

Our Limestone Heritage



*“an antidote to modernity’s flotsam and jetsam”,
a place “where man’s displacement may
begin to be addressed.” It remains, as it has for centuries,
a mute witness and open book of geological and human history.
To truly experience it, you need to leave the everyday world behind,
abandon your car and complete your pilgrimage on foot.
Out on the limestone terraces of the Burren,
if you allow yourself to experience the Silence,
you will hear your Soul speak.*

Edward O Loughlen

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Introduction

The landscape of Ireland owes much of its spectacular appearance to the passage of ice sheets during the last ice age. Much of Ireland's geology consists of limestone, and in places this stone has been revealed by the scouring action of immense sheets of ice, that once moved across the land. Today the resulting intricate sculpted beauty of these limestone pavements is being damaged through ignorance and misunderstanding. Our limestone pavements are a nationally and internationally important part of our unique heritage. Irreversible

damage is being caused from an array of activities including agricultural improvement and the physical removal of the surface limestone pavement itself. The future of limestone pavements is in your hands.

Limestone through the ages

Ireland is home to extensive areas of ice-scoured limestone pavement; a rare and endangered habitat. The bare expanses of limestone, now criss-crossed by deep fissures, date back to glacial times.

The formation of limestone pavement is complex. It arises from a series of events that makes it irreplaceable. The pavement in Ireland was formed on Carboniferous limestone, which was laid down 340 million years ago. Over the last 2 million years the limestone has been laid bare by the erosive action of ice sheets. This ice age scouring created the often level or gently sloping platforms we see today. Dissolution through weathering has been an on going process beneath the soil, which has itself weathered away. The process



1. Pits and pans. Source: Burrenbeo.
2. The Burren. Source: Burrenbeo.



1. Clints and grykes.
Source: Dr. Stephen D. Ward.
2. Runnels. Source: Burrenbeo.
3. Runnels. Source: Stephen D. Ward.
4. Killykeegan Cashel in Co. Fermanagh

continues with the limestone still under attack by acids in rain and ground water, leading to the enlargement of joints and fractures.

The characteristic deep fissures are called grikes, the limestone blocks are clints and the gutter-like channels on the clints which drain into the grikes are runnels.

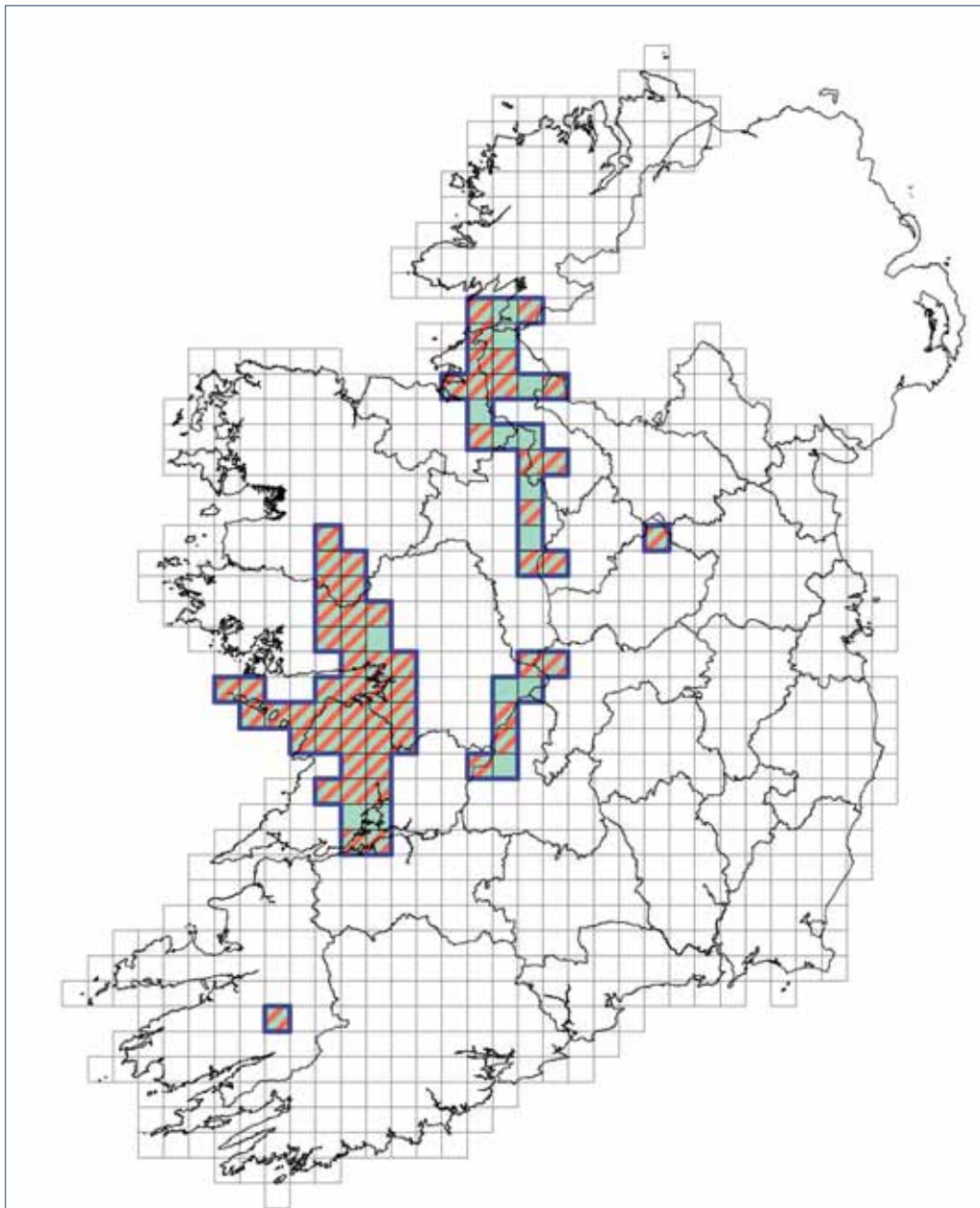
The diversity of appearance which is found in different areas of pavement reflects not only the composition and structure of bedrock but also the direction and length of the glacial scour.

