

CHAPTER ONE

The Physical Geography of North County Wicklow

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Bray town is the gateway to County Wicklow. For anyone interested in geology or geomorphology, Wicklow is a vast open air laboratory. Contained within its boundaries are the 3 major rock types and examples of most of the processes that have helped to shape the rocks into the landscape we see today. This chapter will examine the following physical aspects of the north county: the rocks, glacial features and the coastline. It is hoped that it will provide basic information for those who might wish to undertake field studies in the area.

I – The Rocks

There are 3 major groups of rocks in the Wicklow region (see fig 2). The three groups in chronological (age) order, are as follows:

1. The Bray Group (Cambrian)
2. The Ribband Group (Ordovician)
3. The Granites

THE BRAY GROUP

The Bray Group stretches from Bray to Wicklow town and inland to Roundwood. The group dates from Cambrian times. These are the oldest rocks in the region dating back from 500 to 570 million years ago. For the most part they

are turbidite sediments. Such rocks were deposited on the ocean floor by turbidity currents which are sediment-laden submarine currents. Common rocks of the Bray Group are the quartzites of Bray Head and the purple and green greywackes which can be seen south of the harbour in Greystones.

The rocks of the Bray Group were extensively folded. The folding can be observed at Greystones. There is little agreement about the nature and extent of the folding. Some would argue that the whole area was tectonically thrust into its present position. Others would argue that the area is the remains of an anticline (upfold).

THE RIBBAND GROUP

The Ribband Group of rocks exist in two bands both of which trend from N.E. to S.W. One of these bands lies on the N.W. side of the Wicklow mountains whereas the other lies on the S.E. slopes of the mountains. This groups dates mainly from the Ordovician period which ranges from +35 million to 500 million years ago.

The rocks of the area are also turbidites. They are mainly grey, red and green slates and sandstones.

THE GRANITES

During the Cambrian and Ordovician periods mentioned above, the Wicklow area was submerged under a sea in which sedimentary rocks were forming. On either side of that sea lay continental plates. About 500 million years ago the plates began to close. The pressure of this convergence caused the sediments on the edges of the plates to be folded up into mountains. This mountain building period, which lasted until 400 million years ago, was called the Caledonian Period. The Wicklow mountains were formed at that time. As the mountains were folded, molten magma (hot liquid rock) welled up inside the folds. As it cooled slowly large crystals of mica, feldspar and quartz formed in it. Eventually it cooled to the solid rock we know today as granite.

The Wicklow granite is the largest body of granite in either Ireland or Britain. It is 110 km. long and stretches S.W. from Blackrock in Co. Dublin to Graiguenamanagh in Co. Kilkenny following the N.E. – S.W. trend of the Caledonian mountains.

The main batholith or body of the granite is not as simple as first appears. It is now believed that there are 5 separate domes of granite within the batholith. The granites in the different domes vary in texture and chemical composition.

Wicklow granite is usually grey and speckled with black and silver flakes. It is much valued as a building stone but unfortunately is far too expensive today to be used extensively.

In the 18th and 19th centuries the granite was quarried

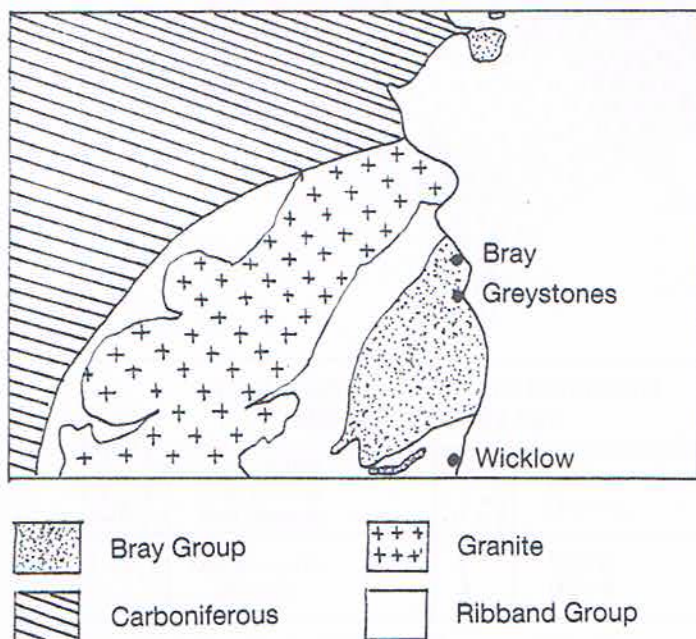


Fig. 2 Geological Map of North Wicklow.

extensively at Dalkey and Ballybrew for use in many of the public buildings in Dublin such as the G.P.O., the Bank of Ireland and Dún Laoghaire harbour. Granite was also exported to Britain.

