURKE & JOHN A. FINN

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The AranLIFE project area – The Aran Islands, located at the mouth of Galway Bay, on the west coast of Ireland.

FARMING FOR CONSERVATION ON THE ARAN ISLANDS

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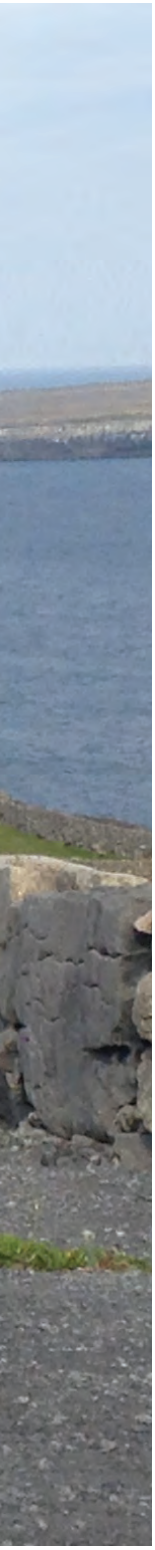


THE ARAN ISLANDS, HUMANS, FARMING AND WILDLIFE

INTRODUCTION

The Aran Islands consists of three islands, Inis Mór, Inis Meáin and Inis Oírr, located at the mouth of Galway Bay, on the west coast of Ireland approximately 43.3 km^2 or 4,330 ha in size. The islands' geology is mainly karst limestone dating from the Viséan age of the Lower Carboniferous, formed as sediments in a tropical sea approximately 350 million years ago. Human involvement with the Aran Islands dates to at least the Middle Stone Age (Mesolithic - between 6 and 10 thousand years ago) when they were visited by hunter-gatherer groups coming from the coast of Clare. Continuous inhabitancy and natural forces have all shaped the appearance of the islands to its present form, an agricultural landscape denuded of trees and subdivided into a mosaic of fields described by Tim Robinson in his book Stones of Aran (1986) as an "*incredible jigsaw puzzle of little fields where farmers clear their stoney patches and mark their every increasing subdivision of their holdings by building walls*".

The 2016 population was 762 people on Inis Mór, 281 on Inis Oírr and 185 on Inis Meáin (CSO, 2019). There are presently over 200 farm businesses on the islands, so agriculture is an important part of island life.

Figure 4.1
Facing page: Moving cattle on Inis Meáin, Aran Islands.

From left:

Figure 4.2
The AranLIFE project area – The Aran Islands, located at the mouth of Galway Bay, on the west coast of Ireland.

Figure 4.3
Winter grazing on Inis Mór, the grass is left ungrazed during growing season to supply a standing crop to graze during the winter

The agricultural system that has developed involves cattle grazing part of the farm during the growing season, and the remainder is left to allow excess grass to grow which is then grazed in the winter as a standing crop. The summer grazing tends to be on deeper soils closer to the dwelling houses and is grazed from calving time (March/April) to late Autumn/Early winter. The winter grazing is left ungrazed during this period to build up a bank of grass for grazing in the period November to March/April. Any excess grass on the summer grazing was traditionally made as hay, allowing some fodder supplementation in the winter, although this practice has declined as it is economically more favourable to purchase hay from the mainland.

This *winterage* practice was likely widespread in Ireland at one stage and in agricultural terms the standing crop is known as foggage, but this system has changed over the years because of the ascendancy of hay and then silage conservation. It is now mainly limited to the Aran Islands and the Burren, where the drier limestone grasslands and limestone pavement are less prone to poaching. It is an efficient farming system; no cattle housing or slurry storage is required and the system takes full advantage of compensatory growth (animal growth may be lower than expected for some months due to under-nutrition; later, the liveweight gain of the cattle will be greater than expected due to good nutrition in the available forage). However, associated

Figure 4.4
Summer grazing on Inis Oírr

with this system is a low stocking rate and high labour requirement which limits the financial returns from the land.

Although the system is similar to that practiced in the Burren, the Islands are much smaller in extent than the Burren and farm sizes are smaller with little recourse to more productive land as they have in the Burren. In addition, the dense network of field walls and highly fragmented farms mean the system is based on a rotational grazing system, in which the cattle are confined to a small area of land and moved regularly to different fields. The Burren approach is based more on set stocking, with cattle grazing over larger areas of land over a longer time period. The Aran's rotational grazing system means utilisation of grass is good but there is a high labour requirement particularly due to the high number of fields. For example, one 32-hectare farm on Inis Mór has 43 different parcels of land scattered across the island made up of 158 fields. Details of the average farm size and estimated stock numbers from the 2010 agricultural census are shown in Table 4.1. Based on these figures and using standard cow equivalent figures the average stocking rates for the island is 0.4 LU/ha. A more recent study by AranLIFE on a random selection of 25 farms found the average stocking of 0.44 LU/ha suggesting that the census stocking rate is an accurate reflection for the islands.

Table 4.1

AGRICULTURAL CENSUS FIGURES FOR THE ARAN ISLANDS

(CSO, 2010)

AGE STRUCTURE OF FARMERS				
Under 35	35 to 44	45 to 54	55 to 64	65 and over
8	9	53	56	99

FARM SIZE					
<10ha	10-20ha	20-30ha	30-50ha	50-100ha	>100ha
92	99	2	12	2	0

LIVESTOCK NUMBERS							
Bulls	Dairy cows	Other cows	Other cattle	Total cattle	Rams	Ewes	Horses
27	0	661	1027	1715	12	220	63

The farming economy of the Aran Islands was traditionally supplemented through fishing, and the sea was an important resource for fuel, food and fertilizer with traditional cropping systems, mainly potatoes, for home consumption. In more recent years, off-farm employment in the tourist industry has replaced fishing for many families as over 250,000 tourists visit the islands every year.

Sales of livestock vary on farms; some farms sell the calves at weanling stage in October only keeping an occasional replacement heifer while others keep the calves over winter and sell them in the following year. Cattle buyers (known locally as "cattle jobbers") come to the Islands and buy the cattle before exporting them to Ireland's mainland for finishing (O'Sullivan and Godwin, 1978). Cattle breeds also vary on farms. Shorthorn was the predominant breed but with a higher demand and financial return for continental cattle, breed type has switched to more continental types such as Charolais and Limousine.

With small farm size and low average stocking rate, sales of agricultural produce is limited. Based on the census figures, 40% of the farms are < 10 hectares and the average beef cow herd size is 3 cows. The islands have all the characteristics of High Nature Value (HNV) farming: low inputs of pesticides and fertilizers; limited cultivation; low stocking rates and; a high percentage of semi-natural vegetation (Albrecht et al., 2007; Bignal and

McCracken, 2000; EEA, 2004). With low potential for livestock sales, there is a high reliance on subsidies on the farm. However, subsidy payments through Pillar 1 of the Common Agricultural Policy (CAP) are also low as they are based on historic claims. CAP support is generally much lower for HNV farms than other farms, where the historic Single Payment System is applied (Keenleyside et al., 2014). In 2014 the average Single Farm Payment for the three islands was €108 per hectare compared to a national average of approximately €270.

ISLAND ECOLOGY

The islands contain 17 different habitats types that are increasingly rare in Europe and listed in the EU Habitats Directive. These include Coastal lagoons (1150*), Fixed coastal dunes with herbaceous vegetation (grey dunes) (2130*), Machair (21AO*), Semi-natural dry grasslands and scrubland facies on calcareous substrates (Festuco-Brometalia) (important orchid sites) (6210*) and Limestone pavement (8240*), Reefs (1170), Perennial vegetation of stony banks (1220), Vegetated sea cliffs of the Atlantic and Baltic coasts (1230), Embryonic shifting dunes (2110), Shifting dunes along the shoreline with *Ammophila arenaria* (white dunes) (2120), Dunes with *Salix repens* ssp. *argentea* (*Salix arenariae*) (2170), Humid dune slacks (2190), European dry heaths (4030), Alpine and Boreal heaths (4060), Lowland hay meadows (*Alopecurus pratensis, Sanguisorba officinalis*) (6510), Turloughs (3180*), Submerged or partly submerged sea caves (8330). Six of these habitats are classed as priority habitats (*).

Based on Halada et al. (2011) nine of the 17 habitat types are fully or partly dependent on agricultural management. This is reflected in the National Parks and Wildlife Service (NPWS) site synopsis that the islands are of 'major scientific importance owing to the range of outstanding karstic carboniferous limestone and coastal habitats, and the number of rare and threatened species found thereon. The cultural heritage of the islands (and in particular the continuation of traditional low-intensity farming practices) is intrinsically linked with its scientific interest' (NPWS, 1997). The main habitat types found are the Semi-natural dry grasslands and scrubland facies on calcareous substrates (Festuco Brometalia) (important orchid sites) (6210*) and Limestone pavement (8240*). These two habitat types form a mosaic across the islands and are the main focus of the farming system.

