

# Forest Clearance and Land Use in Mayo around 3000 B.C.

SÉAMAS CAULFIELD

Department of Archaeology,  
University College Dublin, Belfield, Dublin 4.

## SUMMARY

For thousands of years man inhabited the post-glacial forests of Europe but it was not till the advent of farming that his impact on the forest becomes significant. Stone axes are the most widespread if tenuous evidence of early forest exploitation. Because of special circumstances in the west of Ireland the actual landscape of the Stone Age farmers is still available for study. The discovery of extensive land enclosure under blanket bog which must have been preceded by major forest clearance is changing our view of the nature and scale of early farm settlements in Ireland.

## FOREST EXPLOITATION BY HUNTERS

The earliest direct evidence for tree felling with stone axes in these islands is the felled birch tree still preserving the axe marks on its tapered end which was discovered on the excavation at Star Carr in Yorkshire (Clarke, 1954). Radiocarbon dates indicated that the site was used by hunters about ten thousand years ago. A number of crude stone axes which presumably were used for tree felling were also found on the excavation. Organic material such as wood will not normally survive to be recovered on excavation but numerous stone axes from other sites do point to an exploitation of the forest and its products. Outside of Ireland the intact forests of Europe maintained a limited human population whose economy was based in part at least on the exploitation of the large herbivorous animals; wild cattle, elk, red deer, pig and roe deer. It is difficult to determine what contribution plant foods of the forest made to the diet but it is known that hazelnut shells are very common finds on sites of this period. It is thought that because they can be stored so readily hazelnuts may have been a standby food for times of emergency.

Settlements of this pre-farming period (8000 to after 4000 B.C.) are rare in Ireland and those sites which are known are almost invariably beside water and suggest fishing rather than hunting communities. The explanation for this contrast between Ireland and elsewhere in Europe could be the very limited forest fauna present in Ireland. Of the five large herbivorous mammals named above which were commonly hunted elsewhere, only the red deer and wild pig were present in Ireland and it would seem that a hunting economy based on such a specialised resource was not viable here.

The post-glacial forests of Europe remained virtually intact from human interference for over four thousand years until the arrival of farming communities sometime after 4000 B.C. Farming demanded land on a large scale and forest clearance must have been one of the major tasks during the initial colonising of new territory. Throughout western Europe there has for long been clear evidence for this human impact on the forests both from botanical studies and more indirectly, from archaeological material. Pollen analyses of peat samples show major reductions in tree pollen coinciding with the expansion of grassland, of weeds of cultivation such as plantago and the certain evidence of man, the pollen of the exotic foods, wheat and barley which, in Western Europe, have to be the result of man's activity.

#### FOREST CLEARANCE BY FARMERS

The main archaeological evidence for forest exploitation and clearance is the well recorded occurrence of polished stone axes. The production and trading of axes on a massive scale and over great distances show not alone a great demand for these forest tools but a sophisticated and organised society where such production and trading was possible. In the south of England for example, deep flint mines were sunk in the chalk rock to extract the raw flint. The axes were firstly roughly chipped from the flint and then laboriously polished on a grindstone. At a number of sites in western Britain metamorphic rock was quarried and worked in the same way to produce the main artifact of the stone age farming period — the polished stone axe. At these sites axes were produced in large quantities vastly in excess of what was required locally and they were traded extensively from these axe factories.

Stone axes are very common finds in Ireland and are the products of numerous small "factories". One major factory has been identified in north Antrim on the slopes of Tievebulliagh mountain. Roughly blocked-out axes of Tievebulliagh rock have been found

in their thousands on the mountain and within a ten mile radius. The finished products — the polished axes of Tievebulliagh rock — are found over much greater areas. Tievebulliagh axes have been found as far southwest as Co. Limerick and even more surprisingly in southern England in Kent and Dorset (Mitchell 1976, 121). The distribution of the partially worked and the complete products suggests that the Tievebulliagh quarry was exploited by communities within a ten mile radius who in a few minutes could roughly block out the axe at source to minimise the weight to be transported from the mountain and who then completed the processing of the axes by many hours of grinding at their home bases. It is less clear how the finished products were dispersed so widely — but the most commonly held view is that their dispersal is the result of trading or gift exchange.