Two other geological phenomena found in association with the granite must be mentioned. These are:

The Metamorphic Aureole.

The Mineral veins.

THE METAMORPHIC AUREOLE

When the magma was intruded into the folds, it baked the rocks with which it came into contact because of its temperature, over 1000°C! The surrounding, or country, rocks were changed or metamorphosed by the heat. Shales became mica schists. Such changed rocks are called metamorphic rocks. Surrounding the granite there is a narrow zone of metamorphic rock about 1 kilometre wide known as the metamorphic aureole. It is composed mainly of mica schist.

The mica schist of the aureole and the granite of the batholith are visible today because the overlying sedimentary rocks have been eroded over the last 400 million years. We say that the batholith of granite has been 'unroofed' by the combined processes of weathering and erosion. (figs 3 and 4).

THE MINERAL VEINS

As the magma solidified it cracked. Hot water and gases charged with minerals in solution were forced up through these cracks under great pressure. The most common mineral in these solutions was quartz but there were other more precious minerals present in them as well. Lead, zinc, iron with traces even of gold and silver were among these minerals. The minerals crystallized on the walls of the cracks and gradually closed them up. So the cracks were replaced by

mineral veins. As weather and erosion stripped the granite of its cover, these mineral veins were exposed. These veins have been mined for hundreds of years and have yielded lead, zinc, copper, silver and gold. The greatest concentration of veins and therefore mining was close to the granite/schist boundary. Abandoned mines can be seen today at Killiney, Ballycorus, Glendasan, Glendalough and Glenmalure.

The granite/schist boundary runs through Ballycorus Hill. There was a lead mine there in the 19th Century. The spoil heaps are still there as are the remains of the smelter. Lead ore was brought to the smelter from the mines in the Wicklow valleys. There it was smelted into pure lead and made into shot for the munitions industry. The dangerous gases were taken by a flue to the top of Ballycorus Hill to be released safely into the higher atmosphere. If you visit this area stay out of the flue as there is a high concentration of arsenic in the sulphur deposits on its inside surface.

II – The Glaciation of Wicklow

It is generally agreed that Ireland was glaciated twice during the Pleistocene Ice Age. The first glacial episode is known as the Munsterian glaciation. It is called Munsterian because practically all of Ireland including Munster was glaciated. The only areas to escape were the highest mountains. The second glacial period is known as the Midlandian glaciation. During this glaciation ice only reached as far as the southern midlands. It did not advance as far as Munster.

The study of these glacial episodes is fraught with problems not least of which is the destruction of evidence of the Munsterian glaciation by the subsequent Midlandian glaciation. However, much careful study over the last century has given us a fairly clear picture of the major events during these glacial episodes.

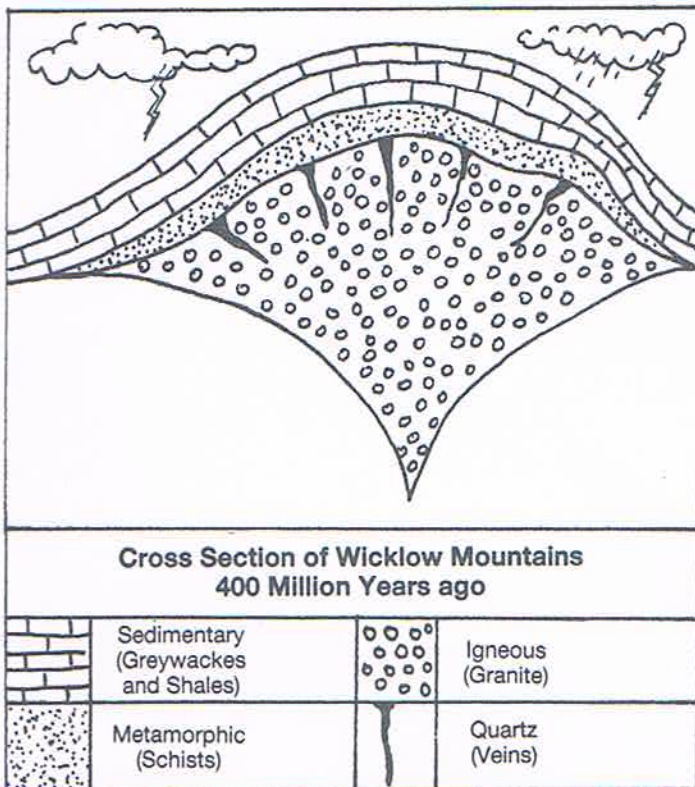


Fig. 3 Cross Section of Wicklow Mountains 400 million years ago.