The farming system of winter and summer grazing conserves the biodiversity of the grasslands. The winter grazing produces a short turf and in the springtime, herbs such as *Gentiana verna* (Spring gentian), *Geranium sanguineum* (Bloody cranes bill), *Lotus corniculatus* (Birds foot trefoil) and *Galium verum* (Lady's bedstraw) flower and fill the fields full of colour. Free from grazing in the summer months, they then set seed and thus the seed bank and species-richness of the fields is conserved and enhanced.

As well as the diversity of plant species on the islands there are also interesting species that are frequently found on the islands but are rare or absent elsewhere. There are plants at their most northerly limit of their distribution and are more associated with Mediterranean regions of France and Spain e.g. *Neotinea maculata* (Dense flowered orchid), *Ophrys apifera* (Bee orchid), *Rubia peregrina* (Wild madder).

There are also Arctic-Alpine plants and plants with restricted distribution within Britain and Ireland, such as *Rhodiola rosea* (Roseroot), *Gentiana verna* (Spring gentian), *Euphrasia salisburgensis* (Salzburg eyebright) and *Saxifraga rosacea* (Irish saxifrage). These species are found in high-altitude meadows in mainland Europe but occur close to sea level here. An anomaly of the Aran Island flora is that these 'typical' arctic alpine plants may occur alongside plants typical of Mediterranean regions. There are species with a limited distribution in Ireland and Britain, e.g. *Ajuga pyramidalis* (Pyramidal bugle), *Helianthemum oelandicum* (Hoary rock rose), *Astragalus danicus* (Purple milk vetch) and *Allium ampeloprasum var. babingtonii* (Babington's leek). These species occur on the Aran Islands and few other places within the country, for example *Astragalus danicus* (Purple milk vetch) only occurs on the Aran Islands within Ireland. There are also some plant species that have died out elsewhere due to intensification of agricultural practise e.g. *Lolium temulentum* (Darnel) is a rare grass species that occurs as an arable weed in the rye crops on Inis Meáin.

Along with the rich floral diversity, the Aran Islands also support a great variety of butterflies that feed and depend on the grassland plants. Twenty-one species of butterfly occur on the Aran Islands, a significant proportion of the national total of 31 species. These include *Cupido minimus* (Small blue butterfly) which is endangered nationally. The caterpillar of this butterfly feeds on the flowers of *Anthyllis vulneraria* (Kidney vetch) which occurs frequently on the islands. The caterpillar of the *Erynnis tages* (Dingy skipper), which is a near threatened species, feeds on *Lotus corniculatus*

Facing page, clockwise from top

Figure 4.5
Species rich Calcareous grassland with limestone pavement out crops on Inis Meáin

Figure 4.6
Astragalus danicus (Purple milk vetch) on Inis Meáin

Figure 4.7
Bombus muscorum, var *allenellus*, a form of the species which is unique to the Aran Islands

(Bird's-foot-trefoil). Wall brown, also an endangered species nationally, is common on the islands and its caterpillars feed on the native grasses.

The Aran Islands has its own variety of bumble bee, *Bombus muscorum*, var *allenellus*, that has only been recorded on these islands. Also found on the Machair grasslands is the rare snail, *Vertigo angustior* (Narrow-mouthed whorl snail). This species can occur on a wide variety of sites however the exact micro-climate that it requires is very strict and it is sensitive to drainage, changes in grazing and management. This species is on Annex II of the EU habitats Directive and is considered threatened within Europe.
The bird life associated with the farming system is also vibrant. *Vanellus vanellus* (Lapwing) a Red listed bird species are found nesting on Machair grassland on the islands whilst their numbers are declining elsewhere. Important numbers of terns (*Sterna paradisaea* (Arctic tern), *Thalasseus sandvicensis* (Sandwich tern) and *Sternula albifrons* (Little tern)) have been recorded breeding on the islands, these species over winter on Antarctic pack ice (*Sterna paradisaea*) and west coast of Africa (*Thalasseus sandvicensis* and *Sternula albifrons*) and return to the Aran Islands to breed in Summer. *Anthus pratensis* (Meadow pipit) and *Alauda arvensis* (Skylark) are also common throughout the islands. The grazing system is favourable for ground nesting birds which have suffered in other parts of Ireland. The winter grazing also leaves a favourable habitat for *Pyrrhocorax pyrrhocorax* (Chough), a member of the crow family with a distinctive red beak, as it requires short turf grazed grasslands to forage for insects and grubs. *Pyrrhocorax pyrrhocorax* is on Annex I of the EU Birds Directive and has been included in the Red List of Birds of Conservation Concern in Ireland (Newton et al., 1999).

ORIGINS OF THE ARANLIFE PROJECT

The poor economics of farming on the island is leading to changing practices that include both land abandonment and/or sub-optimal grazing. This lack of agricultural activity leads to an increase in scrub, particularly *Rubus fruticosus* agg. (Bramble), *Prunus spinosa* (Blackthorn), *Crataegus monogyna* (Hawthorn), *Corylus avellana* (Hazel) and *Pteridium aquilinum* (Bracken). The result is the development of species-poor grassland and/or scrub communities at the expense of the species-rich grasslands. This has caused a visual change in the island with not only grasslands disappearing but the iconic field structure being engulfed by the encroaching scrub. In

the national survey of semi-natural grassland (Devaney et al., 2013), 6 of 7 site assessments on the Aran Islands indicated scrub encroachment as a threat causing a decline in their conservation status. For the islanders, there is a fear that scrub encroachment can also result in negative effects for the tourist industry which forms a major part of the islands economy. The farmers on the islands had seen how a project in the Burren (BurrenLIFE) developed with strong tangible benefits and felt the islands could develop their own plan. In late 2008, BurrenLIFE in conjunction with Teagasc held a series of information meetings on the islands followed by a visit to the Burren with a number of island farmers. The Heritage Council, (a public body that provides policy advice for government on heritage issues including High Nature Value (HNV) farming) commissioned a report in 2009 which recommended the development of agri-environmental schemes that specifically focus on HNV farmland to enhance conservation of the extensively farmed landscape. This aim would contribute to the biodiversity objectives under the CAP and other areas of EU policy, and could potentially contribute to Ireland's National Landscape Strategy (Smith et al., 2010). During that period, Kelly (2010) investigated the impact of the Irish agri-environment scheme REPS (Rural Environment Protection Scheme) on the Aran Islands. REPS was introduced under Council Regulation 2078/92 in order to encourage farmers to carry out their activities in a more extensive and environmentally friendly manner. Overall, the study found that REPS was a beneficial scheme to the Islands, because it increased awareness of the environment, improved knowledge of stonewall maintenance and generally tidied up the farming landscape of Aran. However, some important limitations of the scheme in the context of the Aran Islands were identified, especially in the lack of positive management of habitats. The study also found that specific conservation issues on the Islands (e.g. encroachment of roads in common ownership) were not being addressed by REPS. The report suggested that the concept of High Nature Value Farmland needed to be taken out of the policy arena and into a tangible reality where it ensures the viability of low intensity farming for conservation in areas such as the Aran Islands. The study suggested that future programmes should focus on the specific habitat, species and cultural conservation issues of the Aran Islands.

To develop the recommendations in the reports, The Heritage Council established a HNV Ireland working group made up of various stakeholders including government, local community groups and non-government

organisations. This work was supported by the 'European Forum for Nature Conservation and Pastoralism' (EFNCP) (a European organisation focusing on the maintenance of low-intensity livestock farming) and The Heritage Council, with additional help from the Institute of Technology, Sligo.

The approach taken was a "bottom-up approach". Workshops were held on the islands where the farmers were asked to describe the factors making it difficult for them to maintain their low-intensity agricultural activity and what did they feel needed to be incorporated into future programmes to address these issues. A total of 48 islanders attended the workshops, representing 25% of the farming community. At the meetings a number of farmers volunteered as contact points to assist with future developments with the project The outcome of the workshops was a list of issues and proposed solutions from which a specific agri-environment programme was developed as a discussion document among the group.