Experiments carried out with polished stone axes show that they are quite effective for cutting trees even in the unskilled hands of the modern experimenter. Iversen (1956) showed that a 30cm diameter tree could be cut down in 30 minutes using such an axe.

### THE CLEARED LANDSCAPE

Up to recent years it was usual to consider the early farmers as having practised a shifting agriculture, clearing small areas of the forest and after the fertility of the soil had been used up, moving on and allowing the forest to regenerate itself. This view of early farm settlements has been radically altered in recent years by research into the Stone Age landscape of Co. Mayo (Caulfield 1978).

Mayo offers a unique set of circumstances for the study of land use by these early farmers. Northwest Mayo is covered by the most extensive tract of blanket bog in Ireland. Radiocarbon dates have established that this bog had commenced growing well before 2000 B.C. The landscape beneath the bog is therefore very much the landscape as it existed for the early farmers “put on ice” by the blanket bog for over four thousand years. It was known before the landscape research began that north Mayo was intensively settled by early farming communities as their characteristic tombs — the megalithic court tombs — occur in great numbers here.

Research by the writer in recent years in north Mayo has recorded other more pertinent evidence of landscape use at over sixty sites in the region. Ordinary stone walls and clay fences, exactly similar to the stone walls and fences in use in the area today have been uncovered under blanket bog throughout north Mayo. These walls are built on the mineral soil and predate the growth of bog. They must date therefore to some time in the Stone Age before

2000 B.C. What makes Mayo such a rich source of information in regard to study of the early landscape are the following:

1. The region was intensively settled in Stone Age times as can be shown by the megalithic tombs and the field boundaries which are so widespread here.
2. The early man-altered landscape was fossilized by having a deep growth of blanket peat form over it.
3. Much of the blanket peat in the area has been and is being cut away by hand for fuel and this provides massive free excavation and access to the early landscape under two metres of peat.

When the bog has been cut away for fuel stone walls appear on the mineral soil often as no more than intermittent rows of stones. The main reason for this is that the walls tend to be largely covered up by the top sod or "scraw" which is not burnt and is discarded onto the cutaway surface every year. Formal archaeological excavation at three sites — at Carrownagloagh near the Ox Mountains by Professor Michael Herity and at Behy/Glenulra and Belderg Beg on the north Mayo coast by the writer — have shown that sizeable well built walls lie virtually intact under the blanket bog.

Of the three sites excavated and surveyed Behy/Glenulra is the largest even though its full limits were not established. The site lies on the shoulder of a hill which ends in the sheer cliffs at Céide. This hillside includes portion of the townlands of Behy and Glenulra. The hillside was covered to a depth of 1.5-2.0 metres of peat but in this century turf banks have been cut over an area approximately 800 metres by 12-1300 metres in extent. Fig 1 shows the plan of the early settlement discovered in the cutaway bogs. A number of distinct monuments occur within this Stone Age landscape. "A" is a court tomb excavated by the late Professor R. de Valera, Dr. Seán Ó Nualláin and Professor Michael Herity (de Valera and Ó Nualláin, 1964). "B" is an enclosure about 25 metres across excavated by the writer which produced pottery, flint implements and a stone axe, all objects which could be compared closely with those from the Stone Age tomb. A number of other enclosures were located in the cutaway bog but were not excavated. As evidence of what a Neolithic farmed landscape must have looked like however, the most important results were achieved by the survey of exposed walls in the cutaway bogs. Nine roughly parallel walls spaced 150-200 metres

