

# IRISH FORESTRY

JOURNAL

of  
THE SOCIETY  
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FORESTERS



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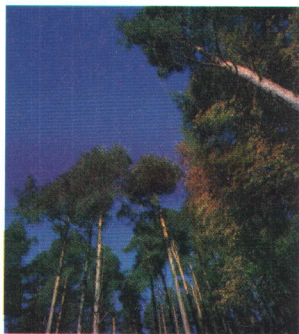


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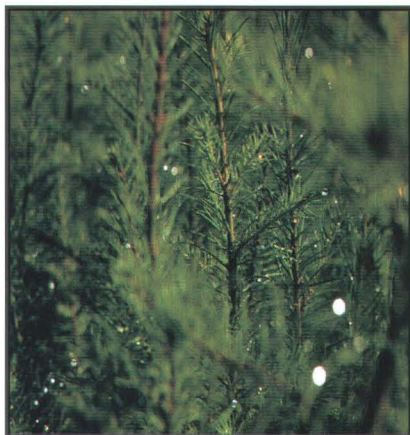


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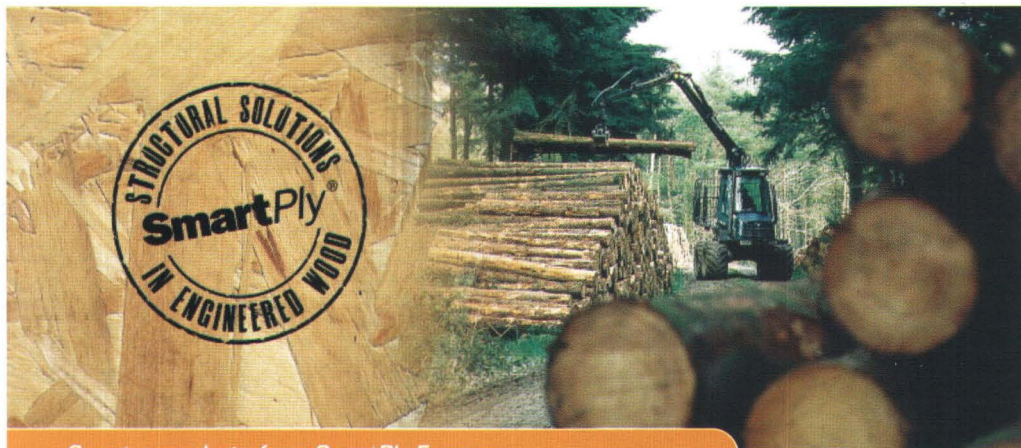
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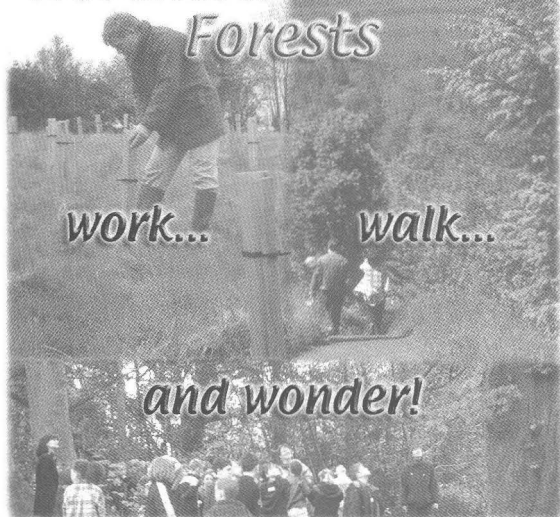
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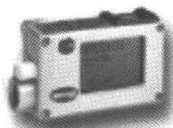
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2. Holders of professional indemnity insurance cover to a minimum of €325,000;
3. Partakers in Continuous Professional Development;
4. Sole Trader or Company Director, Associate or Partner of a forestry consultancy business;
5. A minimum of two years professional experience in forestry;
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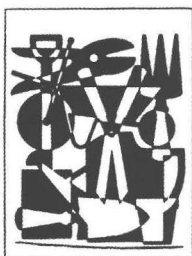
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#### Mission Statement

To lead and represent the forestry profession, which meets, in a sustainable manner, society's needs from Irish forests, through excellence in forestry practice.

#### Objectives

- To promote a greater knowledge and understanding of forestry in all its aspects, and to advance the economic, social and public benefit values arising from forests.
- To support professionalism in forestry practice and help members achieve their career goals.
- To establish, secure and monitor standards in forestry education and professional practice.
- To foster a greater unity and sense of cohesion among members and provide an appropriate range of services to members.

The Society of Irish Foresters (SIF) fulfils its Mission Statement and Objectives by:

- Representing the interests of over 700 members, predominantly professional foresters, but including, through its associate and student membership, a wide cross-section of people involved, or with an interest in, the forest and timber industry.
- Providing an appropriate range of services to its members, e.g. field days, study tours, workshops, lectures and symposia. The Society also publishes *Irish Forestry*, the sole technical publication on forestry in Ireland, a quarterly newsletter *The Irish Forester*, policy position statements and other books of both historical and technical interest. An expansion of services is proposed, e.g. group indemnity insurance scheme.
- Supporting its members by ongoing representation and dialogue at National Government and EU level on forestry issues.
- Promoting professional standards in forestry and the regulation of the forestry profession, by implementation of its Code of Ethics and Professional Conduct.
- Ensuring that the practice of forestry is carried out by appropriately qualified and recognised professionals. To this end SIF is involved with forestry education in Ireland and has a Continuous Professional Development (CDP) Programme in position.
- Maintaining a website at [www.societyofirishforesters.ie](http://www.societyofirishforesters.ie) to inform members and the general public on SIF activities, general forestry matters and forestry links, as well as the provision of a Consultant Foresters list.

There are three types of membership of the Society of Irish Foresters:

- Technical Members must hold a degree or diploma in forestry from a third level institution recognised by the Society, or the Foresters' Certificate of the Society. Technical membership applicants should enclose a copy of their qualification with the application form. Technical members are entitled to use the designation MSIF. Annual subscription €150. Retired technical members pay annual subscription of €75.
- Associate Members do not need to hold a technical forestry qualification but should be desirous of promoting the objectives of the Society and have an interest in forestry generally. Annual subscription €75.
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2. Two complete hard copies of the paper, double-spaced with numbered lines should be submitted to the Editor, *Irish Forestry*, together with an electronic version, in MicroSoft Word. Electronic submission is also acceptable to [sif@eircom.net](mailto:sif@eircom.net).
3. Correct spelling, grammar and punctuation are expected. Nomenclature, symbols and abbreviations should follow established conventions, with the metric system used throughout. Dimensions should follow units with one full space between them, for example 10 kg.
4. Subject to editorial decision, submitted papers will be peer-reviewed. Papers must include an abstract (maximum 250 words) and a list of up to six key words before the main body of the text. Authors are advised to keep papers as concise as possible and no more than 25 pages long (double-spaced, including tables and figures).
5. Where figures are embedded in an article the originals should always be included, along with the information regarding software used to create them. Figures should preferably be saved as graphic files (.eps, .wmf where possible). Avoid .tif, .bmp files and Word picture format. MicroSoft Excel formats, embedded in documents, are acceptable for figures. However, an original hard copy of the figure must also be submitted.
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Lavender, D.P. 1984. Plant physiology and the nursery environment: interactions affecting seedling growth. In Forest nursery manual: production of bareroot seedlings. Eds. Duryea, M.L. and Landis, T.D., Martinus Nijhoff/Dr W Junk Publ., The Hague/Boston/Lancaster, pp 133-141.
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## EDITORIAL

### A forest centenary

A centenary is a time for celebration and reflection, particularly where we are marking a national forestry project that set a vision that looked forward almost to the present day. For ten decades since 1904 the project has engaged several generations of politicians and professionals in creating a forest resource in which we all take pride for the contribution it makes to the economy and society of our country.

No official record remains of the event we are celebrating; that first day of forestry training at Avondale back in 1904 can only be imagined, but it was the beginning of the forestry profession in Ireland, and even more importantly, the start of the reversal of the deforestation trend that had continued, almost unbroken, since man's first arrival on the island. By the beginning of the twentieth century Ireland was virtually denuded of forest cover, the remaining bits and pieces were islands of trees surrounded by intensive agriculture, mountain grazing or peatland. Society at large placed little or no value on forest: livelihoods depended on farming; woodland was the preserve of the estate, and added little or nothing to the local, or indeed the general economy. As a result the only realistic option for recovering forest cover was for the state to step in, and although a role for local authorities was also envisaged, it largely came to nothing. At first, the rate of afforestation was modest, but we must be careful not to judge the achievements of the 1900s today's standards, when forestry is a well-established land use: the fact is a deforestation trend was reversed and a momentum was established.

Over the century the area of forest has increased almost ten fold, a compound rate of about 2.3% per year - a number that would have us today planting close on 17,000 ha of new forest a year, not far off the target 20,000 ha of government policy. The policy makers of the 1900s would be well pleased at the achievement, and in the contribution of forestry to employment and the general economy – about €700 million in 2004 – time for celebration indeed. But times change, and today there are ambitious targets to achieve a forest cover of 17% by 2035, for a greater range of goods and services to be provided by forests, and a new momentum for change in land-use.

The fundamental changes underway in land-use policy arise from the reform of the Common Agricultural Policy, and the move to area-based aid for farmers. Overall, the objective is to move farming to a market-based enterprise that will reward competitiveness and quality. At the same time land-derived public goods such as carbon capture, biodiversity conservation and water quality are receiving increased recognition and reward from the EU and the state, in part it must be said as a means of topping-up aid. Of more immediate significance for the forestry sector will be advent, from 2006 onwards, of the new EU Rural Development Regulation. This is likely to begin a fundamental reorientation and widening of forest policy supports to include specific measures in support of public goods provision, in parallel with changes in the agricultural sector.

In all policy shifts, as the last 100 years have shown, there is danger of jumping headlong into fashions, without sufficient foresight. The new emphasis on public goods



provision is indeed welcome, as they have too much been taken for granted in recent decades, but moving in this direction we should not neglect Ireland's significant advantage in growing quality wood, nor the industry it supports. Many European countries have shown it is possible to maintain competitive production, while at the same time providing an ever-increasing range and level of service of public goods. Managing change in forest practice and composition, and carefully planning new woodland location and type will be necessary to achieve these goals, as will continued and increasing investment in innovation, and in knowledge generation and use.

Some of these issues were familiar to the small minority who advocated a national forest policy a century ago. Indeed, a century is short time from a forestry perspective – it is less than a rotation of oak. At the beginning of the second century of Irish forestry we need to renew and bring the pioneer's vision up to date. Our forest resource is still well below what is needed to provide the raw material we will increasingly need for product and energy provision, and we have hardly begun to explore providing woodland specifically geared for public goods such as water, carbon capture, biodiversity, or indeed for recreation and well-being. These are the significant challenges ahead for forestry and forestry profession in the 21st century. No doubt there will be many twists and turns in meeting these challenges, but if our successors can in 2104 celebrate a similar level of achievement over the preceding century, as we do in 2004, we will have done well.

## A Forestry Centenary

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Avondale House opened its doors as a school of forestry in October 1904, a year now mainly celebrated as the year of ‘Bloomsday’, the day celebrated in James Joyce’s *Ulysses*, and of the founding of the Abbey Theatre. In its first year it had eight students – apprentices – as they were then called. The passing of a round century since that date gives us a suitable opportunity to reflect on progress, achievements and mistakes. This account will try to do that for forestry in Ireland over the period.

### Basics

Let us begin with some primary questions: what is forestry; what does forestry do, and what is it supposed to do?

Definitions of forestry are not scarce to find. These two are from internet sources: ‘The total system of managing and using for human benefit the natural resources that occur on and in association with land with trees.’ That is acceptable as a general principle. ‘The science of planting and caring for forests and the management of growing timber.’ seems more relevant to the Irish situation. Many may believe that no definition is necessary; that, to use the poet AE Housman’s analogy, we can no more define forestry than a terrier can define a rat, but a definition is often useful as a general statement of purpose. Some definitions specify forestry as an ‘art’. That may be acceptable so long as ‘art’ is understood in its primary dictionary meaning of ‘skill as the result of knowledge and practice’, but not in the sense of the creative so-called fine arts: literature, painting etc. – its most usual modern sense. To define the principal purpose of forestry in Ireland we can combine elements of the first two definitions, i.e. to plant and manage trees for human benefit, and in Ireland in the past that benefit related almost entirely to physical resources.

### Historical

Modern forestry in Ireland started with an almost entirely clean sheet. The once well-wooded land had been cleared down the centuries for a variety of purposes: to provide land for food crops; as raw material for house-building and the manufacture of barrel staves; as fuel for industries including iron smelting and glass making, and for domestic heating and cooking. There was little left by the eighteenth century.