To develop the ideas, additional funding was required. Because 75% of the islands are designated under Natura 2000, LIFE (the EU's financial instrument for supporting environmental, nature conservation and climate action projects), was considered the most appropriate instrument. In addition, the main designated habitats on the islands, Calcareous grassland, Limestone Pavement and Machair are priority habitats so 75% funding was available under LIFE. Co-funding was required as well as an organisation to act as the co-ordinating beneficiary, which is an organisation that has sole, legal and financial responsibility to the Commission for the full implementation of a LIFE project. This proved to be the most difficult part in developing a project as whilst organisations were willing to contribute technical and financial help they were not in a position to take on the full requirements of the co-ordinating beneficiary. After consultations, the Department of Culture, Heritage and Gaeltacht (DCHG) agreed to take on the role with Teagasc as associated beneficiary and the Department of Agriculture, Food and Marine (DAFM), Fáilte Ireland, The Heritage Council and Galway County Council all acting as co-funders. Once this structure was in place an application was prepared and submitted to the EU Nature LIFE unit. The application was prepared by EFNCP in conjunction with the Institute of Technology Sligo and the HNV Ireland working group. The final result was the AranLIFE project entitled 'The sustainable management of the priority terrestrial Habitats Directive Annex 1 habitats of the Aran Islands'. The project was successfully funded to the tune of 2.4 million Euro, and ran from 2014 to 2018.

SPECIFICS OF FARMING FOR CONSERVATION ON THE ARAN ISLANDS

To look at the specifics of farming for conservation on the islands it is important to understand the historical and cultural influences on the islands' landscape to date. Farming has shaped this landscape for almost six thousand years. Neolithic farmers began by cutting down the original tree cover to expose the limestone rock and grasslands. Future generations of farmers carried sand and seaweed to make the very soil on which many of the species-rich grasslands now grow. Thousands of kilometres of stone wall were built to shelter their livestock from the harsh Atlantic winds, protect their grasslands, mark boundaries and sometimes just as a way of storing the stone gathered from the fields. Out of necessity an agricultural system developed. This system described earlier with the absence of fertilisers has resulted in a high species diversity of flora, intact historic landscapes and cultural heritage throughout the islands (O'Rourke, 2006). On an individual animal performance, it is an economically favourable system with low associated costs as there are no housing costs. In fact, the islands have been recognised as an important area for livestock production over the ages. In 1684 Ruaidhrí Ó Flaithbheartaigh the Irish historian and 'de jure Lord of Iar-Connacht' wrote in his book 'A Chorographical Description of West Or H-Iar Connaught':

> "The soil is almost paved over with stones, so as in some places nothing is to be seen but large stones with wide openings between them where cattle break their legs. Scarce any other stones there but lime stones and marble fit for tombstones, chimney mantle trees and high crosses. Among these stones is very sweet pasture so that beef and mutton are better and earlier in season here than elsewhere; and of late there is plenty of cheese & tillage" (O'Flaherty, 1684).

The change in agricultural policy and general move to intensification has made the economics of livestock farming on the islands less attractive and the nature of the landscape has limited the possibility for intensifications. The past practices have shaped the farm structure and as a result lead to highly fragmented farms. In the past the land division of the Aran Islands into *ceathrúna* is a direct consequence of the geology and ecology of the islands. Each *ceathrú* provides access to the full range of habitats available on each island: high, rocky limestone plateau, lower fertile grassland, Machair and

Figure 4.8a
The fragmented layout of fields is typical of farms on the islands

sandy shore (Laheen, 2007). Therefore, each *ceathrú* theoretically comprises a self-contained agricultural unit with access to summer and winter grazing, seashore, and other resources (Laheen, 2007).

The fragmented nature of the farms, poor access to some of the fields/habitats and cost of water installation means that it is now easier for the farmer to concentrate livestock in parts of the farm with more productive soils and abandon the fragmented areas. Higher stocking rates can then be maintained with the application of inorganic fertiliser and herbicides to improve the agricultural condition of the sward. This intensification has a detrimental effect on priority habitats whilst at the same time the abandonment of grazing on the other areas leads to their ecological

degradation. Alternatively, there may be grazing levels below the ecological optimum or even a total abandonment of farming.

Specific conservation measures to keep the island grasslands in favourable condition are based on the continuation of traditional grazing. The winter grazing produces a short turf grassland in the *winterages* which allows wildflowers to flourish in the growing season. For the summer grazing, the combination of low fertility, rotational grazing and low stocking rates also aid in maintaining species diversity, though often somewhat lower than in the *winterage*. Therefore, conservation measures for the island aim to ensure optimal grazing and maintain low soil fertility. To aid in this practice the main concrete actions implemented by the AranLIFE project were actions that aided in grazing management. These included:

Figure 4.8b
The fragmented layout of fields is typical of farms on the islands

IMPROVE ACCESS AND GRAZING MANAGEMENT

This was considered to be one of the most important recommendations to improve the island landscape and facilitate grazing on priority habitats by the island farmers. The fragmented nature of the farms on the island and the small parcel size means that the grazing period for a particular parcel of land may be short. Access to these small parcels of land is through a series of communal narrow *boreens* (laneways). Due to the current infrequency of use, they are prone to scrubbing up, mainly with *Rubus fruticosus* and *Prunus spinosa*, and eventually become impassable, and this is resulting in the cessation of grazing on the priority habitat they lead to. The agricultural return from clearing such scrub means it is uneconomic but the ecological return, in terms of increased biodiversity is high. The *boreens* need to be

kept open and clear of scrub to facilitate the movement of cattle so that the optimal grazing regime can be maintained.

Provision of water for grazing livestock

The achievement of optimal grazing requires livestock to have access to water in appropriate locations. In the absence of rivers or mains water on the islands, an appropriate water infrastructure is required to resume and continue grazing. Historically, this was through the use of a tank and slope, known as a rain catcher. The economic return from farming small units means that when these structures deteriorate, there is insufficient funding within the farm to justify the replacement of the water infrastructure. This means it is no longer possible to graze these fields, resulting in a decline in the conservation status of the habitat. Replacing the rain catchers and to ensure adequate water for livestock is therefore vital in the conservation of species rich grasslands.

Removal of encroaching scrub

As stated earlier a reduction or cessation of grazing has led to an increase in scrub, particularly *Rubus fruticosus* agg. (Bramble), *Prunus spinosa* (Blackthorn) and *Pteridium aquilinum* (Bracken). Therefore, initial removal of scrub and bracken is the first step in the restoration of the priority habitats. Once the scrub is removed, these areas can be further enhanced by optimal grazing regimes.

Correction of mineral imbalances in livestock

Healthy cattle are vital in any grazing management system and aid to the economic feasibility of the enterprise. The AranLIFE project monitored the nutrient contribution over two years. In general mineral levels are low in grazed forage throughout the year and without supplementation mineral deficiencies are likely particularly in Phosphorous, Copper, Cobalt and Selenium. Therefore, supplementation is required through use of mineral licks, concentrate supplementation or mineral boluses.

Ensure optimal grazing rates

Once the conditions limiting grazing are rectified, optimal grazing levels are then required to ensure favourable condition.

These conservation measures formed the basis of the AranLIFE project.

DETAILS OF THE DESIGN AND MONITORING OF THE ARANLIFE PROJECT

The Department of Culture, Heritage and Gaeltacht (DCHG) was responsible for the overall management of the project, and employed a dedicated team for its implementation. This team were not DCHG staff but hired as a specialised team who worked full time and were employed on fixed-term temporary whole-time contracts. The team consisted of a project manager (Patrick McGurn), a scientific and technical officer (Amanda Browne) and an administration and financial officer (Gráinne Ní Chonghaile). The project manager had experience in both agriculture and ecology and was responsible for the overall project operation and its day to day management, reporting directly to the DCHG. The main responsibilities included liaising between the project team, project participants, the project steering committee and advisory group; management of the project team; the formation of formal contract agreements with the participating farmers, overseeing implementation of all project actions, monitoring, dissemination and reporting activities. The main role of the scientific/technical officer, whose expertise was in ecology, was to ensure proper operation and monitoring of all conservation actions in line with project objectives and expected results and reporting of the results. The scientific/technical officer was aided by a PhD student (Louise Duignan) who carried out some of the monitoring actions. The project administration and financial officer came from an administration background and had responsibility for day to day operation of project administration and finances, including maintenance of up to date financial records for all project actions. The main responsibilities included administrative support to project manager and scientific/technical officer; general office administrative duties; application of necessary financial and system controls; preparation of monthly and annual financial reports for project manager; communications with stakeholders, and generating farm plans based on information supplied by the rest of the project team.

