



# A new paradigm for Irish peatland afforestation

Edward P. Farrell<sup>1</sup> and Florence Renou-Wilson<sup>2</sup>

<sup>1</sup> School of Biology and Environmental Science, University College Dublin, Belfield, Dublin 4, Ireland  
Phone: +353 (0) 1 7167716, Fax: +353 (0) 1 7161102, e-mail: Ted. Farrell@ucd.ie

<sup>2</sup> School of Biology and Environmental Science, University College Dublin, Belfield, Dublin 4, Ireland  
Phone: +353 (0) 1 7167725, Fax: +353 (0) 1 7161102, e-mail: Florence.Renou@ucd.ie

## Summary

Peatland afforestation in Ireland has long been focused on the naturally treeless blanket peatlands of the west. Through accumulated experience and empirical research, techniques were developed for the successful establishment of significant areas of spruce and pine plantations. The somewhat ill-defined objectives of this venture included an element of utilising the 'wasteland', providing employment in economically depressed regions and achieving a satisfactory level of productivity, without any rigorous approach to assessing economic viability. However, although the productivity achieved was much higher than originally predicted, by the 1990s, the demand for a satisfactory financial return, coupled with increased societal expectations of higher environmental and aesthetic qualities, began to militate against further expansion of blanket peatland afforestation. Simultaneously, attention turned to the new peatland resource created by industrial peat harvesting. The new paradigm of peatland afforestation has as its objective the utilisation of cutover peatlands in a financially profitable manner. It requires a new suite of establishment techniques and presents new challenges for managers. The results of eight years of research on all aspects of cutaway peatland afforestation now make it possible for the conversion of extensive areas to forestry. However, it is clear that techniques developed will not become operational unless economic viability can be clearly demonstrated.

**Key index words:** peatland forestry, afforestation, blanket bogs, cutaway peatlands, productivity, economic appraisal

## Introduction

Irish peatlands are naturally treeless. Sporadic attempts at afforestation in the nineteenth century had ended in failure and no extensive planting was contemplated until after the Second World War. In the late 1940s, the Irish Government adopted a policy of large-scale afforestation. The annual planting rate was to be increased from a very low level to 4,000 ha per annum with the overall target of 400,000 ha of plantation forest.

In this era, the term 'wasteland' was applied to any land not in productive use. Another feature of the mindset of the time was the belief that because trees, in particular conifers, could grow on lands unsuitable for agricultural production, they would grow anywhere, irrespective of the physical or nutritional limitations of the soil. Thus, the large tracts of blanket peatland in the west were particularly attractive for the new policy of accelerated afforestation.

Research in Britain had shown that coniferous plantations could be established on blanket peatland. Although the need for applied phosphate had been demonstrated, the concept of using soil amendments to accelerate the growth of forest trees was foreign to the minds of most foresters of the time. Early plantations quickly demonstrated however, that not only was phosphatic fertilizer desirable in order to promote growth, it was essential for

tree survival on ombrotrophic peatlands.

The other element necessary for the successful establishment of coniferous plantations was drainage. Although manual excavation of drains to release water from local wet areas was common enough, spaced ploughing as a routine element of establishment procedures was something new. It was made possible by the development, in Scotland, of heavy plough units, pulled by tracked vehicles.

## The peatland pioneers

It is difficult now, to appreciate the zeal of the early peatland foresters. The blanket peatlands were sometimes described as 'wet deserts', lands to be conquered, conjuring up images of vast tracts of coniferous forest stretching to the horizon. Again, the idea was widespread that this wasteland was good for nothing other than forestry. The aesthetic character of the treeless peatland landscape was rarely considered. Indeed, it was suggested that scenic beauty of the west of Ireland would be enhanced by these plantations.

The policy of large-scale peatland afforestation continued for three decades, although for foresters on the ground, problems soon became apparent. Initial applications of fertilizer were often too small, spot application inhibited good root development, as did the continuous ribbon



created by the plough. Roots tended to be confined to these ribbons leading to instability. A policy of mechanical, line thinning exacerbated the problem, resulting in significant windthrow, with a whole line of trees blowing in a single storm.