Limestone pavement is of great geological importance as a product of glaciations and dissolutional weathering and we can see our climate and landscape evolution over many tens of thousands of years reflected in its form.

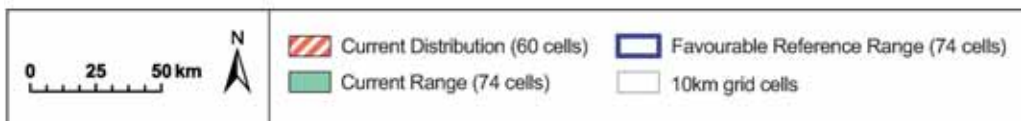
The limestone landscapes have been inhabited for thousands of years and show evidence of settlement and agricultural use. Wedge tombs, ring forts and cashels such as Killykeegan Cashel in Co. Fermanagh and Poul nabrone portal tomb and Cathair Chomáin – a 9th century fortress in County Clare – link us to our limestone past.



Distribution of Limestone Pavement in Ireland



Within Ireland there is estimated to be 36,300 hectares of limestone pavement. Most is found in Counties Clare and Galway with the most southerly outcrop in Killarney National Park and the most northerly area in Ballintra in County Donegal. In Northern Ireland limestone pavement is restricted to west Fermanagh.



The Living Landscape



1. Mountain Avens. Source: Burrenbeo.
2. Maidenhair Fern. Source: Dr. Steohen D. Ward.
3. Bloody Crane's Bill. Source: Dr. Steohen D. Ward.
4. Limestone / calcareous grassland. Source: Burrenbeo.

Limestone pavement is a habitat of national and international importance and consists of a mosaic of bare rock, grassland, heath, scrub and woodland.

The deeper grikes provide sheltered, moist conditions and are favoured by a range of plants more commonly associated with woodland. These include Herb-Robert (*Geranium robertianum*), Hart's-tongue Fern (*Phyllitis scolopendrium*), Guelder-rose (*Viburnum opulus*), Bloody Crane's-bill (*Geranium*

sanguineum), Maidenhair Spleenwort (*Asplenium trichomanes*) and Wall Rue (*Asplenium ruta-muraria*). Rarer species include Maidenhair Fern (*Adiantum capillus veneris*).

The Burren is famed for its unique mixture of wild plants. Mountain Avens (*Dryas octopetala*), for example, has survived in the Burren since the end of the last ice age – it is one of the so called 'Arctic alpine' species. The Maidenhair Fern, on the other hand, cannot tolerate frost and



could not have survived in the Burren when it was icebound.

More than 700 different flowering plants and ferns, ranging from tiny annuals to shrubs and trees, have been recorded in the Burren. This represents about three-quarters of the Irish native flora. The area is also a refuge for many rare species of lichens and mosses, which thrive in the mild damp climate the region experiences today.

Rare residents of pavement include a tiny whorl snail; the narrow-mouth whorl snail (*Vertigo angustior*) is found in mossy vegetation on low level pavement.

Lesser horse-shoe bats (*Rhinolophus hipposederos*) can also be found living in caves and grikes of limestone pavement. A range of butterflies and moths use the limestone flora associated with pavement. These include the threatened pearl bordered fritillary (*Boloria euphrosyne*) and the Burren green (*Calamia tridens*) – a moth which is locally abundant in the Burren, but unknown elsewhere in Ireland. The wheatear (*Oenanthe oenanthe*) and wren may also make their homes in limestone pavement; the wren's scientific name of Troglodytes – a cave dweller – being consistent with it frequenting rocky recesses.