Planting was grant-aided by the newly formed precursor to the Royal Dublin Society, by its members in 1741, and after 1747 with money voted by the Dublin Parliament in College Green. But that supply of money was cut off by Westminster after the Act of Union of 1800.

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That Dublin Parliament also passed laws to assert the rights of forest planters to own the trees they planted; previously they had belonged to the landlord. Many of the woodlands planted and registered under those laws provided timber to be felled during World War I and the ‘emergency’ (World War II) of 1939-45.

### **Policy, Objectives and Targets**

The Department of Agriculture and Technical Instruction (DATI), conscious of the perilous condition of woodlands in Ireland, had established the forestry school at Avondale and in 1906 appointed a Forestry Expert, AC Forbes. Towards the end of the previous century a number of experts were also called upon to report on the suitability and extent of land for forestry but the most forcible and persuasive arguments came from the findings of the Departmental Committee of inquiry which reported in 1908. They envisaged the objective as the maintenance of an area of woodland sufficient for the country’s needs, for the development of industry and for shelter for agriculture (Departmental Committee 1908). This Departmental Committee criticised the government in Ireland for its “deplorable neglect” of forestry, and called for an urgent scheme of forestry to be carried out “by or under the direction of the state”. It pointed out that such a scheme could not be carried out by private individuals: the capital required would be too great and the investment period too long, and family circumstances could change. As it pointed out “... the State is a proprietor who never dies”. In their opinion forests were a matter of grave national concern, an opinion that was to be reinforced within the following decade by the U-boat campaign of World War I. The objective of a strategic reserve for time of emergencies, so prominent in Britain during the 18th and early 19th centuries (when ship-building was entirely dependent on timber), was resurrected. In deciding on the extent of land available for planting the Committee concluded that 5%, or a total of at least 1 million acres (400,000 ha), could be allocated to forestry without interference with agricultural industries.

The Committee concluded that a comprehensive scheme of forestry could only be undertaken by the state either directly or through local authorities or private owners. Some local authorities became involved in woodland ownership (e.g. Kildare and Donegal) but with the Land Acts still fresh in their minds few private owners felt sufficiently secure to invest in their woodlands. In any event whatever government funding was available was directed towards the acquisition of a nucleus of state-owned woodland (e.g. Camolin and Dundrum).

The outbreak of war in 1914 and the subsequent U-boat campaign brought home to the government the need for a strategic reserve. Private woodlands were again called upon for supplies during the war and were largely left in a derelict state, having been highgraded<sup>1</sup> for the best stems; nothing remained except the unwanted culls. By the end of hostilities most woodlands were overgrown with scrub and were either acquired by the fledgling Forestry Section or the culls were left to grow on until World War II when the process was repeated.

<sup>1</sup> ‘Partial harvest removing only the most valuable species or trees of desirable size and quality without regard for the condition of the residual crop’ (Society of American Foresters).



A Reconstruction Forestry Sub-Committee sitting in 1916 saw forestry mainly in terms of a national insurance, and introduced a productivity concept rather than a financial criterion for new planting. This was estimated to be 80 cubic feet of conifer timber per acre per annum ( $7 \text{ m}^3/\text{ha}/\text{yr}$ ) of which "... 40 cubic feet is large timber".

State planting began in a small way and some progress had been made when the Forestry Act of 1919 provided for the creation of the Forestry Commission, which operated in both Britain and Ireland. But its operations in Ireland were severely disrupted by the political uncertainty and armed hostilities of the period up to the establishment of an independent state in Ireland.

Estate woodlands acquired during the early years were mainly on highly productive land but this was to change after 1925 with the announcement by the Minister for Agriculture setting a ceiling on the price that could be paid for forest land so as not to compete with agriculture (Gray 1963). This policy remained in force for the next half century, apart from the 'Economic War' period of the 1930s when Britain embargoed imports of agricultural produce from the Irish Free State and virtually crippled the economy of the agricultural sector. The consequent collapse in the price of land, leading to a higher quality of land acquired during this period, provided an opportunity to diversify species and create the older broadleaf stands of today.

Because of a lack of funding the pace of acquisition was slow in the early years; by 1918 a total of 15,357 acres (6,200 ha) had been acquired in the whole of Ireland. Almost half of this came from private woodland estates. Altogether forest cover remained extremely low; by 1922 it had reached 250,000 acres (100,000 ha) in the new independent Free State, all, with the exception of just over 17,000 acres (6,700 ha) in private hands.

Afforestation targets were increased in the early years of the Free State. In the 1920s a figure of 200,000 acres (80,000 ha) was being mentioned. Following strong advocacy by Senator Connolly for a target of 500,000 acres (202,000 ha) a compromise of 300,000 acres (121,000 ha) was agreed in the late 1930s. With the import difficulties experienced in the early war years the government decided that a programme of 600,000 acres (240,000 ha) was needed to satisfy home requirements.

In the immediate post World War II period a change of government combined with the enthusiastic determination of the Minister for External Affairs, Seán MacBride, brought about a change that was to influence afforestation programmes for the next half century: a decision was taken to increase the afforestation programme to 25,000 acres (ca 10,000 ha) per year.

Having taken "a policy decision ... involving the establishment of 25,000 acres of new forestry plantations annually over a period of 40 years" the Government then authorised a 'flying survey' (in the sense of speed; it was done by ground survey) to determine if sufficient suitable land was available to sustain the programme. The survey indicated the availability of approximately one-and-a-quarter million acres (500,000 ha) of "rough mountain grazings" which were plantable but which would give rise to a conflict of interest (objections to a change in land use from agriculture to forestry). However, the conclusions reached "... were to the effect that the national interest would be better served by the dedication of these areas to forestry purposes ..." (Rea 1985).

In light of these conclusions the government "... expressed the desire to have the conclusions of the survey checked by independent expert advice, and requested that FAO undertake a one-man forestry mission for this purpose." Roy Cameron, Chief of FAO's Forestry and Forest Products Working Group for Europe, duly arrived, spent some ten days in the field and four in discussion with Forestry Division staff. His report recommended the division of the planting programme into two parts of 500,000 acres each (200,000 ha); one with a commercial and the other with a social objective; the latter to be directed mainly to the western counties (FAO 1951). The commercial objective was readily accepted for both parts and the social element was quietly shelved. Such is the genesis and maturation of one of the most profound policy decisions to affect Irish forestry. A detailed and more comprehensive historical account, with source references, can be found in OCarroll (2004).

### **Achievements**

Our main achievement is probably the attainment of a target. In 1948 the Government announced that it intended to introduce a planting programme of 25,000 acres (10,000 ha) a year for forty years, to be completed in 1988. If we add up the annual figures for new planting that target was finally achieved in 1991, despite some vicissitudes in matters of exchequer finances and land availability. But it would not have been achieved so soon were it not for the essentially eleemosynary contributions from Brussels. We will later discuss some of the imperfections that developed in the course of that success, but the achievement of a government target over such a long period, and under a variety of governments must be seen as meriting a mark of perhaps 9 out of 10. The total of new planting up to that year was 1,013,621 acres or 410,373 ha. Planting on privately-owned land contributed 51,943 ha to that total.

In terms of wood production, the output from state-owned forests in the year 2003 amounted to 2,660,000 cubic meters of roundwood. FAO statistics for the year 2002 indicate that Irish production of sawn conifer wood represented more than half of the total consumption. An analysis carried out in 1985 showed that the state's investment in production forestry had given a net return, above inflation, of about 2% compound interest.

Other benefits are hard to estimate in money terms, but most Irish residents will be aware of the increased opportunities for recreation, the greater diversity in the landscape and the visible movement of log-bearing trucks moving from forest to busy sawmills, and wood-using industries such as those in Drumsna, Clonmel, Scariff and Waterford.

### **Tradition and public opinion**

There is no tradition in Ireland of forestry in the sense of managing a crop of trees. There is much ancient lore concerning individual species. One practice that still survived when this story begins is that of planting a rowan tree (mountain ash) beside a house, presumably to ward off fairies, which were generally believed to be maleficent.

Scholars have elucidated many ancient texts concerning trees, but are less helpful in telling how much of this is to be taken literally. Often repeated is the classification of trees into four orders, apparently related to their utility as food, fuel or building

materials. The classes are: 1. Nobles of the wood, including oak, ash and Scots pine. 2. Commoners of the wood, which includes alder, rowan and birch. 3. Lower divisions of the wood, such as elder, arbutus and aspen, and 4. Bushes of the wood, including bog myrtle, furze or whin and heather (Kelly 1997).

Many tree names occur in anglicised form in local names; the commonest appears to be derry (*doire*, oak wood). Other examples are Mayo (*Maigh Eo*, plain of the yew trees), Lucan (*Leamhcán*, place of elms) and Ferns (*Fearna*, elder trees). Many placenames begin with 'Kill-'. This can represent either *coill*<sup>2</sup> a wood, or *cill* a church. (Room 1994).

Public opinion on forestry has had two main influences: the fact that woodlands were associated with the landed estates, and so connected with the largely Protestant ruling classes of the 18th and 19th centuries, and also the fact that such woodland occupied land on which the growing population might grow food crops, a perception heightened by the great famine of the 1840s. In the process of gaelicising Ireland, begun towards the end of the 19th century, the habits and fashions of the ascendancy landlords were eschewed, however unconsciously, but much stronger was the general land hunger among the small tenant farmers. Trees on good farmland were seen as the enemy, probably even more so than the landlords, ever pressing for higher rents. The need for land was exacerbated by the rising population level: from 4.4 million (1791), to 6.8 million (1821), 8.2 million (1841), followed after the famine to a fall to 6.5 million (1851) and 4.4 million in 1911 (Connolly 1994).

Public opinion, as is usual, was slow to change. Despite the belief expressed by the 1907 Committee that "...there is a love of trees among the people" and that "... support will be forthcoming in Ireland for a national scheme of afforestation..." that support was often less than whole-hearted. The Irish Land Commission, set up in 1881, had as its main purposes the fixing of fair rents and the acquisition of estates in order to transfer ownership to the tenants. It subsequently monitored all land sales, and in response to local pressure, ensured that no land of any agricultural utility was planted. This became official government policy for many years and was enforced by a ceiling imposed on the price that the forest service could pay for land for planting. Thus was public opinion enshrined in government policy.

Only in recent years has general public opinion softened in respect of afforestation. This has probably arisen largely from the consciousness that agricultural surpluses in output cannot continue to be subsidised as they formerly were, and also the increase in off-farm employment combined with increased incentives for afforestation, both in planting grants and annual premiums.

There appears still, however, to be a lingering public distrust of commercial forestry. Many urban dwellers have a rural farming background and retain vestigial traces of the land hunger of their forebears. A common public perception of forestry was summed up by an informal off-the-record and tongue-in-cheek comment at a conference: "Trees are all very well as long as nobody is making any money out of them".

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<sup>2</sup> Not to be confused with *coill* (v.t.), castrate.



## The profession

In discussing the training course at Avondale with the 1907 Committee, Mr H. Munro-Ferguson M.P., Scottish forest owner and chairman of the Departmental Committee on British Forestry, 1902, said “I would sooner have it than all I have in my own country”, in which he included Oxford and other centres of education. The Avondale course continued to develop, and increasing numbers of students, triggered by the expanding afforestation programmes during the late 1950s, led to its transfer to Shelton Abbey and Kinnitty Castle. Oblivious to actual needs, recruitment continued with little abatement until the government embargo on recruitment of staff to the public service in the 1980s led to the closure of both. There has been no subsequent replacement, but later a perceived overstaffing situation in state forestry was alleviated through voluntary early retirement.

The 1907 Committee also pointed out the need for higher forestry education to train future experts. It recorded that “... last year [1906?] scholarships were offered for the first time at the Royal College of Science to students of forestry”. The earliest recorded forestry graduate from that college is D. McCaw, 1913. Augustine Henry was appointed professor of forestry in 1913 but on his death in 1930 the professorship lapsed until the promotion of Thomas Clear in 1959. At the time of writing (2004) the professorship appears again to have lapsed.

Entrants to the profession of forestry have tended in the past to have been moved as by a vocation; it has never been seen as an opening for promotion-hungry and ambitious potential high-flyers. Such people have tended to opt for callings such as medicine, the law or big business. As Garret FitzGerald (2004) has pointed out “...there has been a disturbingly short-sighted tendency by many parents to push their children towards courses they believe are likely to secure for them in due course high levels of income”. This is in contrast with the situation in, say, Finland, where forests constitute the main natural resource covering 76% of the land area, and the forestry profession as seen as highly prestigious, and attractive to recruits of the highest calibre. Two foresters have become Prime Minister of Finland, Aimo Kaarlo Cajander, author of *The Theory of Forest Types* (1927) and Mauno Pekkola, who is not known to have left any mark on forest science. Similarly in Sweden where, according to an eminent modern forester, in the late 19th century and early 20th it was generally accepted that the figures of power and trust in rural life were the Forester, the Priest and the Doctor. This difficulty in Ireland was conceded by Professor Clear in the course of a discussion of the quality of forestry graduates with a senior official of the Forest Service in the 1950s. He believed that the best students, those with scholarships, were more apt to follow the course in General Agriculture where at least jobs as agricultural instructors seemed in prospect for graduates.