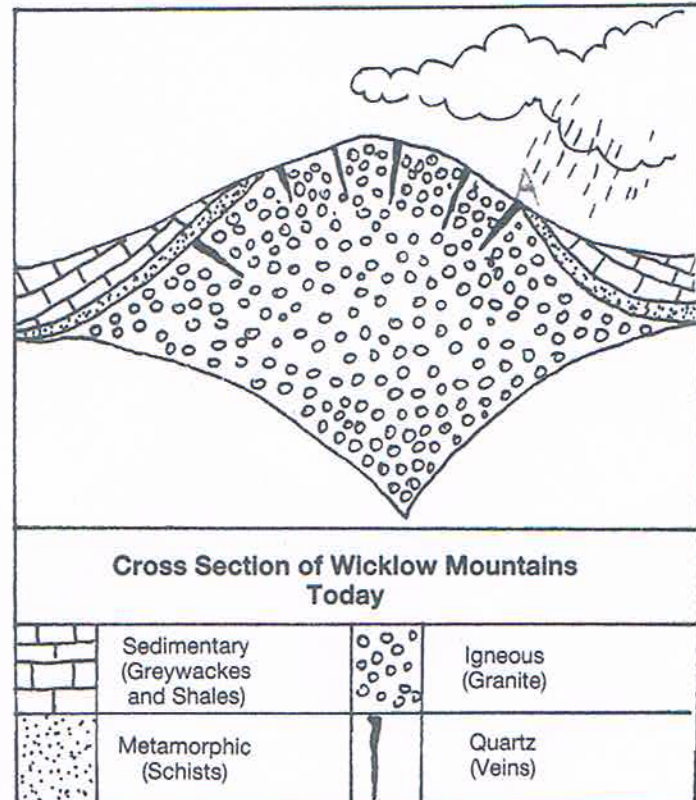


Fig. 4 Cross Section of Wicklow Mountains today.