1. Common lizard on limestone pavement. Source: Irish Wildlife Trust.
2. Wheatear. Source: Laurie Campbell.
3. Fungi and plants thriving on the nutrients provided by animal dung. Source: Burrenbeo.
4. Cows graze the limestone pavement. Source: Burrenbeo.



Striking landscape of the West Fermanagh Scarplands. Source: Northern Ireland Environment Agency

Getting the balance right

Grazing has a strong influence on vegetation and plant life. Appropriate grazing keeps the vegetation short and rich in species. A lack of soil and space for root growth, along with grazing pressure, often means that

any trees or shrubs present are stunted, dwarfed and bonsai-like. Where livestock grazing is low or absent, shrubs and trees can take root in the shallow soils and grikes eventually forming scrub and woodland, which can encroach on

the limestone pavement leading to the disappearance of characteristic species. Under areas of dense hazel, thick carpets of moss grow; the growth of these mosses leads to the formation of new, organic soils.

Our Disappearing Heritage

Limestone pavement took thousands of years to form but can be destroyed in hours. Once it has gone it is lost forever. Within Ireland, there are many examples of the active destruction of limestone pavement from agricultural reclamation, house building, quarrying, the sale of rockery stone, and visitor pressures.

Probably the most damaging of activities to limestone pavements in Ireland are activities associated with agricultural improvement and reclamation of limestone pavement. The use of fertilisers,

herbicides or pesticides on agricultural land that is near to or on limestone pavements can alter species diversity on the limestone pavement and eventually lead to an increase in unfavourable plant species and a reduction in the area of exposed rock. In some areas grikes have been in-filled to reduce the risk of injury to grazing animals, and this leads to the loss of characteristic species. Limestone pavement is also being removed during agricultural reclamation.

Limestone pavement can be removed from sites for new housing and infrastructure once

planning permission has been granted by the Local Planning Authority / Department of the Environment. However planning permission is not required for operations which are below a certain threshold outside Special Area of Conservation (SAC) designated sites, under the E.U. Habitats Directive. This effectively means that any limestone pavement outside an SAC is at risk of damage through extraction.

Limestone has been used for many years for construction and landscaping. The surface features of limestone pavement are



Limestone pavement for sale in garden centres. Source: Dr. Stephen D. Ward.



1. Destruction by quarrying visible in the background. Source: Dr. Stephen D. Ward.



2. This Boulder has been pushed from its place of rest for 10,000 years. Source: Dr. Stephen D. Ward.

inevitably destroyed during deep quarrying activities.

Limestone pavement, which is also known as water-worn limestone, has been used in garden rockeries since the last century. However, it is only in the last 40 years that damage has become more widespread and extensive areas have been relentlessly stripped with the aid of machinery. To many garden enthusiasts, a rockery is still regarded as one of the most desirable features in any garden. Unfortunately this continuing use of waterworn limestone in rockeries is one of the factors which threatens the very

existence of limestone pavements and the special plants which live in them. Gardeners are often oblivious to the origin of water-worn limestone and the fact that one of the world's finest habitats is being destroyed for them.

Considerable damage has been done to the limestone pavements of the Burren in recent times as a result of a craze among visitors for building miniature monuments. The damage is being caused primarily on the shattered limestone pavements of the Burren, where smaller pieces of limestone are used in the building process. In some cases, larger

pieces of limestone have been deliberately shattered to provide building materials. Where stone cannot readily be collected from the pavement, there are many examples of it having been taken indiscriminately from surrounding stone walls, so that these too, which may date from ancient times, have also come under attack. Signs in three languages have been erected by Clare County Council in popular parking spots, requesting visitors not to build such mini-monuments – it is hoped they will deter such damaging activities.

A Brighter Future

While past damage cannot be undone, at least the future for limestone pavement looks brighter than it has done for many years, thanks to increased legal protection and campaigning by environmental groups. Selected limestone pavement sites are protected by a legal designation known as Special Areas of Conservation (SACs), under the EU Habitats Directive. Under this

Directive, over 40 limestone pavement sites have been selected in the Republic of Ireland, 30 of which are found in the counties of Clare, Galway and Mayo. This includes three separate SACs, totaling 28,503ha, which have been declared in the Burren. There are 3 National Nature Reserves with limestone pavement: Keelhillia, Dromore Woods and Garryland.

The total area of limestone pavement in County Fermanagh in Northern Ireland is approximately 220 hectares and more than 90% of this is within designated sites. Much of the limestone pavement is within Cuilcagh Area of Scientific Interest (ASSI) and West Fermanagh Scarplands ASSI. Both

Poulnabrone. Source: Dept. of the Environment, Heritage & Local Government.