## Land

In recent times in Ireland forestry has always been regarded as a land use of last resort. This arose from the land hunger already described, and was so strongly imbued that it led to the disastrously abortive attempt to plant at Knockboy, a barren windswept hill near Carna in west Galway in the 1890s: disastrous because of its influence on public opinion on forestry; abortive because most of the trees were soon dead.

The 1907 Committee criticized the Land Purchase Acts for not making adequate provision for dealing with waste land, part of the estates acquired, but not included in tenants' holdings. Much of this land was suitable for afforestation had to be disposed of, but could not easily be got back for public use.

In a paper presented in 1963 Henry Gray, effective administrative head of the Forest Service, quoted from a report of the Minister for Agriculture for 1925-6 stating that "The Department do not desire to acquire for afforestation land fit for agricultural purposes which might be capable of being used to form new holdings or to enlarge existing ones." This policy was followed by imposing on the Forest Service a ceiling price that it could pay for land, which excluded all but the most infertile and otherwise unwanted land. With increasing land values, that limit became more and more limiting as to land quality, but was strictly enforced by the presence of a Land Commission Inspector in every Forest Service acquisition office who saw all the relevant files and officiously, as well as officially, excluded all land of any conceivable agricultural value. That policy came to an end only with the demise of the Land Commission in the 1990s and European moves to reduce agricultural surpluses.

### **Politics**

Afforestation, or reafforestation as it was frequently called, became politically topical towards the end of the nineteenth century. Seán MacBride in the 1980s wrote "I think I can say that I have been keenly interested in the whole question of the reafforestation of Ireland ever since my childhood days. The aim of pursuing an active afforestation policy was an integral part of the Sinn Féin movement in the early portion of the century. Bulmer Hobson, Arthur Griffith, George Russell, James Stephens and my mother [Maud Gonne MacBride] were always emphasising the importance of a re-afforestation policy. The failure of our governments to give adequate recognition to the importance of forestry and forestry-related industries the priority it deserves has been one of the great disappointments of my life" (MacBride 1984).

While the new independent state carried on with the afforestation programme begun during the previous administration, no serious attempt at a major afforestation drive was made until the arrival of Seán MacBride as a cabinet minister, albeit Minister for External Affairs (i.e. foreign minister) in 1948. MacBride had spent his early years in France and was aware, no doubt, of the successful major afforestation project in the Landes region on the Bay of Biscay in the early part of the nineteenth century. It was MacBride's influence that brought about the government policy to plant 25,000 acres (10,000 ha) each year for forty years.

Although the concept was vigorously opposed by the Department of Finance on the basis that it was inflationary and too long-term an investment without monetary return, MacBride ensured acceptance of his proposal by making it a condition of securing post-war Marshall Plan funding.

Political influence may also have played a part in appointments. Forbes, as Director, was in place at the beginning, but a Scot, Mark Anderson, may have seemed better than an Englishman, and, in the political climate of the 1930s, a German, Otto Reinhardt, Director, 1935 – 1939, better still.

## Organisation

In 1904 forestry activities were controlled and directed by the Department of Agriculture and Technical Instruction. With national independence it remained within the domain of the Department of Agriculture, and remained there until 1933 when it was transferred to the Department of Lands, parent department to the Land Commission. That was a convenient arrangement since it allowed the easy transfer of ‘waste’ land, not suitable for redistribution among farmers, from newly acquired estates, to forestry.

Originally known as the Forestry Division, the combined forest authority and forest enterprise was later renamed the Forest Service, and later again the Forest and Wildlife Service, the ‘wildlife’ element being dropped when responsibility for wildlife management and conservation was moved to the Office of Public Works (later to Dúchas and now with the National Parks and Wildlife Service). The Forest Service has since then resided variously with the Department of Fisheries, The Department of Energy, the Department of the Marine, the Department of the Marine and Natural Resources, the Department of Agriculture Food and Rural Development, the Department of Communications, Marine and Natural Resources and currently back with the Department of Agriculture and Food; a ‘you name it, we’ve been there’ scenario.

In 1984 the then minister, Mr Paddy O’Toole, set up a group to review the current position of forestry and to make recommendations about its future. In its report in 1985 the group recommended the formation of a commercially motivated body similar to the Forestry Commission of Great Britain, to be named the National Forest Enterprise (Review Group on Forestry 1985). A new government decided to set up a state company, Coillte Teoranta, or The Irish Forestry Board Limited. This was implemented under the Forestry Act, 1988. Coillte took over the state forests and most of the Forest Service staff. Forest authority functions, including forest policy, forest health and grant-aid schemes remained with the parent department.

## Silviculture

The 1907 Committee, while it explicitly avoided drawing conclusions on technical aspects of the subject, endorsed the suggestion by both Augustine Henry and John Nisbet that initial policy should be to cover the ground mainly with “... the quicker-growing varieties of coniferous timber”. That policy was adopted, using initially Scots pine, Norway spruce and European larch. Later the particular merits of Sitka spruce became clear, particularly in high-rainfall areas and on wetter soils, its only serious fault being its vulnerability to late spring frosts (Joyce and O’Carroll 2002). But the political imperative of a large annual planting programme, together with increasing land prices, caused further difficulty in acquiring land for planting. This forced foresters more and more to look to the peatlands, and especially the blanket bogs of the west. Fortunately, the availability of heavy forestry ploughs and a knowledge of the efficacy of phosphate fertilisers on such land indicated a possibility of success and much peatland afforestation followed.

Sitka spruce planted on peatland appeared to start well, but often, after a few years, growth slowed to a virtual standstill, entering a condition known as ‘check’. Some recovery could be induced by fertilizer treatment, primarily with phosphate. It is likely

that the check resulted, in many cases, from the early practice of applying the phosphate as a spot treatment to individual plants rather than as an overall broadcast treatment.

No such growth difficulties arose with lodgepole pine, but there were other problems. The first was genetic: lodgepole pine is highly variable, and at first was thought to consist of two species – *Pinus contorta* (shore pine) from west coastal regions of North America, and *Pinus murrayana* from inland regions. A.C. Forbes planted a line of each at Avondale, and on the basis of observed early growth, chose the coastal variety for general forest use. This policy appears to have been reversed by Mark Anderson as Director, presumably because the inland variety had a better stem form. In the event neither has been successful so far. The coastal forms grow fast but usually have very poor stem form, conforming to its botanical name *Pinus contorta*, while the inland forms are of slower growth and often tend to become moribund in later stages, or as it was once put, "... it tends to peter out and die". The other problem with lodgepole pine is that, unlike Sitka spruce, it is subject to a variety of disease and insect pests.

It subsequently transpired that, while relatively high volume yields could be obtained through peatland forestry, the cost of growing and harvesting the product made the investment less attractive (Farrell and Boyle 1990). Fortunately, changes in European agricultural policy released more suitable forest land such as the widespread wet mineral soils. Even some land which had once been 'reclaimed' for farming became available, and the reclamation process was beneficial to the tree crop also.

Douglas fir has also been successful, but only on better forest soils.

In more recent years measures to reduce farm production, and increased incentives for forestry have increased the availability of land suitable for broadleaves, but those same incentives have at times led to pressure to plant broadleaves on less suitable sites. A condition of vigilance on the part of the Forest Authority needs to be maintained in order to avoid a heritage of large areas of unprofitable broadleaf scrub. There has also developed a fashion in public opinion that favours broadleaf planting, irrespective of the economic outcome, combined with a general, and quite unjustifiable denigration of Sitka spruce, primarily on the basis of its superficial appearance.

## **Research and inventory**

Research is an essential component of any progressive organisation. It could be argued that Forbes has research in mind when he established the Forest Plots at Avondale. Certainly the growth performance of Sitka spruce there helped to encourage its acceptance as a suitable species from the 1920s onwards but the plots at Avondale fell far short of the rigorous experimental design standards later stipulated by e.g. Yates (1937), and Cochran and Cox (1957) for scientific research.

A Research Branch was formed with the establishment of the Forestry Commission in Britain in 1919 and the first scientific experiment of latin-square design on thinning was laid down at the Bowmont Estate in Scotland in 1930 which was to provide invaluable data for yield modelling in later years. Yet the Free State continued its afforestation programme without research, preferring to depend on Anderson and the Scottish cohort to provide the experience on species selection. Had research results been available it is possible that the fiasco of planting Scots pine on the Old Red Sandstone



podsoles of Cork and Kerry in the 1920s and 30s might have been avoided. In the mid 1950s these Scots pine plantations were waist high and stagnating at 20-25 years of age. Many were burned, either deliberately or accidentally preparatory to ploughing, but when this practice was seen to be injudicious they were merely ploughed-in and planted with Sitka spruce after fertilising with phosphate. Forest research was deemed unaffordable to a department operating on a tight budget. When the question of affordability of research was put to Timothy McEvoy, then a high-ranking technical officer in the Forestry Division, his reply was succinct: "We can't afford not to have it".

Forest research finally arrived linked with forest inventory in 1957. Two main questions required answers. One concerned the westward expansion of forestry on to oligotrophic peats, the other sought information on the volume and growth potential of the forest resource in order to provide forecasts for sawmills and wood-using industries.

Peatland afforestation had already taken place in Britain but, possibly conscious of the Scots pine debacle of the 1920s and 30s through incorrect interpretation of species selection principles, it was decided to undertake research under Irish conditions on the most suitable site preparation, species and appropriate nutrition regime for afforestation of oligotrophic sites along the western seaboard. Rigorous design standards amenable to scientific analysis were observed for all experiments and LSD<sup>3</sup> assumed a connotation very different from that of a hallucinatory drug in vogue at the time. Research findings were conveyed to management as information became available. Close liaison was maintained with the Northern Ireland Research Section and the Forestry Commission Research Branch and experimental results were compared at seminars and field tours.

The need for information on the forest resource became acute in the 1950s with the establishment of the hardboard manufacturing mill (Bowaters) at Athy and the chipboard producing mill in Scarriff. To satisfy demand a roading programme was undertaken to gain access to stands in which thinning had been neglected during the war years, but information on the extent, volume and growth potential of stands was not available. Information from an inventory undertaken during the war years was never uncovered.

The Forestry Commission had completed a National Forest Inventory in which data were transferred onto punch cards (Hollerith) for subsequent sorting and collation. The Forest Service adopted the system with minor modifications for the Census of Woodlands 1958/59. All state forest over 10 years of age was mapped into stands and species characteristics recorded in 'boxes' on field sheets. The information was then punched onto Hollerith cards. This provided the first reliable estimate of standing volume by species and area for state forests in the country, as well as providing information for growth forecasting. As a by-product it provided the forester with excellent stand maps of his forest with management information on time of thinning and felling. Subsequent inventories have up-dated the information with the digital computer replacing the Hollerith system. A criticism of the approach adopted was that ocular estimation of volume precluded any estimation of the accuracy of the volume estimate. This, however, could only be achieved by time consuming measurement of samples which, taking into account the urgency of the required information, was impractical in

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<sup>3</sup> Least Significant Difference

the first inventory. This feature is being remedied in the current National Forest Inventory where a system of Continuous Forest Inventory based on permanent sample plots is planned (Farrelly 2004).

Over the years other disciplines were added. A growth and yield section was formed in the late 1950s and a genetics section shortly afterwards. One of the early tasks of growth and yield section was to prepare a preliminary yield table for coastal lodgepole pine for yield forecasting of inventory data in the absence of a Forestry Commission table for that subspecies. It went on to lay down a series of thinning grade and thinning intensity experiments for various species which were to provide data for the construction of a yield model for Sitka spruce in Ireland. It was always felt that the British yield model for this species did not accurately represent growth under Irish conditions. A new dynamic yield model has been developed for the species, which it is planned to release in 2005 (Lynch 2004).

In view of its limited staff numbers genetics section concentrated on provenance trials of the two main species, lodgepole pine and Sitka spruce, and was instrumental in drawing up guidelines for the selection of seed provenances of the species. The authenticity of labelling by seed merchants, particularly the suppliers of lodgepole pine seed, required the utmost vigilance in order to avoid planting the wrong provenance. This could have had serious consequences when lodgepole pine constituted 20-30% of the planting programme.