After the general administration associated with implementing a project, the next step was the selection of farmers interested in working with the project. First the project team invited all 225 farmers on the Islands to a meeting where details of the project were outlined, what it hoped to achieve and what would be required from farmers participating in it. Farmers were asked to submit an expression of interest in working with the project. Such expressions were not accepted on the night of the meetings to encourage

farmers to fully consider the project. A total of 98 expressions of interest were received which created difficulties as the project only had funding for 70 farmers. Therefore, the next step was to develop a selection criteria based on the suitability of each farm for the project. This was delivered by visiting each land parcel and assessing them based on a suitability score of 1 (highly suitable), 2 (moderately suitable) or 3 (marginally suitable) based on predetermined descriptions, which included levels of scrub encroachment, current grazing levels, access to water and presence of adjacent *boreens* (blocked by scrub or not).

Farms with higher areas of Score 1 were deemed to be more favourable for selection as they provided the best opportunity to improve conservation status of priority habitats and to achieve the AranLIFE's objectives. For each island the total area of land parcels with a score 1 was calculated per farm and used to rank the farms accordingly, thus prioritising farms in order of their suitability for the project. Ranking the farms in relation to the amount of area of the best suitable habitat for the demonstration of the management techniques was the best way to achieve the objectives of the project. It allowed a transparent procedure which could be justified and explained. It also allowed for a reserve list in case some of the selected farmers withdrew from the project. Using this procedure, 70 farms were selected, with a corresponding area of 1,126 ha of SAC. Letters of offer were issued to the farmers and 67 replied giving the target area of 1011 ha agreed under the LIFE application.

Each farm was visited by the project team and a farm management plan was developed with the farmer. The plan included a farm map which highlighted the location where each action needed to be undertaken and details on scrub control (such as area and density of scrub to be cleared), *boreens* for clearance, position of type of water infrastructure, grazing and management regimes for priority habitats, and the project team also gave the associated costings for the completion of the work. Costs for the work were based on trial works on the island prior to the AranLIFE project. The costs were then standardized to reflect the full cost of the work and no co-funding by the farmer was required. Farmers also recorded the time associated with actions, e.g. scrub clearance during the project to determine the accuracy of the costs. There was a strong positive correlation between the expected cost and the time recorded. The cost incurred by the farmer in the construction of raincatchers was higher in some cases due to the quality of the work and logistic issues getting materials to remote areas. A breakdown for the

associated costs is detailed in Table 4.2. Specific works were based on actual hours e.g. where a wall needed rebuilding to aid access. In all calculations, the hourly rate was €15.

Table 4.2 **PAYMENT COSTS ASSOCIATED WITH FARM PLAN WORKS UNDER ARANLIFE**

	LIGHT	MEDIUM	HEAVY
Boreen clearance (€/m)	1.20	2.40	4.00
Scrub Control (€/ha)	3000	4500	6000
	NEW	**REBUILD**	
Rain catcher (€)	635	300	
	SCORE 3B	**SCORE 4**	**SCORE 5**
Grazing Payment (€/ha)	100	125	150

Along with the farm plan, the project team developed a set of 'Terms and Conditions' for the project signed by the participant and the project manager. The 'Terms and Conditions' outlined the legal status of the project, the obligations of the participant and the project team, and technical details on the work involved.

The farm plans were active throughout the term of the project, and were updated when required by the farmer or project team. The project held regular update meetings with the farmers and regular one-to-one meetings when amending farm plans or carrying out inspections for work completed.

KEY ELEMENTS OF AN ARANLIFE PLAN

The farm plans were developed by the project team and the farmers. In simple terms they were a contract between the project and the farmers which detailed the work to do in each field and the associated cost of the work. To achieve this, there were two main elements to the farm plan; first, the terms and conditions drawn up with legal expertise that detailed the obligations on each side, and; second, the plan element consisting of a farm map detailing the work and the associated costings for each action. Associated with this was a farm map (Figure 4.9) outlining the areas for clearing, site of water facility and the score for each field. Examples of a farm plan are detailed below.

Table 4.3
An example of the farm plan detailing scrub control in different land parcels

WORKS PLANNED for 2014 - 2018

Action C2:Scrub and Bracken control

Parcel No.	Name of field	Area (Ha)	Scrub Parcel	Scrub or bracken density	Area to clean (Ha)	Total Payments€
G1xxxxxxx		0.20	a	Heavy (76-100%)	0.10	600
G1xxxxxxx		0.60	b	Medium (41-75%)	0.20	900
G1xxxxxxx		2.20	c	Medium (41-75%)	0.12	540

Table 4.4
An example of the farm plan detailing water requirements in different land parcels

Action C3 Enhancement of livestock management facilities through the provision of a water infrastructure

Refer to associated maps for location of recommended water facilities:

Parcel No.	Field name	Code	New Water facility	Cost
G1xxxxxxx		1	Water management required	€635
G1xxxxxxx		2	Water management required	€635.00

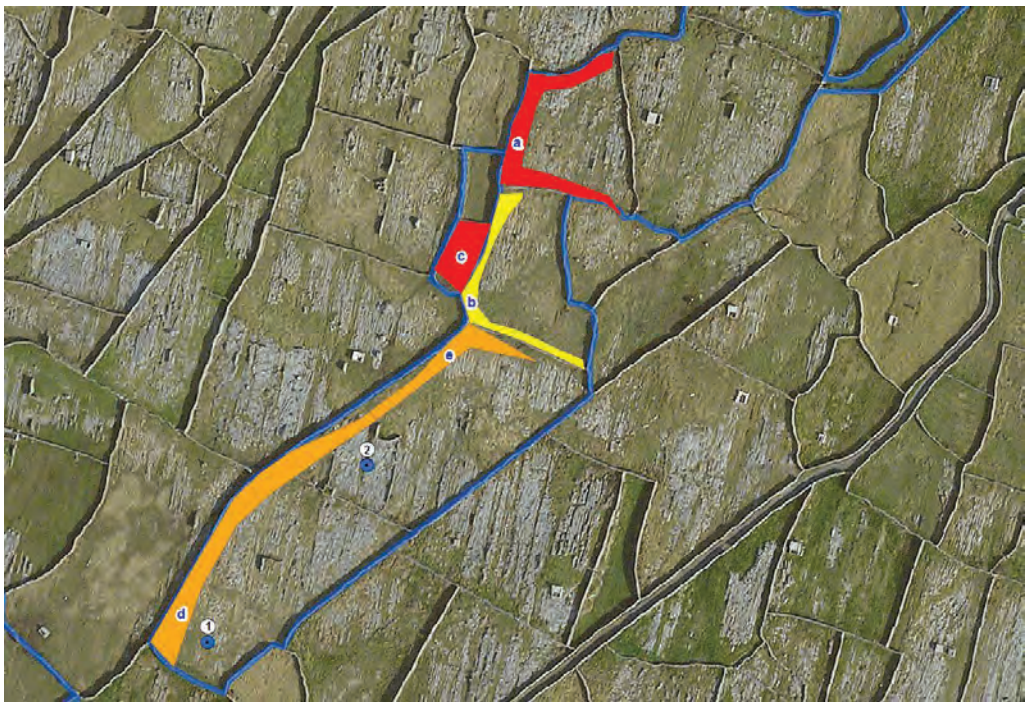
Table 4.5
An example of the farm plan detailing the condition score for each land parcel

Action C4 Implementation of Optimal Grazing Plans

The grazing payment rate is based on the condition of the field where each field has a score from 1 to 5, where 5 is the indicative of best condition. Payment is restricted to grazed grassland with a score of 3 and above.

Land parcel	Field name	Area(Ha)	Updated area	Start score	Activities required	Grassland Payment/ ha	Parcel payment
G1xxxxxxx		1.0	1.0	3b	Graze, scrub and bracken control	€100.00	€100
G1xxxxxxx		1.0	1.0	4	Spring grazing to control molinia	€125.00	€125
G1xxxxxxx		2.0	2.0	5	Continue grazing levels	€150.00	€300.00

Figure 4.9
An aerial view of the farm outlining the areas of scrub to clear based on light (yellow), medium (orange) and dense (red) and the rain catchers for construction (1 and 2)



RESULTS-BASED COMPONENT FOR GRASSLAND CONDITION UNDER THE ARANLIFE PROJECT

To assess the optimal grazing action, the project developed a basic scoring system that reflected the quality of the habitat and level of grazing achieved. The purpose of this was twofold: first, it encouraged farmers to graze the land to a predetermined level, and; second, was an opportunity to trial a results based output which could be used in future agri-environment programmes after the project ended. On-site demonstration days with the farmers helped to improve the principles behind the scoring system so that the farmers understood how a score was allocated to a field.