## Economic appraisal

Prior to the mid-1980s, virtually all afforestation and indeed all professional forest management in Ireland was conducted by the State. A State grant was available for private afforestation, but it was small and only approved for small-scale development on lands not considered strategically important for afforestation by the Forest Service.

The economics of the forestry programme was never seriously examined before the late 1970s. Indeed it was commonly considered that the afforestation of the west of Ireland and in particular the peatlands was a social programme, the main aim of which was to provide employment in economically depressed areas.

Gradually, however, the concept of forestry as a business began to take hold. The level of grant aid was greatly increased in successive European Commission supported schemes from the early 1980s onward. Financial institutions exploited the opportunity provided by the improved financial support. Forestry is particularly attractive as a reliable long-term investment for pension funds. Enterprises were subjected to rigorous financial appraisal, using a discounted cash flow analysis.

Peatland afforestation was never considered an attractive investment by the financial institutions. However, it was accepted that all forestry ventures should be tested against the same economic standards of viability. It soon became apparent that many peatland forests were, at best, only marginally attractive from an economic standpoint.

## The tide turns

Little by little, blanket peatland forestry began to lose its attractiveness. Nutritional problems, drainage difficulties, windthrow, although it never turned out to be as serious as had been predicted, came together with the realisation of the limitations of forestry on blanket peatland as an investment. Equally important perhaps, was the changing attitude to peatlands as a natural resource. The growth of the conservation movement and the acceptance that undisturbed peatlands were a resource, rather than wasteland, contributed significantly to the movement against peatland forestry. Large areas of blanket peatland are now protected through a variety of conservation instruments. Ironically, from the standpoint of productivity, peatland forests were far more productive than had been predicted in the 1950s. Nevertheless, the tide had turned and no longer was it considered acceptable to plant large areas of blanket peatland in western Ireland.

Contrary to the decline in state planting of peatlands, afforestation by private owners has increased. Concurrent with the changing attitude to peatland forestry is the growth in private afforestation. In 1980, less than 500 ha of private afforestation was grant-aided in the country as a whole; by 1990, this had risen to 10,000 ha. The number of private

forest owners has increased from perhaps a few hundred to over 14,000 today. Most of these owners know nothing of the rigorous appraisal adopted by the financial institutions. Neither do most of them worry unduly about the final outcome of their plantation in terms of volume production or revenue. The interest of this first generation of forest owners is focused firmly on the short-term financial benefit afforded by the generous grants and premiums available to them. It is little wonder then that many smallholders take the opportunity to convert their 'wasteland' into forest.

To date, 218,850 ha of blanket bogs have been afforested. Approximately 80% of this is owned by Coillte, the State forest company. In 2006, a total of 8,012 ha of new plantations were established nationally; 2,323 ha (29%) of this was on peat soils (mainly on blanket peatland).

Awareness grew of the profound and largely irreversible changes in peatlands brought by afforestation. The potential impact of plantation forests on water quality also gave cause for concern. The blanket peatlands in the west of Ireland are all underlain by poorly buffered rocks and surface waters are sensitive to acidification. Plantation forests may accelerate soil acidification leading to the increased mobilisation of aluminium by a number of processes, chiefly through canopy interception of acidifying pollutants. Events of extraordinarily high seasalt deposition occur from time to time in western Ireland and these can result in peaks of acidity in streamwater resulting from the transfer of acidity from soil to water. Peatland plantations can also contribute to surface water eutrophication due to the relatively high mobility of phosphate in peat soils, applied or released from decomposing residues following felling.

Environmentalists and a minority of other interest groups have become concerned about the aesthetics of coniferous plantations, which are radically altering expansive, naturally treeless peatland landscapes.

## Afforestation of cutaway peatlands

As the attraction of blanket peatland forestry waned, a new peatland site type became available. Significant areas of industrial cutaway peatlands, most of which are located in the midlands, as opposed to the west of the island, began to come available for utilisation in the late 1980s. Bord na Móna, the state company responsible for the harvesting of peat, is responsible for about 80,000 ha of peatland, most of it originally raised bog. The first experimental planting of cutaway peatland was at Trench 14, in Clonsast Bog, in the 1950s. Unfortunately, the value of this study was limited by poor experimental design and the fact that peat had been harvested using the sod-peat process, rather than by milling which subsequently became the major harvesting process.