With entry into the European Economic Community, currently known as the European Union (EU), forest health and hygiene assumed added importance. Previously our island situation maintained a barrier which was relatively easy to defend. However, the advent of the Single Market and the free movement of timber and plant material within the EU has made protection against forest insect pests and pathogens much more difficult. The discovery of the bank vole in Munster forests; the presence of the giant spruce bark beetle in Sitka spruce stands in Wales and the introduction of oak wilt from the United States into Europe are constant reminders of our vulnerability.

Initially within the Forest Service the Research Branch seemed to be regarded as an appendage rather than an integrated part of forest management to provide information for informed decision-making, but with time this situation improved. However, research was done on a somewhat *ad hoc* basis rather than adopting a long-term strategy with priorities and targets, followed by an audit to determine progress. This would have forced staff to spend more time analysing data instead of concentrating on fieldwork and establishing ever more trials. With time the accumulation of field data needing analysis became unmanageable. Official publication of research findings was spasmodic and readers had to resort to articles in forestry publications such as *Irish Forestry* for research results. In mitigation, there was no established career path within research, a fact which forced promising researchers to migrate to management or acquisition sections. Research Branch was always understaffed and under-resourced; some sections consisting of just one inspector and a field forester.

### **Private planting**

The 1907 Committee, while it foresaw that the main thrust of a national afforestation scheme would be by or under the control of the state, also envisaged that "...corners and

small patches which are of inconvenient shape for cultivation or pasturage, ... might be profitably used for growing timber". That approach continued to dominate official policy for many years. The Forestry Act, 1928, controlled forestry on privately-owned land for the first time; it prohibited the felling of trees without a permit from the Forest Service, a move advocated by Jonathan Swift in his *Drapier's Letter No. VII*, first published in 1735. That act also provided for planting grants, without any repayment conditions as had been required under the British Forestry Act, 1919. But those grants were set at a level too low to attract significant areas into forestry, and farmers generally were reluctant to transfer any productive land out of farm use. Further, while not saying so publicly, the Forest Service believed that any available substantial areas would be better incorporated into its own operation. It was not until the mid-1980s, when European policy moved towards alternative crops, and when incentives were set at a more appropriate level and an annual tax-free premium was introduced, that private planting began to grow. With the continuing reduction of state planting by Coillte private planting now exceeds state planting by a factor of about ten.

Throughout the period prior to the mid-1980s private planting made very little impact on the overall programme. This was partly due to the availability of generous grants for reclamation of marginal lands that many agriculturists would privately admit to be better suited to the growing of spruce than stock raising. Soils along the drumlin belt were virtually impossible to drain and 'poached' badly in wet weather, whereas such soils were among the most productive in the country for Sitka spruce. Attempts by the Forestry Division to acquire some such areas were met with stiff resistance. This caused unnecessary resentment towards forestry in general. Forestry, even when privately undertaken, was eschewed by the farming community despite the examples of successful and financially rewarding plantations as shown on the O'Rahilly farm in Leitrim and the Tottenham farm in Clare. It is of interest that planting on the latter was undertaken only after futile attempts at reclamation and against the advice of an agricultural instructor. A more enlightened approach to land use on the part of the Department of Agriculture would have directed money that was ill-spent on attempted reclamation into rewarding plantations that would benefit the private owner. That farmers would have responded is demonstrated by the success of organisations such as the North-Western Co-Operative today. The ingrained inclination of each civil service department to protect its own sphere of influence resulted in a certain rivalry that militated against active co-operation. The position is exacerbated when both departments are competing for the same resource - land in this instance. Both the Department of Agriculture and the Forestry Division operated in isolation rather than in integrated land use development. As the dominant organisation responsible for the vast majority of the resource the onus lay with the Department of Agriculture to take the initiative. The position was resolved only in the 1980s when a superior authority, the EU, took the situation in hand and with the aid of generous grants and premiums over-rode the isolationism of both departments. Just as improvements in agricultural methodology helped to curtail destruction of the forests of Europe one and a half centuries ago, over-production in agriculture is now helping to restore forests to countries such as Ireland.

The Forestry Act, 1946, included a provision, not in the 1928 Act, that to every General Felling Licence "... there shall be attached ..." a condition requiring the cleared

land to be replanted within a specified period, and there is no provision permitting that condition to be rescinded. This incorporates the widely accepted principle that land under trees is normally deemed to be permanent forest.

The formation of the state company, Coillte Teoranta, in 1988, put forestry on a more commercial footing. A strategic plan – *Growing for the Future* – published in 1996 envisaged a target size for the industry or ‘critical mass’ which would require timber production to increase at least four-fold from a current 2.5 million m<sup>3</sup> per annum to approximately 10 million and preferably to 12-15 million m<sup>3</sup>. The achievement of critical mass would require maintaining an afforestation level of 25,000 ha per annum to year 2000 and 20,000 ha per annum to year 2030, with a target yield class equivalent to Sitka spruce yield class 18 m<sup>3</sup>/ha/yr for all sites. Furthermore, the plan envisages reducing Sitka spruce to 60% of national average afforestation with other conifers replacing Sitka spruce on 20% of sites, and broadleaves on a further 20%.

The 1996 plan for afforestation of 20,000 ha per annum ran into difficulty when the EU made very generous grant and premium schemes available to farmers in order to get land out of agricultural production and avoid the creation of ‘beef and butter mountains’ through intervention. Farmers responded enthusiastically and land that might have previously been sold to Coillte was planted privately. Unfortunately the ‘stop-go’ nature of these schemes led to alternating periodic shortages and surpluses of nursery material, particularly broadleaves. As every forester knows it takes two to three years to prepare plants in the nursery, so advance planning is essential. Retrenchment of planting programmes left nurseries with plants that they could not dispose of which had to be destroyed. When planting resumed plants were not available and had to be imported from continental Europe, usually France. This has resulted in unknown provenances being planted and even some undesirable species, such as brown-bud or narrow-leaved ash (*Fraxinus angustifolia*) instead of common ash (*Fraxinus excelsior*). Although they are difficult to distinguish<sup>4</sup> in early years, common ash grows into a magnificent forest tree up to 40 m in height (used for hurley manufacture, furniture etc.); the other into an overgrown shrub (up to 25 m in height) of inferior quality wood. Since they hybridise freely in southern Europe contamination of the native ash gene pool is a serious probability.

## Conclusion

We have come a long way in the last 100 years and the future, as always, is uncertain, but with prudence and caution our forests can continue to develop and prosper and be a source of national prosperity and pleasure.

In looking back over the century it is appropriate to pay tribute to those who contributed in no small way to the creation of what is the Coillte estate today. They are the forest workers who, in the hungry 20s, 30s and 40s had what to them was a job in ‘the Forestry’, working for meagre wages on the slopes of mountains from Cork to

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<sup>4</sup> *Fraxinus excelsior* can be distinguished from *Fraxinus angustifolia* by its black buds and its leaves which show more serrations than lateral veins; *Fraxinus angustifolia* has brown buds and its leaves show the same number of serrations as lateral veins (Tutin *et al* 1972).



Donegal, as an alternative to joining McAlpine's Fusiliers in Birmingham, London and Manchester, and further afield. Although working conditions improved for later generations their lot was only relatively less demanding. They are the true builders of what John Mackay called 'Green Gold' (Mackay 1928).

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## Avondale - A National Forestry Resource

Michael Carey<sup>a</sup>

### Abstract

The year 2004 was the centenary of the acquisition of Avondale estate by the Department of Agriculture and Technical Instruction. The objective in acquiring the estate was firstly to establish a forestry school for working foresters in which young men could be trained in plantation establishment and management and, secondly, to enable trials to be laid down to determine the most suitable species for Ireland's forestry programme. The school was highly successful and provided the competence needed to deliver the successful forestry programme. Forest cover is now 10%, compared with 1.6% in 1904.

Between 1905 and 1913 approximately 49 ha of land was planted in 104 different plots. Eighty-four tree species were planted: 46 coniferous and 38 broadleaf. In addition, small pure groups of 16 rare species (nine coniferous and seven broadleaf) were planted in corners and in situations likely to suit them. This brought the total number of species planted to 100. Some species were planted pure, others in mixture with nurses, mainly larch and Norway spruce). Most of the planting took place between 1905 and 1907.

In addition to the experiment plots, an arboretum, covering an area of 17 ha, incorporating a pinetum of 6.75 ha, was also developed.

The conifers far outperformed the broadleaves in volume production. Of the conifers the best performers were: Sitka spruce, Corsican pine, Douglas fir, grand fir, Lawson cypress, European and Japanese larch, Monterey pine, Norway spruce, the redwoods (notably the coast redwood), western hemlock and western red cedar. Of the broadleaves the most promising were: beech, hornbeam, pedunculate oak, sessile oak, Spanish chestnut and sycamore.

The paper reviews the progress of, and lessons arising from, the initiative, and suggests a way forward in relation to the future management of the area.

### Introduction

Avondale, near Rathdrum in Co Wicklow, the home of Charles Stewart Parnell in second half to the nineteenth century, and, in former times, the property of Samuel Hayes, the celebrated author of *A Practical Treatise on Planting and the Management of Woods and Coppices*, first published in 1794 (republished in 2003), has been at the centre of Ireland's forestry programme for the last one hundred years.

The area of woods and plantations in Ireland in 1903 amounted to 122,000 ha, representing a landscape cover of about 1.6%. The lack of woodland led to a consensus that action was needed, insofar as wood supplies into the future were concerned. The action programme centred on the setting up of a forestry school for working foresters, in which young men could be trained in plantation establishment and management and, secondly, laying down of a series of field trials to determine the most suitable species for Ireland's forestry programme.

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Although landlords had, during the eighteenth and nineteenth centuries, introduced many species to the country, and had planted quite extensively around their manors, there was no scientific information available on what constituted the best species for an afforestation programme, or how they might be managed from a silvicultural point of view.

Enquiries regarding a suitable site for the venture commenced in 1903, during which various localities and properties were considered in Cos Tipperary, Waterford and Wicklow. It was finally decided to purchase the Avondale Estate in Co Wicklow. The decision in favour of Avondale was very likely influenced by an approach by John Parnell, who had inherited the estate, to the Department with a proposition: “to place the estate under the Department as an experimental farm in part of which trees would be grown and experimented which would do for all parts of Ireland from Wicklow to Galway as we have so many diversified positions such a valley, hill, sea, lake and mountain exposures” (Forbes 1946). John Nisbet, who surveyed the woods in Co Wicklow in 1903, and was an expert witness to the Departmental Committee on Forestry in 1908, was also positive about Avondale. However, his preferred choice was Whaley Abbey Cottage estate, a few kilometres away in the same district (Nisbet 1903). Nisbet refers to the presence of the remains of an old sawmill in Ballytrasna wood on the Avonmore river which closed down in 1902 “when the stock of marketable timber in the estate became exhausted (except in the ornamental demesne woods and in the park timber)”. He also mentions the stone foundations of a small turbine sawmill worked by C.S. Parnell around 1878. Parnell it seems was more interested in timber processing than in forest management.

Avondale was seen to have advantages as a choice site because of its location in the centre of a relatively well wooded district, and its proximity to the Wicklow mountains in which forestry operations on a large scale were likely to take place, which they did subsequently. (The forest area of Co Wicklow increased from 7,000 ha in 1906 to 43,000 ha in 2003.)

Excluding tenanted holdings, and outlying portions of the property unsuitable for afforestation, the estate included the present country house and outbuildings, about 80 ha of unplanted grassland and 120 ha of woodland. The outlying areas, mostly mountain land, amounted to some 1,200 ha. A price of £9,870 was paid for the whole property.

Much of the planted woodland and trees on the estate dated back to the second half of the eighteenth century, and the silvicultural interests of Samuel Hayes, a man of many talents and a prolific planter of trees (McCracken 1968). In April 1768, Hayes was awarded a gold medal by the Royal Society for “having planted out since October last 2,550 beech trees under five years old not nearer to each other than fifteen feet” (Royal Society 1768). Many of these, and a limited number of other specimen trees, such as European larch, sessile oak, silver fir, Spanish chestnut and walnut, planted by Hayes, are still to be seen around the estate. The announcement of the award gave his address as Hayesville, Co Wicklow. The estate is referred to as such on a 1760 map of Co Wicklow prepared by Jacob Nevill (1760). However, Hayes subsequently changed the name to Avondale in 1770, and the property has this title on a revised edition of the Nevill map published in 1790.

Fraser (1801) refers to “the improvements of Avondale made by the late Colonel Hayes, a name truly endearing to all who feel the enthusiasm of extending zeal for the rural arts”. He mentions plantations of larch and large Weymouth pine on “the front and side of the house large beech trees and remarkably well-grown fir, particularly the spruce”. Later, Radcliff (1812) refers to John Parnell’s involvement in tillage at Avondale and to lime being transported from Carlow as “manure using horses a wagon and carts imported from England”. Some of the areas subsequently limed were very likely planted with trees and this may explain why some of the plots described below suffered from butt rot (*Heterobasidion annosum*).