A score of 1 to 5 was given to the land parcels to determine the condition of the habitat and relate it to grazing level. This was a visual assessment method, which was intuitive and quick to apply in the field and was associated with the scientific monitoring across the range of habitats.

Score 1: Non-priority habitat and therefore not covered by the LIFE project

Score 2: Semi-improved habitat with limited indicators of priority habitat, grass dominated, usually with higher levels of fertility or more recently made grasslands in an island context.

Score 3a Areas of priority habitat either not in agricultural use or where grazing is not occurring or where the grazing rate is so low there is a substantial build-up of grass.

Score 3b Priority habitat with reduced numbers of positive species indicators. Habitat is not optimally grazed and scrub encroachment may be an issue. Habitat may also support negative indicator species.

Score 4 Priority habitat with a high number of positive indicator species and an appropriate grazing regime (lacking indicators of undergrazing and overgrazing) but with scrub or bracken encroachment an issue.

Score 5: Priority habitat perceived to be very well managed, indicated by a high number of positive indicator species and an appropriate grazing regime (lacking indicators of undergrazing and overgrazing).

Figure 4.10
An example of a field with a Score 2

Figure 4.11
An example of a field with a Score 3a

Figure 4.12
An example of a field with a Score 3b

Figure 4.13
An example of a field with a Score 4

Figure 4.14
An example of a field with a Score 5

The fragmented nature of the farms on the islands usually means that the farm consists of a number of isolated parcels of land, with each land parcel made up of several small fields, usually managed as one block. The score given was based on these individual parcels. For parcels with a percentage of semi-improved/improved, where this area was less than 30% then the

dominant score was given to the whole area, but if the area was greater than 30%, the areas were scored as separate units. Semi-improved and improved grassland automatically received a score of 2 whilst areas of shoreline, lane ways etc., received a score of 1.

The area had to have clear signs of grazing visible from the condition of sward, these included areas cleared of vegetation or a range of vegetation height covers including tightly grazed patches, indications of livestock tracks, faecal material, lying areas. Encroaching scrub/bracken present in the area was also assessed and incorporated into the score as was an assessment of damage, such as excessive poaching, damage as a result of feeding troughs, excessive vehicle damage. Such attributes would reduce the score.

Sward condition was assessed using the presence and abundance of specific indicator species. This method also identified the presence of negative indicator species, areas of scrub/bracken and agricultural grasses. The procedure involved taking a line transect across the field diagonal and identifying the species located in an area of $1m^2$ in a total of 10 random points within the transect. For grazed areas of limestone pavement, the survey points were concentrated on the grazed outcrops within the limestone.

Where a field contained one or less positive indicator present in an area of one square metre at six out of ten random points in the area, it is likely to be a semi-improved or improved field with a grass dominant over herbs and so will have a score of 2.

A field having between two and four positive indicators present in an area of one square metre in at least six out of ten random points in the area is indicative of a moderately species-rich field and will have a score of 3. The presence or absence of grazing will determine if it is 3a or 3b.

Where four or more positive indicators are located in an area of one square metre at five out of ten random points in the field, it would have score of 4. The remaining five points will likely consist of scrub, course grass or semi-improved grassland.

If five or more positive indicators are located in an area of one square metre at eight out of ten random points in the field, then the area will have a score of 5. Fields with 5 indicator species at between 5 to 8 random points will have a score of 4 with the remaining random points likely to consist of scrub, course grass or semi-improved grassland.

Based on feedback from the demonstration days, AranLIFE produced brochures detailing the species found to help farmers identify plants on their own farm.

Above:
Figure 4.15
An example showing part of a flora brochure developed by the project to aid farmers in plant identification

Table 4.6
THE INPUT SHEET USED FOR SCORING GRASSLANDS IN THE ARANLIFE PROJECT

FIELD NO.	MAIN HABITAT	AGRIC. ACTIVITY Y/N	SCRUB > 10%	DAMAGE ASSESS-MENT	SWARD CONDI-TION	MANAGE-MENT ADVICE	SCORE

The final score given also reflected other variables, for example, a field could score highly under the Sward Condition but could include excessive damage, and in such cases the field would drop a score.

POSITIVE INDICATOR SPECIES

Determining positive and negative species was initially based on NPWS 2013 data for determining favourable condition and included forb, graminoids, positive indicator species, negative indicator species, scrub and bracken encroachment, sward height, litter cover, extent of bare ground, and grazing and disturbance levels (O'Neill et al., 2013). However, following the vegetation analysis of well managed areas of calcareous grassland within the project, additional indicators were added to reflect local conditions.

The following are the top species used in scoring at stops within the fields.

Table 4.7

SPECIES NOTED DURING SCORE ALLOCATION

	HIGHLY POSITIVE	POSITIVE
Briza media (Quaking grass)	★	
Geranium sanguineum (Bloody cranesbill)	★	
Anthyllis vulneraria (Kidney vetch)	★	
Primula veris (Cowslip)	★	
Carlina vulgaris (Carline thistle)	★	
Campanula rotundifolia (Harebell)	★	
Antennaria dioica (Cat's-foot, Mountain everlasting)	★	
Blackstonia perfoliata (Yellow-wort)	★	
Sanguisorba minor (Salad burnet)	★	
Linum catharticum (Fairy flax)		▲
Sesleria caerulea (Blue moor-grass)		▲
Lotus corniculatus (Bird's-foot-trefoil)		▲
Galium verum (Lady's bedstraw)		▲
Thymus praecox (Wild thyme)		
Carex species (Sedges)		
ORCHID SPECIES		
Euphrasia officinalis (Eyebright)		
Succisa pratensis (Devil's-bit scabious)		

Higher field scores resulted in higher payment levels (Table 4.8), and directly reflects a results-based approach. The payment was for adequate grazing levels, but the decision was taken early in the project to relate it to the quality of the habitat as an encouragement to complete some of the concrete actions required to improve grazing output.

The AranLIFE project investigated factors which contributed most to the production of high quality grasslands, and early indications showed that the amount of time invested in land parcels is the main driver. Additional time is required for maintenance of walls to control the extent of grazing, time in moving livestock across the farm, constant herding of cattle to ensure removal of vegetation, regular removal of encroaching scrub by hand cutting, and the supply of adequate water to meet the needs of the grazing livestock. This often involves bringing drums of water to livestock in periods of dry weather when raincatchers are no longer functional. Based on national data figures (Teagasc, 2008), the labour required for an out-wintered cow equates to 3.5 working days per year or 28 hours. Initial indications from the AranLIFE project, are that slightly higher stocking rates are required to achieve higher scores. The payment rates were based on the additional labour input required to achieve the higher scores. To ensure no dual funding with other agri-environment measures, the work involved had to be above the requirements of land under an agri-environment measure. Details of payment rates and their relation with agri-environment schemes, specifically the Low Input Permanent Pasture under the Green, Low-Carbon, Agri-Environment Scheme (GLAS) are detailed in Table 4.5. GLAS is the existing national agri-environment scheme and farmers under AranLIFE could also participate in GLAS. Under the Low Input Permanent Pasture action of GLAS, farmers selected a suitable pasture that contained a minimum of four grass species (excluding Ryegrasses) e.g. Cock's-foot (*Dactylis glomerata*), Timothy (*Phleum pratense*), Bentgrasses (genus *Agrostis*), Fescues (genus *Festuca*), Sweet vernal grass (*Anthoxanthum odoratum*), Yorkshire fog (*Holcus lanatus*), etc. and a minimum of three other non-grass plant species e.g. Plantain (genus *Plantago*), Chickweed (*Stellaria media*), Trefoils (genus *Lotus*) etc., and these must be reasonably dispersed throughout the field. There must be less than 30% Ryegrass cover (genus *Lolium*). The sward is then maintained by grazing with a maximum chemical nitrogen usage on the parcels of 40 kg/ha/annum of nitrogen.

Under AranLIFE, such management would be unsuitable to maintain the high species count found under a 4 or 5 score and therefore such scores need higher management requirements; thus, a farmer participating in GLAS could also receive the AranLIFE payment on scores 4 and 5 only.