Despite this early work, there was little interest in exploring the potential of milled cutaway peatland for forestry. The assumption for many years was that this would be a valuable growth medium for grassland and that the opportunity cost for forestry would be too high. It is true that the potential of milled cutaway for grassland is considerable. Early attempts at reclamation encountered difficulties due to



peat oxidation, shallow rooting depth and the emergence of fossil timber as a result of peat subsidence. However, an intensive reclamation technique involving deep ploughing of relatively shallow peat residues, followed by mixing of peat and sub-peat mineral soil proved successful and yielded excellent results. Not only was a high level of productivity achieved, the trafficability of reclaimed land was as good, if not better than that of mineral soils in the vicinity.

As with blanket peatland forestry, it was not the technical problems, but economics which proved the biggest stumbling block. By the mid-1980s, it was clear that the conversion of large areas of cutaway peatlands in the Irish midlands to intensive grassland was not compatible with the butter and other mountains of agricultural produce accumulating at the time in Europe. There was no demand for large areas of grassland and Bord na Móna was confined to the reclamation of limited areas for sale to local farmers.

This reversal of expectations presented foresters with an opportunity which had not been anticipated. Quite suddenly, in the late 1980s, the Forest Service was tasked with the planting of some thousands of hectares of milled cutaway peatland. Between 1988 and 1992, some 3,000 ha of industrial cutaway was planted, with very limited understanding of the problems of cutaway, as opposed to virgin peatland, or the differences between the several peat types which occur in mosaic in these landscapes.

The failure rate in the early plantings was high. Faced with the realisation that this indeed was a new medium, with its own particular challenges and difficulties, Coillte Teo, the state forest company which had inherited the State forests from the Forest Service, suspended further afforestation of cutaway peatlands.

Surveys of the state of the existing plantations confirmed that the condition of the majority on cutaway raised peatland in the midlands, was poor and deteriorating. A smaller area of cutaway blanket peatland, in the west of the country had also been afforested. These plantings, on a much simpler growing medium have performed well.

The problems with the raised bog cutaway plantations arose from insufficient knowledge of the properties of the peats and from insufficient attention to the risk of late spring frosts, which are locally severe, in the low-lying terrain of former post-glacial lake basins.

In 1988, a major research programme, BOGFOR, was initiated to develop techniques for the afforestation of these peatlands. The results of the BOGFOR project are described in another paper to be presented at this conference.

## Conclusion

It is well known that the greatest challenge facing researchers is not to solve problems, but to find the right problems to solve. It is relatively easy to find the answers to questions, but much more difficult to define the right questions to address. It is striking that despite the experience gained in the afforestation of blanket peatland, we were ill prepared to deal with the challenge of milled cutaway afforestation. The history of peatland forestry, the history of the development of any policy, is important, because it is through an understanding the factors that drove developments in the past, that we can learn to anticipate the future.

When the developments in Irish peatland forestry are analysed, it becomes apparent that factors affecting the large-scale afforestation of blanket peatland was initiated by a policy decision based, not on any great technical knowledge, but by an awareness of the need to grow the forest resource, on the one hand and on a rather nebulous concept of providing a social service, on the other. Neither the move from blanket peatland forestry, nor the decision to plant cutaway peatlands were the consequence of firm decision by government, or local authority. They were, instead the result of a gradually growing awareness that despite its technical success, the economics and probably more importantly, the public perception of blanket peatland forestry, on the one hand, were negative and that, on the other, the cutaways represented a new source of forest land. In neither case, was the technical aspect, the ability to grow trees successfully on the medium, the overriding factor.

In the case of the cutaway peatlands, the driving factor which led to their afforestation was again, not the technical ability to do, although this was, incorrectly, assumed, but the fact that the designated use of the land had become irrelevant. If this policy shift had been anticipated some years in advance, we would have been much better prepared to take on this challenge.

The lesson from this is that we must give our researchers the scope to work on issues which may seem removed from immediate reality. Funding agencies should try not to be overly prescriptive. They should make space for researchers with flair and ideas. They should encourage the development of free thinking through think tanks and discussion fora designed to bring together people from different disciplines and occupations, researchers, managers, policy makers. The people who run the funding agencies may not have all the answers. They certainly don't have all the right questions.