Between 1905 and 1913 approximately 49 ha of land was planted at Avondale along the Great Ride in 104 different plots. Most of the plots were 0.4 ha in area. The 84 tree species planted were comprised of 46 coniferous and 38 broadleaf species. Pure groups of 16 (nine coniferous and seven broadleaf and other rare species were also planted in situations considered “likely to suit them” (Forbes 1915). This brought the total number of species planted to 100.

Some species were planted pure, others in mixture with nurses, mainly larch and Norway spruce. Most of the planting took place between 1905 and 1907.

In addition to the experiment plots, an arboretum, covering an area of 17 ha, incorporating a pinetum of 6.75 ha, was also developed between 1905 and 1917. The collection was added to in the 1920s, 1940s and 1970s. By the mid 1970s it stood at 413 taxa, spread over 123 genera (MacOscair 1978).

One hundred years after the start of the initiative at Avondale, the forest area in the Republic of Ireland has reached 700,000 ha, 10% of the landscape. This has been a remarkable achievement, given the socio-economic conditions that prevailed, and the fact that planting for most of the 20th century was confined to marginal land or land peripheral to the needs of agriculture. Although many of the new forests were planted on land of poorer quality than that at Avondale, the experiment plots have provided a wealth of information on species adaptability and suitability.

The Forestry School also achieved its objectives. The students who trained there in the first two decades of the 20th century, and later on into the 1930s and up to the mid 1950s and again in the 1960s and 1970s<sup>1</sup>, provided the expertise needed to develop the successful state forestry programme, and more recently the expanding private forestry initiatives.

Avondale is now owned and managed by Coillte Teoranta<sup>2</sup> (The Irish Forestry Board). In 2004, the company commissioned the author to carry out a survey of the experiment plots and, on the basis of the findings, to advance proposals for their treatment and management into the future. This paper outlines the findings of the survey, in addition to detailing the background to the establishment of the plots at the beginning of the 20th century.

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<sup>1</sup> The school closed in 1914 but reopened again at Avondale in 1934, where it remained until 1955. It was then moved to Shelton Abbey near Arklow in Co Wicklow and subsequently to Kinnitty Castle in Offaly, in order to cope with increasing numbers of students.

<sup>2</sup> The commercial state forestry company, established in 1989.



### *Forbes and the forestry initiative at Avondale*

A.C. Forbes, a “dynamic” 37-year-old lecturer in Forestry from Armstrong College of Science, Newcastle-Upon-Tyne, was chosen to drive the initiative at Avondale. Forbes was well acquainted with the history of forestry in Britain and Ireland, and was convinced as to its importance in the economic life of a country. His attitude was described as being essentially commercial; he had little time for social forestry or the acquisition of land for that purpose. He subsequently became the first Director of Forestry in Ireland. He was described in an obituary in the *Irish Times* as “not one of those men content to remain in a groove, and just to carry on as required until superannuation overtook him. He brought to his task a mind that refused to be circumscribed by short-term views, nor was it tolerant of temporary expedients” (*Irish Times* 1950).

Forbes had the view that Avondale was, in many ways, “not too suitable” for the purpose for which it had been acquired (Forbes 1946). He felt the area was somewhat on the small side to allow work to be carried out on economic lines and that “the bulk of it was fairly good tillage land not usually devoted to tree planting”. Although this may have been the situation for most of the 20th century, the major changes through which the agriculture sector is currently undergoing may result in the trials becoming increasingly relevant as better land is planted.

Nevertheless, Forbes set about his new task with enthusiasm and decided to turn the main part of the property into a forest experiment station on the lines of a continental forest garden. In addition to the training of foresters, he saw one of the main objectives as being to “prove as far as this can be done in one place, on a limited area, the cost of production, yield in timber and the comparative market of the species planted” (Forbes 1915).

### **Establishment of the experiment plots**

In laying out the experiment plots the area was divided into 19 sections with separate species being allocated to a series of plots within each section. The layout is shown in Figure 1. Table 1 gives a breakdown of the species planted and the number of plots in each section.

The following are some of the other main features of the plots:

- None of the plots were replicated. This was a serious shortcoming in terms of experimental design. However, the soils at Avondale, although mainly light in texture, are generally relatively fertile from a forestry point-of-view. The main variation in soil type relates to changes in the physical composition of the parent material and slope, both of which influence drainage. In general, apart from a few localised areas, the drainage is free.
- The use of mixtures was adopted across the plots in order to reduce the cost of plants and secondly to minimize the risk of frost damage to the nursed species. Frost was seen as a risk factor, which was well founded, in that some of the more susceptible species, including Sitka spruce and silver fir, were damaged in the early years after planting. The following principles applied in the case of the mixtures:
  - (a) The species intended to represent the main crop formed at least 25% of the

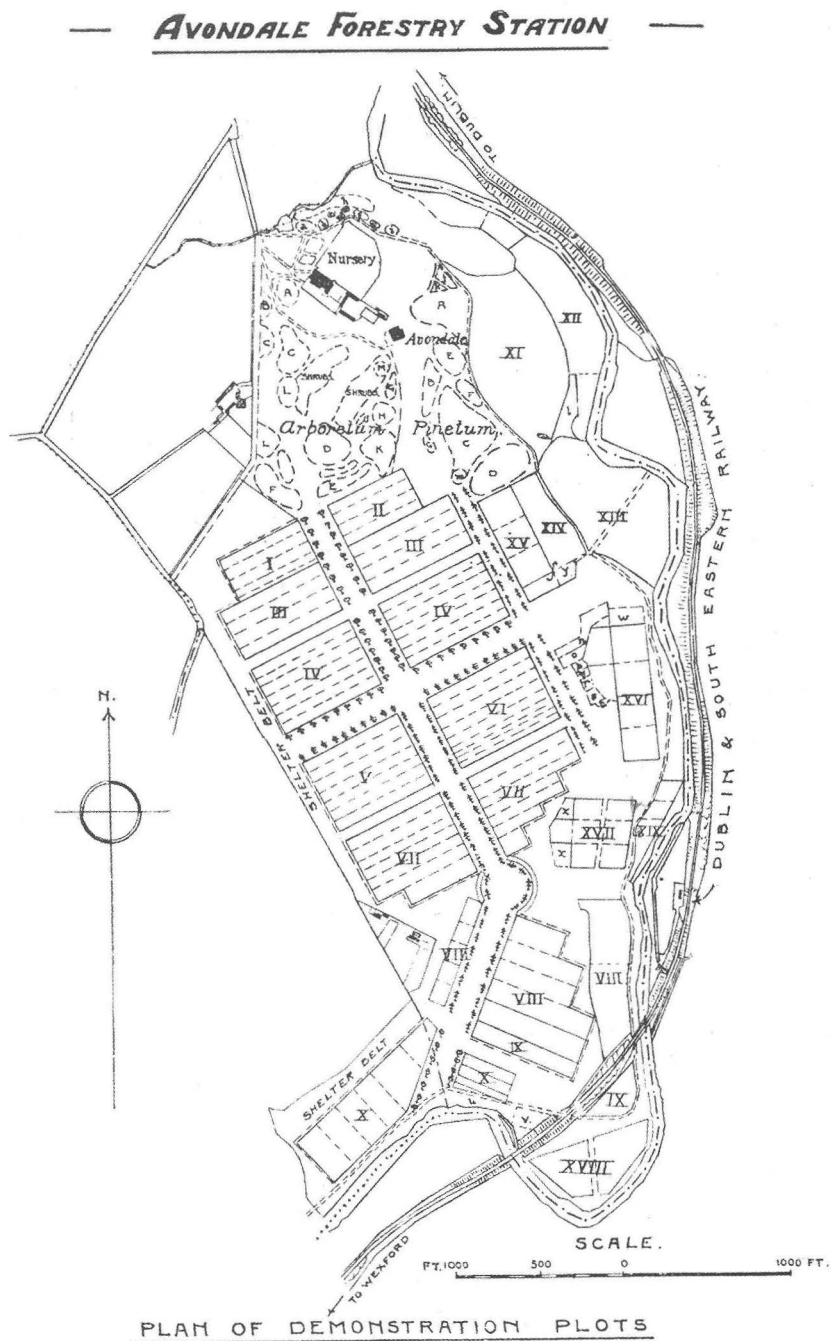


Figure 1. Layout of the species demonstration plots at Avondale (Forbes 1915).

total number planted. At a general planting distance of 1.22 m (4 feet) apart this provided for about 1,682 main crop and 5,045 nurse trees/ha.

- (b) Nurses were either closely allied to the main crop, or, as in the case of larch, capable of being commercially harvested at an early age. They were intended not merely to draw up or nurse the main crop, but also to enable the planting to be carried out at a cheaper rate than if the more expensive species alone formed the crop.
- (c) The two most common nurses of the important forest trees were larch and Norway spruce, so far as space would allow.
- (d) Pure crops of all the important species were planted side by side with the same species in mixture, with a view to noting their development under both conditions.

Larch and Norway spruce were mainly used to nurse the broadleaf species. Scots pine was used as a nurse for most of the more unusual pines and common silver fir for the fir section. Beech was used with larch and oak, ash with oak, walnut and American ash, hickory and tulip tree. In most cases larch outgrew all other species, which necessitated cutting back of the side branches. Norway spruce had the same effect in some instances. Silver fir and ash failed as nurse species due to frost damage.

**Table 1.** *Main genera planted at Avondale, 1905-1912.*

<i>Section</i>	<i>Genus</i>	<i>Number of plots</i>	<i>Area ha</i>
<i>I</i>	<i>Maples</i>	4	1.21
<i>II</i>	<i>Elms</i>	4	1.21
<i>III</i>	<i>Beech, Spanish chestnut, hornbeam</i>	8	3.23
<i>IV</i>	<i>Oaks</i>	14	5.26
<i>V</i>	<i>Silver fir</i>	7	2.83
<i>VI</i>	<i>Spruce</i>	7	2.83
<i>VII</i>	<i>Pine</i>	14	4.85
<i>VIII</i>	<i>Larch</i>	7	5.66
<i>IX</i>	<i>Cedar</i>	2	1.01
<i>X</i>	<i>Ash</i>	9	2.73
<i>XI</i>	<i>Chestnut coppice</i>	1	4.45
<i>XII</i>	<i>Locust tree coppice</i>	1	2.42
<i>XIII</i>	<i>Douglas fir</i>	2	2.83
<i>XIV</i>	<i>Hemlock</i>	2	1.21
<i>XV</i>	<i>Cypress and juniper</i>	3	1.21
<i>XVI</i>	<i>Western red cedar, redwood, Cryptomeria</i>	4	1.61
<i>XVII</i>	<i>Hickory, walnut, plane, tulip tree</i>	10	2.02
<i>XVIII</i>	<i>Cherry</i>	2	1.61
<i>XIX</i>	<i>Poplar</i>	3	0.80
<i>Total</i>		104	48.98

Before planting commenced the whole area was ploughed, apart from the sloping area adjacent to the river that contained some scrub.

Plants were 2+2, 30-60 cm in height, depending on species. Considerable difficulty was experienced in sourcing some of the more rare species, with the result that quality varied.

Planting was done by digging pits, commencing in the autumn of 1905 and continuing on into the two following winters.

Filling-in and planting of species slow and difficult to procure continued until 1912.

The cost of planting was influenced by the availability of plants. Average costs for planting, including labour, trees and replacement of failures over the first three years are given as £12-£18/ha, equivalent to about €4,680-€7,020/ha today (Kennedy 2005).

### *Underplanting initiative in the 1950s*

In the 1950s it was decided to underplant a number of the original plots with shade-tolerant species. The decision was influenced by the fact that the broadleaf plots, apart from beech and hornbeam, and the pine and larch plots, had 50 years' growth of briar, furze, hazel and other species, and were an impenetrable jungle. The decision led to some controversy, but was approved on the understanding that the new planting would not be allowed to become a constituent of the crop. Unfortunately this turned out to be difficult in practice. The end result of the decision was that a number of the plots, notably the elms, some of the Corsican pine plots, in addition to the Scots pine, eastern white pine and Monterey pine plots were underplanted with a variety of species, the most common being western hemlock, Lawson cypress, Douglas fir, grand fir and western red cedar. Corsican pine was underplanted with beech in 1957. The beech has grown poorly. In general Douglas fir also grew poorly when underplanted, whereas the shade-tolerant western hemlock grew well.

## **Species performance**

### *Conifers<sup>3</sup>*

Tables 2 to 6 summarise the performance of the coniferous species.

#### Fir (*Abies*) species

Grand fir was the outstanding performer (Table 2). European silver fir was used as the nurse species in all the fir plots and replaced with grand fir because of it being badly damaged by frost. It showed the greatest vulnerability to frost of all the fir species.