Table 4.8

PAYMENT RATES UNDER ARANLIFE FOR DIFFERENT SCORES AND THE RELATIONSHIP WITH AGRI-ENVIRONMENT SCHEMES

SCORE	ELIGIBLE FOR GLAS	ARANLIFE	ARANLIFE PAYMENT /HA	DAFM POSITION
5	Yes	Yes	€150	Farmer paid both GLAS & AranLIFE
4	Yes	Yes	€125	Farmer paid both GLAS & AranLIFE
3	Yes	Yes	€100	Farmer only paid GLAS payment
2	Yes	No	€0	Farmer only paid GLAS payment
1	Yes	No	€0	Farmer only paid GLAS payment

For each scored parcel, advice was presented in the farm plan which gave the participant farmer some feedback on the score and what additional works were required to improve the score. A summary of the main advice for each score is detailed in Table 4.9.

Table 4.9

ADVISORY INFORMATION FOR EACH SCORE CATEGORY

LAND PARCEL SCORES FOR GRAZING ACTION	
SCORE	RATIONALE
5	Continuation of the existing management is main action required here, ensuring no increase or decrease in stocking levels. Maintain all water structures and access points to ensure stocking levels can be maintained. Small pockets of scrub control may still be required in some areas to prevent further encroachment.
4	Targeted Scrub removal will be main action required with follow up treatment. A small increase in stocking level may be required post scrub cutting. Ensure adequate water supplies.

3b	Increase current grazing levels, the main aim is to remove excess vegetation to allow species diversity. This may mean supplying adequate water facilities by either construction of new raincatcher/spring catchment or using facilities in adjacent fields. For winterage a flash grazing during the summer could be considered early enough to allow regrowth. Areas of encroaching scrub should be removed with retreatment as required. For fields with high levels of Molinia (Purple moor-grass), consider spring grazing when the grass is palatable to livestock. Remove any features that increase likelihood of damage, e.g. feeders.
3a	Reintroduction of adequate grazing is first step, best achieved through grazing with higher number of cattle over a short period. Areas of dead grass avoided by livestock should then be cut back along with the removal of areas of scrub. Ensure adequate water supplies for livestock which may mean construction of rain catcher.
2	Short term improvements in biodiversity unlikely. Determine whether semi-improved area is part of overall farming systems, supporting sensitive management of grazing areas elsewhere. If farmer is willing to improve species content, reduction of fertility levels is likely first step. Consider taking a hay crop from field, followed by grazing to reduce fertility. No inorganic or organic fertiliser to be applied.
1	Non-priority habitat and therefore not covered by the LIFE project.

AGRICULTURAL OUTPUT

AranLIFE also investigated the forage quality of Aran pastures and whether they meet the nutritional requirements of grazing livestock. A total of 369 forage samples were collected over 10 sampling occasions between March 2015 and January 2017. Samples were analysed for oven dry matter (DM), N (Dumas method), crude protein (CP) (N x 6.25), ash, acid detergent fibre (ADF), and neutral detergent fibre (NDF) (Van Soest analysis). In addition, 76 forage samples were analysed for dietary minerals, i.e. P, Mn, Ca, Na, K, Cl, Mg, Cu, Zn, Se, Co, I, during May 2015 and January 2016.

Overall, forages sampled from the less ecologically rich summer grazing areas were of a higher nutritional quality. Forage quality was highest in the pastures during the summer months and lowest on winterage during February and March. The winterage sward contains a high degree of scenesced plant material. Crude protein levels in forage are at an annual low

and fibre (i.e. NDF) content is high, indicating a low feeding value of the forage (i.e. energy content and digestibility is low). This is at a time when the daily energy demands of the suckler cow are highest due to rapid foetal growth during the third trimester of gestation (Duignan et al., 2018).

Mineral analyses data indicated that Aran forages are seasonally deficient throughout the year in P, Cu, Se, Co and Zn. Overall there were moderate to high levels of Ca, Mg, K, Mn and I. Very high levels of Na and Cl were recorded in Aran forages.

Therefore, to maximise the agricultural output may require some form of supplementation. Blood sample of grazing livestock reflected these deficiencies with the exception of phosphorous. Accurate sampling for phosphorous requires serum to be separated from the red/white blood cell clot within one to two hours of collection; however, this was not logistically possible for the project. Further investigation techniques are required but AranLIFE, working with the local veterinary surgeon developed mineral supplementation specifically suited to the islands' forage.

MONITORING WITHIN THE ARANLIFE PROJECT

Monitoring the impact of the project was an important element of the AranLIFE project. Many of the actions were designed using best available knowledge but were untested in the specific context of the Aran Islands. Therefore, a monitoring programme was developed to test effectiveness of the project actions and make recommendations that could be developed for other programmes in the Irish Rural Development Programme.

Monitoring of the impact of project actions on conservation status of the priority habitats involved baseline surveys prior to action implementation followed by the reassessment of monitoring locations later in the project by using $4m^2$ permanent quadrats or relevés to record change in percentage cover of species over time. A total of 350 relevés were recorded over the course of the project. The national methodologies for the assessment of limestone, coastal and grassland priority habitats, have derived indicators of condition and set targets that were used by the project to assess and monitor the conservation status of the habitats. These relevés were analysed as monitoring stops according to the criteria for assessing conservation status (Ryle et al., 2009; Devaney et al., 2013; Wilson and Fernández, 2013; O'Neill et al., 2013). Fixed point photographs were taken, and the

following information was also recorded in the relevé: percentage cover of bare rock, bare soil, litter, of grass/sedge layer, broadleaf layer, bryophyte layer, woody layer and sward height.

To monitor the development of the scrub species and bracken following scrub control measures, transects were set up along cut areas within scrub patches and the frequency of the scrub species (number of stems or stalks of bracken, briar, blackthorn and hazel) was recorded within $1m^2$ quadrat at 5m intervals. Percentage cover of the scrub/bracken species was also estimated. A $4m^2$ relevé was also collected within the cleared area and was paired with a relevé recorded from adjacent optimal vegetation outside of the scrub patch. From this data the progression from scrub encroached habitat to optimal species-rich habitat following scrub control measures was assessed.

Relevés recorded within scrub patches before cutting were also used to monitor the effectiveness of scrub control measures. These relevés were resurveyed and analysed for changes in vegetation following scrub control actions and used to assess if the developing vegetation resembles priority habitat quality following scrub removal.

The effectiveness of the protocol for measuring the scoring system outlined previously was also monitored. Transects containing ten 1 m^2 plots were recorded within a land parcel or field to verify the optimal grazing scores given to these areas. A total of 39 transects (each with 10 x 1 m^2 plots) were recorded across the three islands. Locations of 1 m^2 plots were randomly selected in a diagonal across or in a 'W' if the diagonal of the field was less than 100 m. At each of the 10 stops or plots within the transect the presence of higher plants and dominant bryophytes was noted. The analysis of these transects helped to ascertain the indicators which distinguish the scores and refine the national species indicators to suit the Aran Island context.

COMPARISON OF LAND PARCEL SCORES FROM 2014 AND 2016

Year 1 vs year 3 scores

Despite the short time period, improvements in the quality habitat, reflected through the scoring system did show an improving trend with land parcels moving up the scoring system over time with the changes of management. Comparison of grazing scores from 2014 and 2016 on the three islands shows a significant increase in areas scoring 5 (Figure 4.16).

Figure 4.16

COMPARISON OF LAND PARCEL SCORES FROM 2014 AND 2016

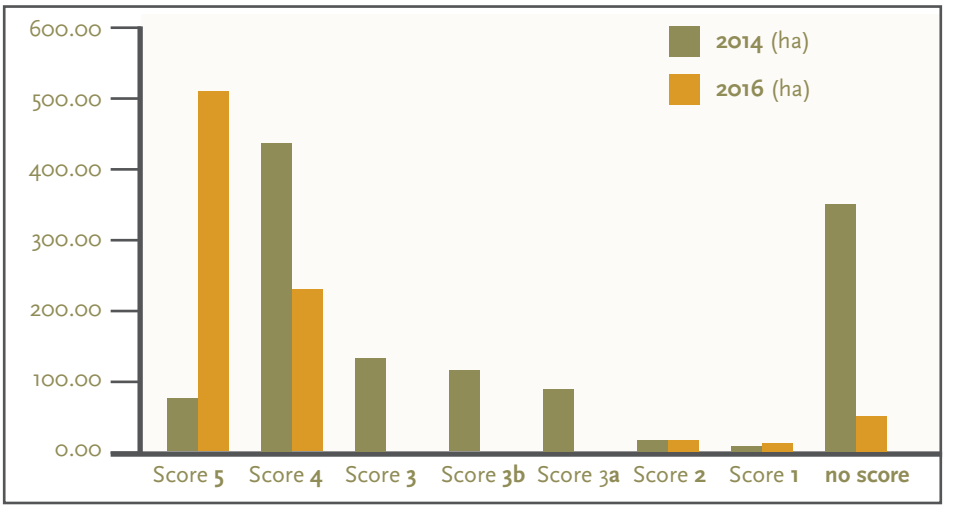


Figure 4.16. Total Area = 1016 ha. The change in grazing scores between year 1 of the project in 2014 and year 3 in 2016. Grazing score 3a was introduced in 2016 to take account of priority habitat that was not being grazed. Score 5 area increased by 315 ha from 2014 to 2016, and most of this improvement is from score 4 fields that had scrub removed and implemented optimal grazing.