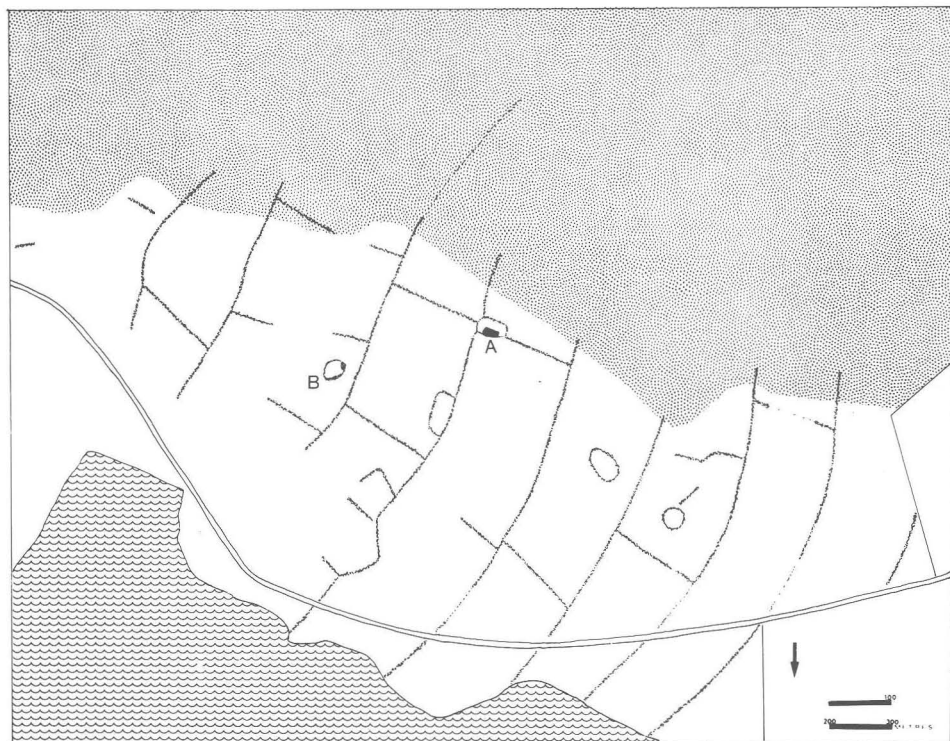


Fig. 1 Behy/Glenulra pre-bog farm settlement. A. Behy court tomb. B. Glenulra enclosure. Stripped area at top indicates uncut blanket bog.

apart were built from the cliff edge inland for an unknown distance. All of these walls continued into uncut bog so their limits could not be readily traced. However it would seem that the settlement still to be traced under the uncut blanket bog is at least as extensive as that already surveyed. The long parallel immediately to the right of the excavated enclosure was traced for a distance of almost 300 metres by probing with a long iron probe through the two metres of blanket bog. Also, other walls are visible in erosion gullies about a half a mile to the south of the cutaway bogs which suggests that the settlement is a least twice as large as the 1km<sup>2</sup> already surveyed. The strips of land formed by the long parallels are divided by offset cross walls into large rectangular fields. Only at one location at bottom centre is there a more irregular pattern of smaller fields.

It is obvious that the older view of early farmers (clearing small patches in the forest and then moving on after a few years) cannot be reconciled with the permanency and scale of settlement which this plan represents. The plan is witness to an organised community who either at the dictate of a single leader or as a result of a more democratic decision clear the forest, divide the landscape and subdivide it into fields, all as a single operation. The larger field pattern is clearly not the result of piecemeal clearance and enclosure. If it were such one would not find the regular pattern of striping which is almost of the standard of Congested Districts Board striping in the early years of this century. Communal work is implicit in the scale of forest clearance needed for this settlement, in the laying out of the fields, in the building of the tomb and in the use of the tomb. On the other hand, the division of the total area into fields of this size could indicate individual farm ownership. The fields are much too large and the area too exposed to have been suitable for cereal growing. If as seems probable, these are pasture fields then the division into fields would seem to point to individual farms. Another possible explanation is that the fields were used for herd management such as weaning or to prevent overgrazing and cutting up of the ground on the partially sheltered lower hillside.