Glacial Deposits in the Bray Area

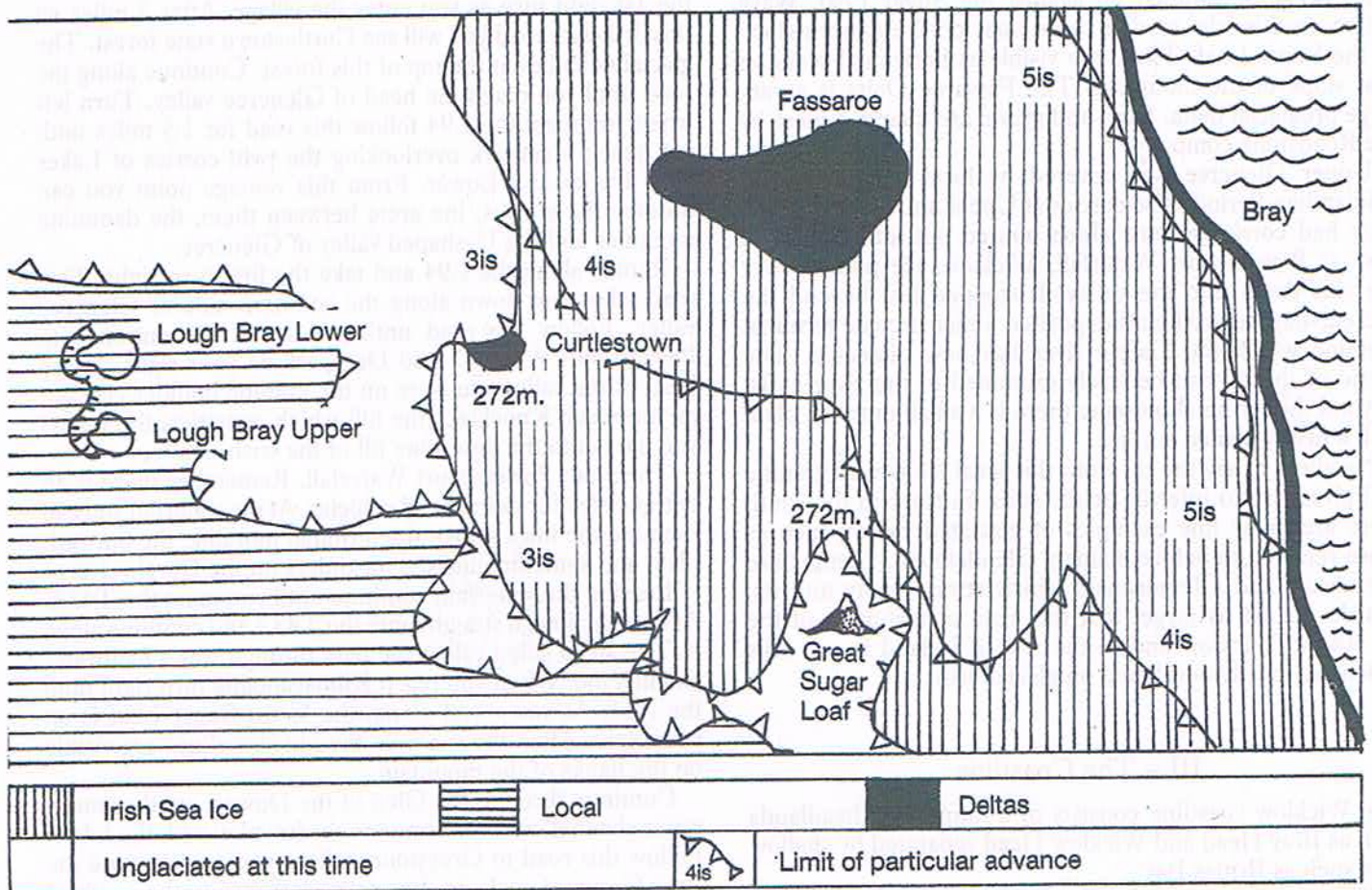


Fig. 5 Glacial Deposits in the Bray Area.

THE MUNSTERIAN GLACIATION

During the period 200,000 to 130,000 years ago, ice gradually advanced from the north down over Ireland and down the Irish Sea Basin. It is likely that this ice was thick enough and powerful enough to over-ride the Wicklow mountains. The Great Sugar Loaf was a nunatak at the time i.e. it protruded above the ice. The extensive scree cones (loose rocks) that encircle its summit are taken as proof that it was exposed to severe freeze thaw action commonly experienced by nunataks.

The Scalp and Glen of the Downs are both steep V shaped valleys cut by melt water, released during the Munsterian glaciation. They may well be subglacial channels cut by melt-water streams under severe hydrostatic pressure beneath the ice.

Undoubtedly many of the famous Wicklow glaciated valleys such as Glenmalure, Glendalough, Glendasan and Glenmacnass were originally cut at this time by valley glaciers.

THE MIDLANDIAN GLACIATION

75,000 to 10,000 Years Ago.

This glacial episode was quite complex. Ice advanced from the north and from the Irish Sea again, but it wasn't thick enough to over-ride the Wicklow Mountains. It pushed up against the slopes of the Wicklow mountains and encircled their northern, eastern and western sides. This ice is called

Midlandian or Irish Sea Ice. The till it deposits is usually rich in calcareous materials such as limestone.

While this was happening local ice caps and valley glaciers were developing in the Wicklow mountains. These were moving downhill towards the Midland and Irish Sea Ice. The till deposited by this ice is very rich in granite and so is quite different and easily distinguishable from the till of the lowland ice.

Often the unglaciated land between the two ice sheets was flooded by meltwater flowing from the ice. These ice dammed lakes are called proglacial lakes and there were extensive ones in Glenree and around Blessington. The meltwater streams flowing into these proglacial lakes often formed deltas at their entry points. The sand and gravel in these deltas is very suitable for building purposes. Also, the presence of these deltas enables us to tell the height of the surface of the proglacial lakes. The lakes had to have overflow or spillway channels for the excess water to escape otherwise their heights would keep rising. The Glen of the Downs was an important spillway channel at this time.

Figure 5 shows the glaciation of Bray area during the Midlandian period.

The Irish Sea Ice advanced as far inland as the line 3IS. It then retreated to the line 4IS and finally to the line 5IS. The till deposited by this ice is rich in calcium and weathers into fairly fertile brown earth soils.

The Irish Sea Ice dammed a proglacial lake in Glenree. The Curtlestown delta at a height of 272m was deposited by

a meltwater stream flowing into glacial lake Glencree. This lake was also dammed up against the Sugar Loaf. Wave action on this lake eroded shore lines on the eastern slope of the Sugar Loaf. These are visible as horizontal scars on that slope of the mountain. The Fassaroe Delta is a very large proglacial delta. Sand and gravel are quarried there by the Roadstone company.

Upper Glencree was covered by local ice during the Midlandian Period. The corries at Upper and Lower Lough Bray had corrie glaciers which poured out into Glencree. Also at Powerscourt Waterfall, Wicklow, ice poured over the cliff down into the valley. It stopped just beyond the present-day waterfall and deposited a nice arcuate terminal moraine which the Dargle river has now dissected. The fabric of the till can be easily examined in the river cliffs. Beyond the terminal moraine there is a small outwash plain with a neatly planed surface.