As expected the results over a small time period tend to reflect that with changes in management there is a movement from habitat just below favourable condition (Score 4) to favourable condition (Score 5), whilst improved grazing and scrub control did move some areas with a Score 3b to 5. In generally a longer period of time is required to change the score at the lower end of the scale (Score 3b and 2).

In relation to scrub control, the monitoring programme demonstrated that for successful control, follow up treatments were required. With one cut of scrub and no follow up treatment, positive indicator species may increase over the short term, however scrub encroachment is still an issue. Further cutting, herbicide treatment or selective grazing with goats all helped control subsequent regrowth. Scrub cutting operations helped to increase the grazing score over most of the areas, even though the vegetation underlying the scrub patch may not be of high conservation value, unlike the vegetation throughout most of the field. Once the scrub had been cleared and adequate water provision supplied, fields could then be optimally grazed and attain a high grazing score.

COMMUNITY INVOLVEMENT

As detailed earlier the development of AranLIFE came from the island community who were concerned about the changing landscape due to changing farming practices. There was a strong recognition that the island landscape was linked with the tourist industry in terms of landscape character and biodiversity. So AranLIFE was not a project developed from government agencies and then rolled out on the islands, but was a combination of groups working together to meet the needs of the different stakeholders. Farmer involvement was critical to AranLIFE's development. Initially meetings with farmers outlined what work they felt was necessary. Trial works were then undertaken by farmers to aid in the costing of measures and at different stages of the process information was fed back through farmer meetings. This greatly aided in the delivery of the project as there was greater awareness of what the project was about and also the measures came from the farming community.

This stakeholder engagement continued throughout the duration of the project. To increase awareness of the work educational initiatives were developed, information days held, an island bioblitz (intense period of biological surveying) was carried out on Inis Mór and the project team facilitated a large number of outside group visits. These events explained the biodiversity of the islands, the role of farming in maintaining that biodiversity, as well as its significance at a national and international level. The main target groups were the islands' farmers and the local community, local school children (primary and secondary), universities and the wider public (visitors, service providers and farmers from other High Nature Value farmland areas in Ireland).

The use of information sheets, public notice boards and other beneficial materials informed people of the AranLIFE Project and the importance of Natura 2000 sites. To provide accessible information for participant farmers and the wider public, a range of pamphlets were produced. One was an information leaflet giving details of the project and was available in locations around the islands. Additional leaflets were produced as a series on wildlife on the farm and included colourful guides of plants on the farm, butterflies and birds found on the islands. Informative road signs were produced for each island.

KEY FINDINGS, LESSONS LEARNED AND THE WAY FORWARD

The main aims of the AranLIFE project were to demonstrate best management techniques to either maintain favourable condition, or restore sites to favourable condition by addressing the multiple threats of land abandonment, undergrazing, intensification, loss of traditional management systems and associated loss of knowledge. By doing so, the project aimed to improve the conservation status of 218 hectares of Limestone pavement (8240*), 78 hectares of Orchid rich calcareous grasslands (6210*), 686 hectares of Limestone pavement (8240*)/Orchid rich calcareous grasslands (6210*) mosaic and 29 hectares of Machair (21AO*). The project also aimed to enhance understanding, appreciation and engagement of all the key stakeholders with the conservation of priority habitats on the Aran Islands, and provide recommendations on appropriate support mechanisms for farming on the Aran Islands that will address the issues that threaten the status of the priority habitats of the islands.

The results-based approach was tried as it was a way of both encouraging work on the negative features, such as undergrazing, scrub control, and also it helped farmers to understand what the conservation status of habitats actually meant on the ground (McGurn and Moran, 2013). The AranLIFE approach has been successful. The main advantages of the approach taken were:

- an improvement in the condition of priority habitats and harnessing of knowledge regarding their management from both the farmers and other stakeholders.
- a specialised team with their own identity helped to foster a good working relationship with both the participant farmers and the islands' community.
- a Steering Committee and wider Advisory Group to oversee the project brought together the relevant statutory agencies, farming communities, and researchers, thereby improving communications between all stakeholders and gave the project team the necessary support when required.
- a farm plan approach was an efficient way of detailing works. From the farm plan, a farmer could clearly identify the work required and the costings involved. Once the work was complete the farmer could make a

claim for payment. The plans were also a good way of recording all works completed.

- a high level of engagement between the project team and farmers simplified the project, with farmers willing to help out in different ways.
- a results-based model that could be used as a template for other High Nature Value farming areas within Europe which are currently not being served by existing agri-environment schemes.
- production of information guides on farming and biodiversity on the islands were popular with farmers and tourists.

AranLIFE was a LIFE project, the EU's funding instrument for the environment and climate action, aimed at specific habitats with a range of actions that include specific works to improve the quality of the habitat. The approach taken by AranLIFE was to incorporate payments for a range of actions, including scrub control, access improvements, and optimum grazing, with the latter being judged on a results-based approach. This approach allowed us to develop ideas for future results based agri-environmental measures that could be incorporated into future Rural Development Programmes, and so address the limitations of existing schemes in the management of habitats (as in Kelly, 2010). For the farmers, the AranLIFE work therefore had a range of payments for capital works, prescribed actions and results-based outcomes. For AranLIFE, this approach was beneficial because it enabled the farmer along with the project team to:

- address the conservation issues he/she had at a field level;
- supply the necessary funding to carry out actions;
- have a payment to ensure optimal grazing
- communicate the message across to the farming community of what the project was looking to achieve.

For AranLIFE, the results-based payments for grazing outcomes ranged from 0-€150 per hectare (Table 4.8), while the scrub control payment ranged from €3000-6000 per ha. Both payments are for the participants' time, and this can be a weakness in the blended approach, incorporating an action and results-based approach. Basically it can be more financially advantageous

for a farmer with high levels of corrective actions over a farmer with high-scoring land. In other words, the restoration of a habitat may attract more payments than its maintenance. This can create a perception in the farming community that the farmer who hadn't looked after their land was better rewarded in comparison to the farmer who has always maintained a high level of habitat quality. In an ideal results-based approach, the level of payment for the highest score should reflect the work involved in maintaining it. However, with high payments for specific actions needed to bring degraded habitat back to a favourable condition, this can be unrealistic.

On the other hand, although there may be more payments for restoration, the farmer must still conduct the works, and these works are required for the farmer to be in a position to maintain the habitat and get the smaller (but ongoing) payments for achieving high scores. While the intention is not to profit from non-productive investments, works involving a labour input from the farmer need to be set at a sufficient rate to incentivise the farmer. These can be seen as an additional income and favoured by the farmer.

THE FUTURE

Ireland's offshore islands have and will have greater uncertainty in the future due to: isolation, poor employment prospects, a very extensive agriculture system, less favourable economic justification for provision of services, and adverse climate conditions. Over the years there has been a continuous decline in the number of islands inhabited. However, the habited islands are important aspects of Ireland's cultural and natural capital. The AranLIFE project has been vital in highlighting the natural capital of the Islands, liaising with stakeholders, working with the islands farming and non-farming community, increasing the understanding of why agriculture is important to maintain these habitats and developing suitable policies to meet requirements. Compared to the value of the livestock produced, the additional services from this agricultural system are of greater value to the overall economy in terms of tourism and the genetic resource of the island. Disseminating this information is one of the important long term benefits both from an environmental, economic and social point of view, as without the AranLIFE Project there is a poor platform for highlighting such issues at a local and European level.