The work of forest clearance which preceded the laying out of the fields was probably more arduous and time consuming than the building of the miles of boundary walls. Stone axes were probably used but it is likely that fire was also a clearance method. The fields are so regularly laid out with scarcely any deviation from their sinuous courses that there cannot have been any groves of trees still in existence to block out the sight lines and obstruct the run of the walls. Burning would seem the most likely method of such large scale clearance. Charcoal occurs in the mineral soil throughout the

entire settlement area and appears to be the result of forest burning before the growth of the blanket bog.

While today the use of land for forestry or agriculture can be a vexed question there is no doubt but that the clearance at Behy/Glenulra increased its potential for human settlement many hundredfold. Using figures from modern forestry management studies it is likely that the total exploitable biomass of deer and pig in a pine forest would be of the order of 400-500kg/km<sup>2</sup> at most (Mellars 1975, 52). With a one-sixth annual cull and a killing out rate of 60% clean carcass weight to live weight the animal food to be "cropped" from this site would be 40-50kg per annum — sufficient only for the total food requirements of one family for one week. Cleared of forest and organised into fields as it is, this same area could have provided six forty-acre farms which could have maintained as many families on a year-round basis. Beef production on grassland around 3000 B.C. would have benefited from the superior average temperatures current then. At present grass growth is maintained for 9-10 months in this part of Ireland and research has shown that every 1°C increase in winter temperature represents an extra month's grass growth. It is thought that the post-glacial climatic optimum reached over 2°C warmer than at present and around 3000 B.C. it is thought to have been 1°-2°C higher than at present. The grass growing season could therefore have been between 10-12 months every year. These calculations in themselves help to explain the intensity of Neolithic farm settlements as against the virtual absence of the Mesolithic hunters.

Behy/Glenulra is just one of over sixty pre-bog sites now identified in North Mayo though it must be made clear that no more than a few are as extensive as Behy. Many in fact are no more than a short length of wall occurring in isolation in modern bog cuttings but nevertheless they do indicate human settlement and land utilisation. At Belderg Beg, four miles west of Behy, excavation by the writer has uncovered plough marks in the subsoil and ridges similar to potato ridges (identical ridges were used in places in Ireland even into this century for cereals) (Fig. 2). Similar cultivation ridges were discovered by Professor Herity at Carrownaglogh.

While Mayo appears to have the greatest concentration of pre-bog settlement in Ireland these structures are fairly widespread along the western blanket bog area from Kerry to Donegal and into central Ulster. Much of this bogland both uncut and cutaway bog is considered suitable for afforestation. The writer would welcome any report of prebog structures which may come to light as a result of forestry survey or plantation.





Fig. 2 Belderg Beg. Cultivation ridges and round house at bottom centre.



## ACKNOWLEDGEMENTS

The Archaeological excavations at Behy/Glenulra and Belderg Beg have been financed in the main by grants administered by the National Monuments Branch of the office of Public Works on the recommendation of the National Committee for Archaeology of the Royal Irish Academy. Financial support has also been given by University College, Dublin.

## BIBLIOGRAPHY

- CAULFIELD, S. 1978. Neolithic Fields: The Irish Evidence. In *Early Land Allotment in the British Isles*. Eds. H. C. Bowen and P. J. Fowler, British Archaeological Reports 48: 137-143.
- CLARK, J. G. D. 1954. *Excavations at Star Carr*. Cambridge.
- DE VALERA, R. and Ó NÚALLÁIN, S. 1964. *Survey of the Megalithic Tombs of Ireland. Vol. 2 Co. Mayo*. Dublin.
- IVERSEN, J. 1956. Forest Clearance in the Stone Age. *Scientific American*, 194 36-41.
- MELLARS, P. 1975. Ungulate populations, economic patterns and the Mesolithic Landscape. In *The Effect of Man on the Landscape: The Highland Zone*. Eds. J. G. Evans, S. Limbrey, H. Cleere. C. B. A. Research Report No. II: 49-56.
- MITCHELL, F. 1976. *The Irish Landscape*. London.