Needless to say the till from this local ice is very granitic and gives rise to infertile acidic soils. Further to the south there are many fine examples of glaciated valleys such as those referred to before, namely Glendalough, Glenmalure, Glendasan and Glenmacnass which attract many tourists. But do not let us forget that the main contribution of the Ice Age to Wicklow and to the rest of Ireland is our soils which are mostly developed on glacial drift.

III – The Coastline

The Wicklow coastline consists of a number of headlands such as Bray Head and Wicklow Head separated by shallow bays such as Brittas Bay.

The coastline to the north and south of Bray Head is composed of glacial deposits. These are unconsolidated and so have little resistance to erosion. In Killiney Bay, near Corbawn Lane, the cliffs are retreating at an annual rate of .5m. The rate of erosion was so rapid that the railway had to be moved inland to protect it. The same occurred to the north of Greystones on the southern side of Bray Head.

But not all of the Wicklow coast is being eroded. At Brittas Bay the sea is depositing sand and the coastline is being added to. The sandy deposits are then piled up into dunes by the winds.

SUGGESTED ITINERARY

By following the itinerary below, one can observe at first hand many of the features mentioned above.

From Bray travel northwards towards Dublin along the N11 until you come to Shankill. At Shankill Church turn sharply to your right into Corbawn Lane. At the end of this lane you can observe cliffs in glacial till which are being eroded rapidly.

Back on the N11 continue towards Dublin until you pass Loughlinstown Hospital. Take the first left turn and follow the L201. After about 2 miles you will see a signpost on your left for Ballycorus, take this turn. This road will take you past the smelter and along by the flue to the old Ballycorus mines. On the top of the hill the granite/mica schist boundary is clearly visible.

Make your way back to the L201 and follow it until it joins the T43. At the junction of these two roads turn left towards Enniskerry. After 1.5 miles, you pass through the meltwater channel known as the Scalp.

Continue along the T43 until you reach Enniskerry. Take the 1st right turn as you enter the village. After 2 miles on this 3rd class road you will see Curtlestown state forest. The glacial delta lies at the top of this forest. Continue along the road until you reach the head of Glencree valley. Turn left when you meet the L94 follow this road for 1.5 miles until you reach a carpark overlooking the twin corries of Lakes Bray Upper and Lower. From this vantage point you can observe the corries, the arete between them, the damming moraines and the U-shaped valley of Glencree.

Return along the L94 and take the first turn right. This road takes you down along the southern side of Glencree valley. Follow the road until you reach the entrance to Powerscourt Waterfall and Deerpark on your right. At the head of the valley you were on the granitic boulder clay but as you reach Knockree (the hill which constricts the valley) you pass onto the limestone till of the Irish Sea Ice.

Turn into Powerscourt Waterfall. Remember there is an entrance fee for visitors and vehicles. At the waterfall you can examine the mica schist, the terminal moraine, the outwash plain and some fine incised meanders on the Dargle river.

Leaving the waterfall, continue until you meet the T43A. At the junction go straight onto the T43A and continue along it. The steep sided valley you pass through was a meltwater channel too. When you reach Kilmacanogue turn right onto the N11. As you travel along, the Great Sugar Loaf is on your right. After about a mile the old shorelines are visible on the flanks of the mountain.

Continue through the Glen of the Downs, another meltwater channel, until you come to the junction with the L164. Follow this road to Greystones where you can examine the Bray Group of rocks in the rocky platforms to the south of the harbour. To the north of the harbour one can examine cliffs in glacial till similar to those at Corbawn.

Leaving Greystones on the L25 you get a good view of the quartzite peaks on Bray Head. And from there it is a short distance back to Bray.

CONCLUSION

Finally, it must be said that the physical environment of Co. Wicklow is a precious resource not only for its inhabitants, but also for the citizens of Dublin who live on its doorstep. It is essential that such a valuable resource be conserved by good planning and thoughtful use so that its benefits can be enjoyed by future generations.

FURTHER READING

The following publications are valuable sources of information on the physical geography of the Wicklow area.

Frank Mitchell, *Shell Guide to Reading the Irish Landscape*, Dublin, 1986.

G. L. Herries Davies and Nicholas Stephens, *The Geomorphology of the British Isles – Ireland*, London, 1978.

The Bulletin of the Geological Survey of Ireland, Vol 1, No. 1, 1970; Vol 1, No. 2, 1971; Vol 2, No. 1, 1976.

Guide Series, no. 2, The Geological Survey of Ireland.

A visit to the Interpretive Centre in Glendalough is also very rewarding.