#### Spruce (*Picea*) species

All species grew well for the first few years, but Sitka spruce has been by far the best performer (Table 3), despite having suffered badly from both frost and aphid damage in the early years. Apart from Norway spruce, none of the other spruces showed any potential.

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<sup>3</sup> Conifer nomenclature is based on the Gymnosperm Database (<http://www.conifers.org/index.htm>).



**Table 2.** *Growth performance<sup>i</sup> of fir (Abies) species at Avondale.*

<i>Species</i>	<i>Common name</i>	<i>Yield class</i> <i>m<sup>3</sup>ha<sup>-1</sup>yr<sup>-1</sup></i>	<i>Performance</i>
<i>Abies alba</i>	European silver fir	16	Frost damage. Windthrown in 1974. Top height 27.5 m. Poor quality.
<i>A. cephalonica</i>	Greek fir	20	Frost damage. Quality poor. Forking.
<i>A. concolor</i>	White fir	16	Frost damage. Poor quality/ multiple stems. Top height 26 m age 68. Windthrown in 1974.
<i>A. grandis</i>	Grand fir	26	Good growth. Two rotations since 1906. Wind damaged.
<i>A. nordmanniana</i>	Caucasian fir	16	Frost damage initially. Top height 26 m at age 68.
<i>A. numidica</i>	Algerian fir	na <sup>ii</sup>	Poor
<i>A. procera</i>	Noble fir	16	Good growth but frost damage initially. Felled in 1964, age 58 years. Top height 24 m.

<sup>i</sup> In 2004 unless otherwise stated<sup>ii</sup> Yield class not assigned**Table 3.** *Growth performance<sup>i</sup> of spruce (Picea) species at Avondale.*

<i>Species</i>	<i>Common name</i>	<i>Yield class</i> <i>m<sup>3</sup>ha<sup>-1</sup>yr<sup>-1</sup></i>	<i>Performance</i>
<i>Picea abies</i>	Norway spruce	14	Good. Windthrown in 1990s. Reached top height of 30 m.
<i>P. glauca</i>	White spruce	na <sup>ii</sup>	Poor
<i>P. jezoensis</i>	Yezo spruce	na	Poor
<i>P. mariana</i>	Black spruce	na	Poor
<i>P. omorika</i>	Serbian spruce	12-14	Grew well but died off after about 55 years. Attractive appearance.
<i>P. pungens</i>	Blue spruce	na	Poor
<i>P. rubens</i>	Red spruce	na	Poor
<i>P. sitchensis</i>	Sitka spruce	24	Very good. Severely frosted initially and suffered aphid damage. Fomes noted. The p 1925 plot currently has a mean height of 30 m and a mean dbh of 59 cm.
<i>P. smithiana</i>	Himalayan spruce	14	Poor. Frost damage.

<sup>i</sup> In 2004 unless otherwise stated<sup>ii</sup> Yield class not assigned

Pine (*Pinus*) species

Of the pines Corsican and Monterey grew best (Table 4). Corsican pine grew best on its own. It was suppressed when planted in mixture with either Norway spruce or European larch. However, the quality of the pure plot of Corsican pine underplanted with beech in 1957 is very good. The plot currently has a mean height of 27.0 m and a dbh of 51.0 cm. Monterey (*radiata*) pine is very impressive, where it survived. Macedonian pine is promising.

**Table 4.** *Growth performance<sup>i</sup> of pine (Pinus) species at Avondale.*

<i>Species</i>	<i>Common name</i>	<i>Yield class m<sup>3</sup>ha<sup>-1</sup>yr<sup>-1</sup></i>	<i>Performance</i>
<i>Pinus banksiana</i>	Jack pine	na <sup>ii</sup>	Poor. Suppressed by larch nurse.
<i>P. contorta</i>	Lodgepole pine coastal		Not tested until 1964 when planted in a clearfelled noble fir plot. Grew vigorously but was of poor form and was windthrown, as is typical on fertile sites.
<i>P. nigra var salzmannii</i>	Corsican pine	16	Good form. Was underplanted with beech in 1957.
<i>P. nigra var nigra</i>	Austrian pine	na	Poor
<i>P. peuce</i>	Macedonian pine	na	Planted 1916. Comparable with good Scots pine.
<i>P. pinaster</i>	Maritime pine	na	Could not compete with larch nurse and died out.
<i>P. radiata</i>	Monterey pine	18	Growth impressive where it survived.
<i>P. rigida</i>	Pitch pine	na	Poor
<i>P. strobus</i>	Eastern white pine	na	Started well but died off.
<i>P. sylvestris</i>	Scots pine	12	Mixed quality and form.

<sup>i</sup> In 2004 unless otherwise stated

<sup>ii</sup> Yield class not assigned

Larch (*Larix*) species

Of the larch species Japanese and European larch grew best (Table 5). Many fine specimens of both are still present, particularly in plots of other species where they were used as a nurse. In the pure plots beech, Norway spruce and larch were used as nurse species.

Forbes described Tyrolese larch as doing badly.

Lack of information on the West American larch suggests it also grew poorly. However, according to Forbes (1915), extra seed for the species was sourced by Augustine Henry in 1910. The larch plots are now redundant and the area now forms part of the of the general forest surround. Hybrid larch (*L. x marschlinsii*) was not tested until the 1970s but its performance is impressive

**Table 5.** Growth performance of larch (*Larix*) species at Avondale.

<i>Species</i>	<i>Common name</i>	<i>Yield class m<sup>3</sup>ha<sup>-1</sup>yr<sup>-1</sup></i>	<i>Performance</i>
<i>Larix decidua</i>	European larch	8-12	Grew well. Good quality.
<i>L. decidua var polonica</i>	European larch	na <sup>ii</sup>	One line of trees planted. Canker resistant.
<i>L. kaempferi</i>	Japanese larch	10	Grew well. Good quality.
<i>L. occidentalis</i>	Western larch		No records.

<sup>i</sup> In 2004 unless otherwise stated

<sup>ii</sup> Yield class not assigned

#### Other conifer species

Douglas fir, coast redwood, Lawson cypress, western hemlock and western red cedar, have all done well, and have benefited from their location on a sheltered slope (Table 6). Douglas fir has been a consistently good performer at Avondale.

#### Summary of growth performance of conifers

Of the 54 conifers tested in the initial experiment plots and later trials only a relatively small number were found to perform outstandingly well. These included:

- Sitka spruce.
- Norway spruce.
- Douglas fir.
- Grand fir. This had the highest yield class of all the conifers. However, its timber has limited use relative to the other high performing species.
- Corsican pine. The performance is impressive and the species warrants further investigation.
- Monterey pine, where it survived, is outstandingly impressive. The species warrants further investigation.
- European and Japanese larch performed consistently well. Their inherently lower yield class makes them less attractive options for commercial forestry. However, the vigorous nature of many of the old trees remains impressive. Should be allowed to continue on as long-term retentions, even though they have been harvested for timber over the years.
- Western hemlock. Performed well. Continues to be vigorous and healthy.
- Western red cedar. Performed well. Continues to be vigorous and healthy.

**Table 6.** Growth performance<sup>i</sup> of other conifer species at Avondale.

Species	Common name	Yield class $m^3ha^{-1}yr^{-1}$	Performance
<i>Cedrus atlantica</i>	Atlas cedar	na <sup>ii</sup>	Poor performance.
<i>C. deodara</i>	Deodar cedar	na	Mixed, poor performance.
<i>Chamaecyparis lawsoniana</i>	Lawson cypress	16	Good. Larch nurse.
<i>Cryptomeria japonica</i>	Japanese cedar	na	Bad frost damage. Form poor, forking.
<i>Cupressus macrocarpa</i>	Monterey cypress	na	Bad frost damage. Poor survival. There are a few excellent trees. Larch nurse.
<i>Juniperus virginiana</i>	Eastern red cedar	na	Failed. Taken over by larch nurse.
<i>Pseudotsuga menziesii</i>	Douglas fir	16-20	Good. Oregon provenance better than Colorado. Interior provenance also planted in 1929 and was poor.
<i>Thuja plicata</i>	Western red cedar	20	Good. Larch nurse.
<i>Tsuga mertensiana</i>	Mountain hemlock	na	Failed due to frost.
<i>T. heterophylla</i>	Western hemlock	22	Impressive. Prolific natural regeneration.
<i>Sequoia sempervirens</i>	Coast redwood	20	Good. Larch nurse.
<i>Sequoiadendron giganteum</i>	Giant sequoia	22	Good. Larch nurse.

<sup>i</sup> In 2004 unless otherwise stated<sup>ii</sup> Yield class not assigned

- Lawson cypress. Performed well. Continues to be vigorous and healthy.
- The redwoods, notably the coast redwood (*Sequoia sempervirens*), are impressive.

Only four of these species now play a significant role in forestry in Ireland: Sitka spruce, Norway spruce, Douglas fir and larch - notably Japanese larch and hybrid larch (not included in the original plots).

Lodgepole pine played a highly significant role in the afforestation programme in the last century but was not included in the initial experiment plots at Avondale. However, according to O'Donovan (2005) the performance of "an original coastal lodgepole pine tree" at Avondale was said to have influenced Forbes in deciding to favour that provenance rather than the inland form for the national afforestation programme. This was to have far reaching implications for the state forestry programme, as the coastal

provenance, which was widely planted on infertile sites, grew well, but overall had very poor stem form.

The overall findings and performance of the coniferous species at Avondale over the last one hundred years therefore vindicate current policies on species selection. The key species, Sitka spruce, Norway spruce and Douglas fir remain vigorous and healthy and the most productive. Although a substantial area of the Norway spruce planted in 1905 was windthrown in 1998, when it was 93 years old, one of the remaining plots of the species has a current mean height of 25.7 m, and a mean dbh of 50 cm. The Norway spruce in this plot was originally planted as a nurse for pedunculate oak, but completely suppressed it.

The Sitka spruce planted in 1926 has a mean height of 29.6 m. Its performance is impressive, given that it is recorded as having suffered from severe frost damage and aphid attack in its earlier years.

Species such as western hemlock, western red cedar, Monterey pine, Corsican pine, and Macedonian pine deserve further consideration. Indeed the yield class for a number of these exceeds that of Norway spruce. Collectively, when taken as a group, they offer some opportunities for species diversification, particularly on reasonably fertile sites.

### *Broadleaves*

Pedunculate and sessile oak were originally planted together. Overall performance of the two main oak species has been disappointing, although they are far superior to all the other oak species, most of which failed (Table 7).

Larch, hornbeam and beech were effective as nurse species in the oak plots, which grew better when nursed by these species, than where it was planted pure. Beech was the best nurse for the pedunculate and sessile oak, but tended to out-perform both species. Norway spruce dominated when planted as a nurse species. Ash and hornbeam were ineffective as nurse species for pedunculate oak. American oaks generally performed very poorly relative to European species.

Spanish chestnut did best when planted pure.

### Summary of growth performance of broadleaves

Forty five broadleaf species were tested, 38 in the original series, followed by a further seven in later years. Only six of the broadleaf species showed any promise. None had a yield class greater than 8, and stem quality was poor to mediocre.

The most promising species were:

- beech
- hornbeam
- pedunculate oak
- sessile oak
- Spanish chestnut and
- sycamore.

Although the quality of the sycamore is mediocre, it is by far the best of the maple species tested and has an indicative yield class of 8. The absence of the grey squirrel from Avondale for most of the period of its growth allowed the species to reach its potential. The pest now occurs throughout the experiment plots.



**Table 7.** *Growth performance<sup>i</sup> of broadleaf species at Avondale.<sup>ii</sup>*

<i>Species</i>	<i>Common name</i>	<i>Performance</i>
<i>Acer saccharum</i>	Sugar maple	Poor. Outgrown by larch nurse.
<i>A. macrophyllum</i>	Oregon maple	Poor. Badly affected by frost. Larch nurse grew well.
<i>A. pseudoplatanus</i>	Sycamore	Grew reasonably well. Quality mediocre and may be related to provenance.
<i>A. platanoides</i>	Norway maple	Poor. Grew well initially. Quality poor.
<i>A. saccharinum</i>	Silver maple	Poor. Outgrown by larch nurse.
<i>Carpinus betulus</i>	Hornbeam	Good growth. Yield class 8. Suppressed by Norway spruce nurse. Best with larch nurse.
<i>Carya cordiformis</i>	Bitternut hickory	Poor records.
<i>C. glabra</i>	Pignut hickory	Poor records.
<i>Castanea sativa</i>	Spanish chestnut	Frosted initially. Suppressed by larch nurse. Best pure.
<i>Fagus sylvatica</i>	Common beech	Good growth and quality
<i>Fraxinus excelsior</i>	European ash	All ash species performed poorly.
<i>Fraxinus latifolia</i>	Oregon ash	All ash species performed poorly.
<i>F. nigra or pennsylvanica</i>	Ash from eastern US states	Failed
<i>Quercus rubra</i>	Northern red oak	Frost damaged. Beech nurse which is now dominant.
<i>Q. cerris</i>	Turkey oak	Failed. Yield class 4. Poor records.
<i>Q. coccinea</i>	Scarlet oak	Poor. Yield class 6
<i>Q. frainetto</i>	Hungarian oak	Grew well initially. Yield class 4. Poor records.
<i>Q. palustris</i>	Pin oak	Failed
<i>Q. petraea</i>	Sessile oak	Mediocre. Yield class 6-8. Best of the oak species. Larch and hornbeam effective as nurse species. Norway spruce nurse suppressed oak.