Widening the scope of AranLIFE may change the delivery mechanism and may involve the use of outside specialised planners or an expanded project team requiring training to fully understand the ecology and agricultural system on the islands. A follow-on project, Caomhnú Árann, an EIP (European Innovation Partnership)-Agri Operational Group co-funded by the Department of Agriculture, Food and the Marine and the EU, is investigating alternative ways of developing farm plans using remote sensing. This has potential to aid in the delivery of local led programmes whilst reducing the administration costs involved. This new project, which commenced in 2019, will build on the work of AranLIFE working with 127 farmers, including the majority of farmers who participated in AranLIFE over the three islands, with the idea that the approach could be rolled out as a large scale Results Based Agri-environment scheme. Caomhnú Árann will also investigate whether high scoring species rich grasslands can be used as a wildflower seed source, where seed is collected to meet a growing market for wildflower seed but with no negative effect on the overall grassland biodiversity. This is possibly a way of adding value to grassland outputs.
Recognising the high administration costs associated with the AranLIFE project and with a lot of other results based programmes, a central element of Caomhnú Árann is to look at remote sensing to aid in the delivery of farm plans and monitoring. The Caomhnú Árann project team of three people is working with farmers using existing ortho-imagery available and drone technology to see if habitat quality and encroaching scrub can be identified quickly and accurately, thus reducing the need for complete land survey work. Training farmers along with the project team will aid in this process. A full monitoring programme is in place within Caomhnú Árann to judge the efficiency of using such technology.

AranLIFE was a successful demonstration project contributing to the implementation of the objectives of the Habitats and Birds Directives. Stakeholders worked together to deliver a series of actions. Caomhnú Árann is the next step, it will look at how predetermined outputs can be delivered at a wider level using different processes to reduce administration costs when instigated over a higher number of farmers. Different approaches need to be incorporated in the development of national agri-environment schemes within Rural Development Plans. The history of direct payments within the CAP is based on historic entitlements, reflecting past stock numbers. Low stocking rates are and have been a feature on the islands and hence direct agricultural payments per ha are low. In the present structure there is no

allowance for other services such as biodiversity. Adding value to the cattle, possible with a quality label is one approach, but is difficult to achieve. The small number of farmers and low stocking rates limit the guarantee of supply that wholesalers, restaurants require. In addition, the feeding value of the Aran Island grasslands during the winter is poor, therefore finishing cattle would require a major change in the agricultural system with possible negative effects on biodiversity, the very selling point of the Aran Island beef. Greater co-ordination with beef finishers on the mainland may be a better option with the beef sold as sourced from the Aran Islands.

The results-based approach implemented by AranLIFE and now trialled under Caomhnú Árann is a step towards improving farm income based on the provision of ecosystem services. Farmers can then make the decisions on the path they would prefer to take. Some will continue trying to maximise the agricultural output through the sale of livestock, whilst other will favour the route of maximising payment for ecosystem services. Such programmes can be implemented independently and alongside existing agri-environment measures but, ideally, they should be incorporated into existing agri-environment schemes. AranLIFE implemented the measures the farming community felt were needed, coupled with additional technical expertise. Many of these actions were untested and the LIFE project was a source of innovative practice and demonstration. Incorporating results based payments into future agri-environment schemes will require a higher level of input, targeted areas, community involvement, and identification of indicator species, assessment procedures and payment structures. The projects funded under the EIP Agri measure, including Caomhnú Árann, are a good method to trial such ideas on a broad range of habitat types.

Appendix 1 Outputs from AranLIFE – clockwise from top left; outputs 1,2,3 and 4

Achievements of the AranLIFE project

Worked with 67 farmers across the three Aran Islands to improve the conservation status of habitats of international importance.

Improved access to land parcels to facilitate management including grazing, by clearing 28km of boreen and installing 40 gates and assisting access to approximately 460ha of land.

Scrub and bracken control management resulting in 91ha of scrub controlled.

Enhancement of livestock management facilities through the provision of a water infrastructure consisting of 131 new water features installed, and 107 existing rain catchers repaired. This infrastructure secures the conservation of over 4,500,000 litres of rainwater annually and improves the grazing in approximately 474ha of land.

Identified the deficiencies in the forage and worked with the local veterinary surgeon to provide mineral supplementation specifically suited to the island forage.

Implementation of optimal grazing plans on 1,011ha of land within the project, based on a result based approach to measure success.

Development of a simple scoring system that reflects the quality of the habitat and level of grazing achieved. The purpose of this is twofold, it encourages farmers to graze the land to a predetermined level and provides an opportunity to trial a results based output which could be used in future agri-environment programmes elsewhere. This simple scheme can be used in farmer self-assessment.

Erection of 4 noticeboards, one on each island outlining the AranLIFE work. An additional noticeboard was erected on Inis Mór highlighting the importance of the Machair, and the sensitivity of the bird species that nest there.

The production of a range of short videos detailing the biodiversity of the islands and the conservation issues that the Aranlife project dealt with.

Production of a range of informative booklets (entitled: Aran Islands: Plants of the farm; Butterflies and day flying moths of the farm; Birds of farms and villages, coastal birds and Historic monuments on the farm) calendars (700) and posters (1,206).

The Flora and Fauna of the islands information guides (over 11,000 have been produced) have been well received by locals and visitors. Four wildlife notice boards have been erected at the playground on Inis Oirr based on these Flora and Fauna guides. AranLIFE helped adapt the information to suit Inis Oirr. These notice boards were erected by Comhar Caomhán Teo, Inis Oirr with funding from Galway County Council through the Local Agenda 21 Environment Partnership Fund.

Produced 4 newsletters which have kept our farmers and the general public up to date with AranLIFE events and achievements.

The production of Best Practice Guides and Information sheets to encourage more effective ecologically sensitive management of additional land on the islands and for use in other areas.

APPENDICES

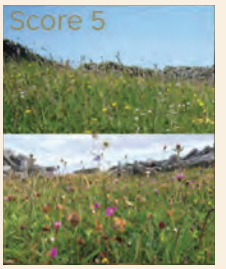
Appendix 2 The AranLIFE scoring system

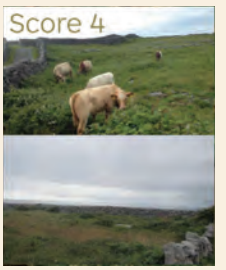
The AranLIFE scoring system

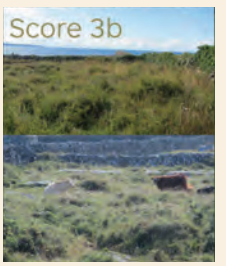
Score 5
Represents good quality priority habitat. It is well managed with an appropriate grazing regime, which usually involves grazing to a short turf in winter, but may also involve a flash grazing during the summer if grass growth is good.
A score 5 has a high-species diversity with frequent positive indicator species, producing a colourful array of flowers during the summer months, including an abundance of orchid species. No fertiliser is applied to this grassland as doing so would reduce the species diversity significantly. Since the grazing intensity is at an optimum level, scrub and bracken encroachment is not an issue or has been rectified by cutting.

Score 4
Is priority habitat that has a high-species diversity with frequently occurring positive indicator species. The grazing level is appropriate for the most part, however, scrub or bracken encroachment is an issue.

Score 3b
Is priority habitat with reduced number of positive indicator species. It has low species diversity due to sub-optimal grazing levels, which favour a dominance of rank tall grasses, and a higher sward height in summer which shades out the herbaceous species typical of calcareous grassland. Scrub or bracken is an issue in these fields, which is also a consequence of the sub-optimal grazing regime.





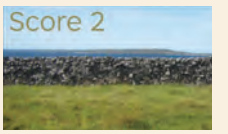


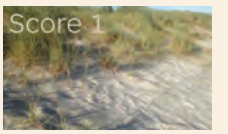
The AranLIFE scoring system

Score 3a
Is priority habitat either not in agricultural use, where grazing is not occurring or where the grazing rate is so low that there is a substantial build-up of grass.

Score 2
Is semi-improved grassland with limited indicators of priority habitat. The vegetation is grass dominated, with higher levels of fertility or more recently made grasslands.

Score 1
Is habitat that is not one of the habitats covered by the AranLIFE project.





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Agricultural habitats cover approximately half the European Union (EU) and an estimated 50% of all species and several habitats of conservation concern in the EU depend on agricultural management. Reversing the loss of European biodiversity is clearly dependent on the conservation of farmland biodiversity.

Results-based approaches are the focus of a growing discussion about improved biodiversity conservation and environmental performance of EU agri-environmental policies. This book outlines lessons learned from a collection of Irish case studies that have implemented results-based approaches and payments for the conservation of farmland habitats and species. The case studies include prominent projects and programmes: the Burren Programme, AranLIFE, KerryLIFE, the NPWS Farm Plan Scheme and Result-Based Agri-environmental Payment Schemes (RBAPS) project.

This work is intended for an international audience of practitioners, policymakers and academics interested in results-based approaches for the conservation of biodiversity and the provision of ecosystem services.

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Teagasc
Agriculture and Food Development Authority

An Roinn Cultúir, Oidhreachta agus Gaeltachta
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