Crossmurrin, Co. Fermanagh. Source: Northern Ireland Environment Agency.

have been designated as SACs. 70 hectares of limestone pavement in Fermanagh is included within two National Nature Reserves (NNR): Killykeegan and Crossmurrin NNR.

All extraction or damage to limestone pavement within SACs is illegal. However, extraction from other sites not protected by SAC designation can proceed so long as planning permission has been granted.

In November 2007 the Irish Government stated that it wanted to declare some unprotected limestone areas as Natural Heritage Areas (NHAs). NHAs are a national designation, under the Wildlife (Amendment) Act 2000, for areas considered important for the habitats that occur there, or because they are home to plants and animals that require protection. Under the Wildlife (Amendment) Act 2000, it is a

function of the Minister to secure the conservation of wildlife and to promote the conservation of biological diversity. Conservation includes measures to maintain, enhance or restore the quality, value or diversity of species, habitats, communities, geological features or geomorphological features.

How You Can Help

In relation to farming, appropriate management of the land is vital to preserve biodiversity. Out-wintering, where animals graze on the lowlands during the summer and move uphill during the winter, is favourable as it allows the plant species of the uplands to seed and flower during the summer period. Farmers can join agri-environment schemes and obtain grants for the appropriate management of limestone pavement e.g., Rural Environmental Protection Scheme (REPS) and the National Parks and Wildlife Service Farm Plans Scheme in the Republic of Ireland. In Northern Ireland the Northern Ireland Countryside Management Scheme (NICMS) is available.

In relation to housing, planners and developers can help prevent the destruction of limestone pavement; indeed, development should not be permitted on limestone pavement. Inadequate attention paid to waste water disposal facilities can contaminate the groundwater and requires careful consideration. Planning legislation should be reviewed to

ensure adequate protection of this threatened, rare habitat. County Development Plans/Area Plans and Regional Development Guidelines / Planning Policy Statements provide guidance on the need to protect key habitats such as limestone pavement which should be enforced by the relevant Local Authorities.

In relation to gardening, gardeners should note that when water-worn limestone is no longer sought by gardeners and landscapers, limestone pavement will no longer be extracted for this market. Alternatives such as sandstone, granite, slate or deep quarried limestone are readily available and more environmentally acceptable. You can help safeguard our world-class heritage, not only by ensuring that you never buy water worn limestone, but also by informing the Irish Wildlife Trust or National Parks & Wildlife Service, Northern Ireland Environment Agency or Heritage or Biodiversity Officers in your local council if you see:



1. Ash scailp. Source: Burrenbeo.

2. Early Marsh Orchid. Source: Burrenbeo.

3. Coral fossils preserved for millions of years. Source: Burrenbeo.

- Water-worn limestone for sale. It may be sold as Irish Limestone.
- Water-worn limestone being used in rockeries or landscaping schemes.
- Damage occurring, or evidence of recent damage, to any limestone pavement.

This will help the relevant organisations to compile records of the scale of the problem and identify appropriate responses to address it.

With appropriate management, visitors should be encouraged to enjoy and appreciate the landscape.

All visitors to environmentally sensitive sites should follow a Code of Good Practice.

Following this code will help to ensure that limestone pavements are there for others to enjoy.

Code of Good Practice

- Leave no trace of your visit to a limestone pavement area.
- Keep to official walkways and paths
- Do not damage or move any walls, stones, monuments.
- Do not create your own mini monuments.
- Take only pictures or make drawings
- Do not remove ANY vegetation, as this is illegal.



1.



2.

1. Recently built stone wall using extracted limestone pavement. Source: Burrenbeo.
2. Dark Red Helleborine. Source: Burrenbeo.

Useful Contact Details

Irish Wildlife Trust

Sigmund Business Centre,
93a Lagan Road,
Dublin Industrial Estate,
Glasnevin, Dublin 11,
Ireland.
www.iwt.ie



The Heritage Council

Church Lane,
Kilkenny, Ireland.
www.heritagecouncil.ie

An Chomhairle Oidhreachta
The Heritage Council



National Parks and Wildlife Service

7 Ely Place, Dublin 2
Ireland.
www.npws.ie



Comhshaoil, Oidhreachta agus Riailas Áitiúil
Environment, Heritage and Local Government

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burrenbeotrust
open your eyes to the living burren

Northern Ireland Environment Agency

Klondyke Building
Cromac Avenue
Gasworks Business Park
Lower Ormeau Road
Belfast, Northern Ireland.
www.ni-environment.gov.uk



For further information on
limestone pavement in Ireland
and the UK, visit
www.limestone-pavements.org.uk



Oughtmama Church, Co. Clare. Source: Dept. of the Environment, Heritage & Local Government.



Our Limestone Heritage

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An Chomhairle Oidhreachta
The Heritage Council



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