<i>Species</i>	<i>Common name</i>	<i>Performance</i>
<i>Q. robur</i>	Pedunculate oak	Mediocre. Yield class 4-8. Second best oak species. Dominated by beech nurse. Ash and hornbeam were not effective as nurse species. Norway spruce nurse suppressed oak.
<i>Q. tinctoria</i>	Black oak	Failed
<i>Q. velutina</i>	Black oak	Failed
<i>Ulmus americana</i>	American elm	Unimpressive. Not possible to differentiate the four species. All underplanted in 1958.
<i>U. glabra</i>	Wych elm	Slow start. Unimpressive. See above.
<i>U. procera</i>	English elm	Slow start. Unimpressive. See above
<i>U. x vegeta</i>	Huntingdon Elm	Unimpressive. High mortality due to disease.
<i>Platanus orientalis</i>	Oriental plane	Poor survival.
<i>Juglans nigra</i>	Walnut	Poor records.
<i>Liriodendron tulipifera</i>	Tulip tree	Died-out.
<i>Prunus cerasus</i>	Sour cherry	Poor
<i>P. serotina</i>	Black cherry	Poor
<i>P. alba</i>	White poplar	Did best of the poplars but poor.
<i>P. x canadensis</i>	Black Italian poplar	Poor. Unhealthy.
<i>P. x canadensis nova</i>	Black Italian poplar.	Poor. Unhealthy.
<i>Pterocarya fraxinifolia</i>	Caucasian wing nut	Poor records.
<i>Zelkova serrata</i>	Iron tree	Poor

<sup>i</sup> In 2004 unless otherwise stated

<sup>ii</sup> Information on the performance of the species in the lowermost 12 rows in the table is lacking, but in general none showed any promise.

The two native oaks, although their performance was generally unimpressive (yield class 4-8), were far better than the other species of oak tested, most of which failed.

Because of the lack of replication of the plots, and paucity of data, it is not possible to state which of the two oaks, pedunculate or sessile, performed best.

The findings on mixtures are also far from clear although larch, hornbeam and beech mixtures appeared to have a positive effect relative to pure plots of oak. However, beech took over in both the pedunculate and sessile oak plots, and is now the dominant species.

Beech grew relatively well and had an indicative yield class of 8. The current plots are reasonably impressive and of better quality than the other broadleaf species selected, apart from sycamore. As stated, where it was planted as a nurse with pedunculate or

sessile oak it tended to take over and dominate. These plots are now virtually pure beech, with few oaks remaining. The beech in the sessile oak plot currently has a mean height of 24.5 m, compared with 21.6 m in the sessile oak plot. This is indicative of a yield class of 6.

Spanish chestnut is also promising, although it suffered badly from frost in the earlier years.

Although a number of ash species were included in the plot series, none have grown satisfactorily. The acid nature of most of the soils at Avondale, (notwithstanding the earlier comment on liming in the nineteenth century), and the severe frost damage in the earlier years of the trials may have had a negative impact on the performance of the species. Their location on the lower lying areas near the river may have aggravated this damage.

### *Mixtures*

As stated, mixtures of different species were used across the plots in order to reduce the cost of plants and secondly to minimize the risk of frost damage to the nursed species.

In general Norway spruce proved to be too vigorous as a nurse, suppressing main crop species such as pedunculate and sessile oak, beech, the other minor spruce species and Corsican pine. It also suppressed Douglas fir.

Larch was generally more effective as a nurse but suppressed Corsican pine, eastern white pine and the other slower growing pine species, such as Jack pine and cluster pine. Larch appeared to have a positive effect on the performance of hornbeam. It appears also to have been compatible with western red cedar, Lawson cypress and the redwood species. It is not possible to state if it had any positive effect on the growth of the other nursed species, however.

The lack of plot replication however makes it difficult to draw clear conclusions on the effect of mixtures, although larch/, hornbeam/ and beech/oak mixtures grew better than pure plots of oak. However, in the case of the two main oak species, beech eventually took over, became dominant and suppressed most of the oak.

Silver fir was not effective as a nurse species, due to its being badly damaged by frost.

Mixtures are commonly planted in practice nowadays, with larch being particularly well proven in terms of its nursing effect, particularly on impoverished mineral soils. Larch is also planted for other values, related mainly to the changing and attractive colour of its foliage with the seasons. Such values were not foremost in Forbes's mind in 1904.

Mixtures of spruce and pine are also widely planted, on peat soils in particular, but these were not included in the plots at Avondale. Neither were mixtures of Douglas fir and Sitka spruce. These now appear to be developing in interest.

## **Discussion and conclusions**

The objective in acquiring Avondale in 1904 was twofold:

1. to establish a forestry school for working foresters in which young men could be trained in connection with plantation establishment and management and,

2. to enable trials to be laid down to determine the most suitable species for Ireland's afforestation programme.

The first objective has clearly been achieved: Avondale successfully realised its training role in the first half of the last century. The students who trained there in the first two decades of the century, and later, provided the competence needed to develop the state forestry program. Educational needs and services have changed since then; at present foresters are trained and educated at University College Dublin, Galway/Mayo Institute of Technology or Waterford Institute of Technology.

Avondale's main training function now relates to the second objective, in that it provides hard evidence on the ground of the performance of the main commercial and non-commercial tree species over a long period. The series of plots now provide living proof for growers of what to expect from the various species, tested over a period of one hundred years. This is particularly so in the case of the broadleaf species.

Most of the surviving trees in the plots are now between 92 and 99 years of age. Although a number of the plots have either failed or suffered severely from storm damage (December 1998), and currently have an unsatisfactory appearance, collectively they represent a highly valuable pool of information on species performance. Although the plots are relatively small in area, they represent the largest areas and number of species tested out in Ireland over the last 100 years, apart from The John Fitzgerald Kennedy Park at New Ross in Co Wexford, laid down in the 1970s.

Nevertheless, given the age of the trees, their present state and condition, the progress and developments in forestry over the last century, which has seen a six-fold increase in forest cover, and the original objectives of the initiative, it is fair to question the relevance and possible role of the plots into the future. Is the forestry agenda at the beginning of the 21st century different to that in 1904 and if so are the forestry plots at Avondale still relevant, and if so why? Or are all the values now based on a mixture of sentiment, and confused with images of Parnell and his values?

In answer it can be said that the surviving plots, particularly those with good demonstration value, represent reassurance of long-term performance, insofar as the main tree species are concerned, given their longevity and continued health.

Furthermore, although a number of the original plots and trees initially planted no longer survive, having either failed or blown down or been replanted with other species, the bulk of the plots are still on the ground. These provide a large amount of information on the performance of different tree species under Irish conditions, and on the rationale behind the make up of the forest estate in Ireland, which is essentially man-made.

The plots have been divided into four categories based on their demonstration value and recommended future management (Table 8).

Although only 26 of the original plots are now considered to have high value as demonstration areas, those considered to have limited value, 36, should also be retained for the time being. The rationale behind this recommendation relates partly to the need to provide shelter for the important plots, and the sensitivity of the Avondale area generally in terms of felling, and its high amenity value. However, many of the plots in this category also serve a useful purpose in demonstrating the difficulties in growing the particular species concerned. The medium to long-term plan for this category will centre on their gradual removal and replacement over the next ten to twenty years, with the

**Table 8.** *Demonstration value and management recommendations for the experiment plots at Avondale.*

<i>Plot demonstration value and management recommendation</i>			
<i>Good, retain as experiment plots</i>	<i>Limited, but retain as experiment plots</i>	<i>None, manage as a normal crop</i>	<i>None, clear out and reforest</i>
<i>Number of plots</i>			
26	36	30	12

most successful species from the particular genera concerned. For example, the poorly performing maples will be replaced by a good provenance of sycamore. Beech will gradually replace the hornbeams. The exotic oak species will be replaced by native species (this is part of the present plan). All the fir species will be replaced by Douglas fir, and the spruce plots by either Sitka spruce or Norway spruce. Pine species will be replaced by Corsican, Monterey or Scots pine.

The overall aim is to rationalise the number of plots and species, by concentrating resources in the future on the gradual conversion of the area from its current experiment plot state, to a demonstration forest that reflects the lessons learned from the first 100 years, and focuses on the key species insofar as Irish forestry in the future is concerned.

A key element in all of this will see the establishment by Coillte of a new Centenary Forest Trail at Avondale that will enable the public to come to a greater appreciation of its arboreal and historic values.

Forestry has come through significant change in recent times and all the indications are that it will continue to change into the future, in line with overall societal change and expectations. There are a number of reasons for these changes:

1. farmers have become involved in the industry in a serious manner and their interests are likely to grow in the years ahead, given the imminent changes on the horizon;
2. sustainable forest management is now high on the agenda of the industry generally, and there is increasing emphasis on broadleaf planting and species diversification;
3. while the production of a sustainable supply of roundwood for industry at a competitive price continues to be the imperative, other non-wood values are likely to play an increasing role - these include forest recreation and carbon sequestration. The big concern in 1904 was the low forest cover of the country and the need to develop a forestry programme to address future timber supplies for the country. (Even to this day Ireland imports half of its timber needs.)

The initiative at Avondale played a key role in the development of the forestry programme through the training of foresters and the provision of information on an ongoing basis on the growth patterns of the many different species tested. Without both of these ingredients policy makers and practitioners would have been working in the dark, and it is most unlikely that the programme would have been as successful as it turned out to be. The forest plots at Avondale provide hard evidence on the growth and performance of a wide range of tree species. This information is highly relevant, not only



for the evidence it provides on the successful species but also on those that proved to be unsuccessful. In hindsight it would have been possible to draw more definite conclusions on performance of the various species had the plots been somewhat larger and replicated. However, the plots are what they are, and the results to date do provide adequate evidence on what the best species are likely to be in the future, and secondly on what species warrant further investigation.

All of the information is highly relevant to an expanding industry that is under increasing pressure to diversify in its choice of species and to increase the level of broadleaf planting. In many respects the results at Avondale constitute a wake-up call for the industry insofar as broadleaves are concerned, given the overall disappointing performance of practically all of the species on what must be considered a moderately good soil.

New planting now being planned for Avondale will reflect the changing values taking place in forestry, and at the same time reinforce the results from the original trials and in so doing ensure the learning curve continues to rise.

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## Forest Perspectives

Given that this whole issue of Irish Forestry is a celebration of 100 years of Irish forestry, marking the opening of Avondale as a forestry school in 1904, it is illuminating to see why it was such a strong symbol of a new-found determination to begin in earnest the reforestation of Ireland after centuries of over-exploitation of the forest resource. Previous to the establishment of Avondale efforts had been made to reverse the declining area of tree cover, but they met with limited success

One of the principal actors in early running of Avondale, Arthur C. Forbes (appointed there as lecturer in 1906), traces the tree establishment story in his paper *Tree planting in Ireland during four centuries*, (reproduced here in full with the kind permission of the Royal Irish Academy), from the 17th to the 20th century. He clearly brings out the principal reason for tree planting was to 'make good the losses of many centuries of waste and exploitation'. Also traced is the scheme administered by the Dublin Society in the 1700s, the most effective effort at large scale tree planting before the beginning of the 20th century.

Forbes had the article published in 1932, when he had reached 67 years of age, and had the benefit of almost three decades of working in forestry in Ireland. In reading the article one senses that in his day there was more time for reflection on past events, and for learning from past experiences and policies. Certainly he would have searched extensively for examples of the growth of individual species when planning the species performance plots he established at Avondale. All of the exotics he came across in his searches were obviously planted; no doubt this aroused his interest in wider aspects of tree planting.

The article continues up to and beyond the setting up of Avondale, up to the early 1930s when afforestation and forestry practice was at last beginning to take on a determined and permanent character. He has many things to say which are surprisingly modern in content, the importance of private forestry, the usefulness of wood for fuel and the conifer v broadleaf debate was obviously well underway in the 1930s, given his discourse on that never-ending debate.

During the latter half of the eighteenth century entry into publication was not as easy as is today; many manuscripts that would have provided valuable insights into forestry thinking and practice have been lost. Fortunately Samuel Hayes was able to publish, in 1794 - one hundred and ten years before his own home was opened as a forestry school - his *Practical Treatise on Planting and the Management of Woods and Coppices*. He died only one year later, but his book went through several reprints, and a facsimile edition was published in 2003 by New Island, sponsored by The Irish Tree Society. This enduring interest in Hayes's work is an indication not only of its historic interest, but the freshness of much of the advice in the treatise, based, as he points out, on practical experience in establishing and managing forests over several decades.

A quarter of a century earlier, in 1769, and as a relatively young man, Hayes undertook a journey through England and recorded his experiences in a journal which Nicola Jennings has come into possession of, and has transcribed into the paper that is published here for the first time, some 235 years later. Like the treatise, many of the

issues it deals with are still with us, not least the observation that “Deer have been so prejudicial to trees since the Rage of Planting has prevailed many People have Dispair’d.”

Throughout the piece there is a keen interest in the landscape and how this can be ‘improved’ by species selection and forest management. Students of Avondale will be intrigued by his description of woodland walks on the estate, predating the present forest paths by more than two centuries. Admittedly Hayes’s paths would be far less trodden than those of today, confined as they were to the landed gentry of the time.

The journal shows his deep interest in, and strong opinions on practical issues such as coppice management, fencing and underplanting. Together with his interest in the landscape, the concept of multifunctional forestry had an early advocate and practitioner in Samuel Hayes.

*Editor*

## **Journal of Samuel Hayes**

### *Foreword*

The Journal of Samuel Hayes was given to me by my grand uncle, Captain Archibald Mateer. His mother Olivia, after the death of her first husband, married John Howard Parnell, elder brother of Charles Stewart Parnell. Consequently, on her death, Captain Mateer inherited a number of items which had originated in Avondale, home of Samuel Hayes and subsequently of the Parnell family. Among them was the Journal.

The Journal consists of part of a tour through England. Hayes described it as “not kept regularly”. It opens on Sunday June 11th 1769. Hayes was en route to Richmond, his intention being to view the King’s Garden and Kew. On Monday June 19th he left London travelling west towards Bristol. He first visited West Wycombe House, at High Wycombe in Buckinghamshire, the estate of Lord le Despencer, which he described in detail. From there he travelled through Oxford and Witney to Cirencester, where he spent a few days viewing Lord Bathurst’s extensive Improvements, including the Great Park. He then visited the estate of the Duke of Beaufort and Badminton.

Finally he arrived at Bristol where from the Banks of the River Avon he viewed the mouth of the Severn and the King Road. He visited Mr Farr’s Belvidere, near the Hott Wells, and the copper works at Keynsham. Travelling by ferry from Aust to Beachley on Friday the 7th July he went on to Chepstow, his destination being Mr. Morris’ Improvements at Piercefield.

Throughout the journey he compared everything, using praise or criticism, with his home at Hayesville, which from 1770 he called Avondale. There he planted with dedication. Though most of his original trees have long since fallen, their descendants still remain.

*Nicola Jennings*

Nicola Jennings is a qualified librarian who has had a number of short stories published. She has contributed to Sunday Miscellany (RTÉ) on John Parnell, father of Charles Stewart Parnell, as well as on Avondale.

## Journal of Samuel Hayes June - July 1769

Continuation of a Journal of our Tour through England not kept Regularly only as matter of any Entertainment or Particular curiosity occurs.

**Sunday Morning June 11th 1769.** We continued our Route towards Richmond having in vain attempted to see Esher which the servant said he dare not shew without ticketts from Miss Pelham. We were not very eager as nothing has been done there this long time and the House (a fine old Gothic one) is to be seen in the approach to Esher from Weybridge.

I should mention that we walkd from the White Lyon Inn at Esher to Mr. Pelham's thro' Mrs Greening's nursery the finest and most extensive nursery, Grape House or Rather Town Melonry etc. etc. I ever beheld or is to be beheld in England. The Grapes were in full ripe clusters. He had sent many Bunches to London. The Melons in Plenty full ripe - the finest kind of cantaloupes. Yet all these in Brick framed Beds of an immense lenth but with Partitions in some I observed. I believe the beds were (...) 6 feet long between the Partitions and about (...) or 9 wide. I had so often heard of the Difficulty of Raising Melons without (lining) with Dung to keep up the Heat etc that I could not help being very Desirous to gett as much of his art as in Decency I could. In short our Blockheads lose the best of the season for Ripening Melons. They cannot be persuaded to sow the seeds early enough. May is often the Hottest weather and freest from rain of any month in the year and it is not till September they can be persuaded to have our melons in a way to Receive the Benefitt of warm weather. He told me he had nothing but Dung I said how could he keep up the Heating. He showed me very obligingly his manner. It is to make the Bed at the near side of the frame about five wide. Here he first Plants the Melons and when their Vines extend he putts in Dung on the farr side in a warm day and so keeps up the Heat as He pleases till at lenth the whole Breadth of the frame is filled with Dung and the Melon Vines are extended over the whole Bed. Thus by his management he is freed from the trouble of Perishable (frames) and yett raises the Earliest Best MELONS of any man in England. His Oaks of all the foreign kinds one shilling each. His accassias very Reasonable, the Rose accassia for a shilling and the Expense of Bringing the trees to London is but 1/6 a parcel and putting them aboard the ship for Dublin.

Before I come to mention Richmond I must observe that the New Grotto making by Mr Hamilton with all sort of naturally Rustic wrought Stones – I know not how to Express myself Better will be very Pretty. It is under the arch of a Bridge where by Disposing of the odd fantastic stones in great open Arches and Broken caverns etc the whole has a mighty fantastique and Romantic appearance. I might have a Beautifull arch at Hayesville in the same way from the Rock under which the walk might pass and water conveyed over it to fall a great Hight. It would be very Beautifull if well Executed. Memorandum. In this case the Arch should rather appear way worn thro' a Rock than the smallest Remains of architecture which would be a Horrid Solecism in such a wild spott but if Executed here and there with Judgement would make the natural Romantic Rock still more surprising in their own way – but I fear Mr. Hamilton as all great geniuses

except when they have no further scope to Extend their fancy on are apt to run too farr with what they have. I fear I say he is falling into this Error and will over dress this fine Desmesne and run from ornamented nature to concetti. As he is now making a Grotto or a Recess under the Arch which is to have water works in it. Surely they will be most Ridiculous in such an Improvement and I fancy few would shut themselves up there to see a little miniature of a Pretty natural (scene), when they have so lovely a one Existing before them on stepping out of the Grotto.

We drove to Richmond to the King's Garden but were told they would not be open that day. They are now very seldom to be seen, we were greatly disconcerted and concluded woud also miss Kew but were agreeably Disappointed in our fears as we found they were to be seen. The collection of all species of trees is beyond anything in England. I had no notion of it as I was not so fond of trees when there before. The oranges were brought out of the Orangery and either Interspersed with the clumps of flowering shrubbs near the House or edging the Lawn Immediately near the Dwelling House. They are the tallest grafted oranges citrons etc., that I ever mett out of Italy. The Bay Leaved Portugal Laurel is a fine Plant. Now for what Kew is worthy of observations for Exclusive of the fine collection of Plants is the elegant laying out of a Dedd flat which tho' it can never Appear to the advantage of Pieces of ground (Varigat) with Hill and Dale by nature nor ever give its Viewer that Pleasure Resulting from such "Sweet Interchange" yett from that very Reason Displays the Skill of the Designer who out of so unpromising a piece of ground has found so fine a Place.

The Idea of the Disposition is this. The whole is divided and Intirely surround by sunk fences with a Rail in the Bottom of a sloping Ha Ha – there are three Lawns – the one next the House divided from the second by a piece of water. The next Divided from the third by a little Ridge of Land about a hundred yards Broad formd beside a still Higher Mount by the Earth taken from the Ha Ha I mentioned. This Ridge as I call it and the ground taken off the three Lawns by the sunk fence all Round is kept Intirely as the Pleasure Ground and may be in all I believe 30 acres. The whole is 150. The surrounding thirty acres comprehend every thing one can conceive in a Pleasure Ground. Little smooth Lawns scattered with the most curious Exotics, GreenHouse and its Lawn, flower garden, aviary and Basin of goldfish, Pheasantry and above all a garden for the cultivation of every curious exotic too Valuable and tender for ornamenting the Improvements. Here are great water troughs to contain water Plants and artificial mountains of coarse stone on which are planted all mountain Plants. A collection worthy of the greatest Bottanical Society in the Universe. Here I saw this Large leaved Kalmia Blow the most Beautifull Plant I Ever beheld and I am told hardy as any of the American Plants. The Rhododendron is a very fine Plant the flower like a (...) Pink Peony. There is the Laurel leaved (Lisser?) and Purple Magnolia and the Umbrella Tree. In the open air amongst the Plants in the shrubbery are several Hemlock Spruce which when young look very Pretty. The Catalpa grow twenty feet High here and to my great satisfaction I found my favourite (I may call it) passage in an Improvement often Repeated viz. small Lawn scattered with Rare Large Growing Trees at the same time so surrounded that (...) were free from cold and storms. By this means you see the Perfect shape of these Exotic trees and manner of growing which is not to be found when they are thick Planted with

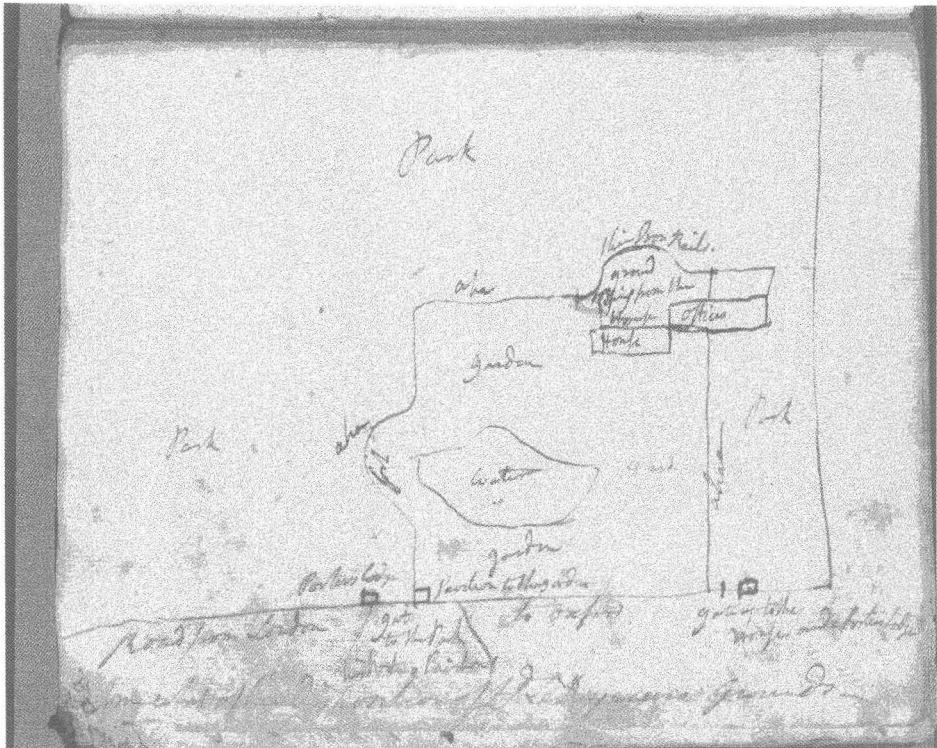


other Shrubs. These Little Lawns and the aviary gardens etc are all connected and surrounded by the thickest and best Planted shrubbery imagineable with a gravill path about 8 (...) Broad thro' it.

I took Particular notice of a Piece of about two acres laid out very Pleasingly so as to appear five times as Large as it really is. I attempt it on the other Page. I must observe that the Best Shrubberies are never dug amongst when once the trees gett about four feet High so as to kill grass and keep the ground amongst them fresh and moist. Trees in single Plantations viz. scattered on grass Lawns have always about a foot Dug around the stem which makes them thrive much better than letting the grass matt all about the Roots. The scattered trees at the Princesses tho' on that Part of the Lawn which was fenced from the cattle and (bound) in with the close shrubbery (...) all surrounded with three or six uprights and crosspoles at top or top and bottom so carefull are they for fear the sheep might gett at them tho' but for a moment.

**Monday 19th of June.** Left London for Bristol but determined to take Oxford in my way. I rode a grey mare I Bought from Monk Keeper of the Livery Stable near Hidepark Corner. I observed the culture of Peas and Beans as Mr Young mentions in his six weeks tour all nicely Earthed up with the Plow to their stems which supports them at the same time stirring the Earth does the crop a deal of good. This chiefly round Acton. I was delighted with fine clean crops of wheat round this town and Hayes. The Attentively fallowing for Beans or Turnips which Kill the weeds gives them a crop of Wheat that wants but Little weeding. On the whole there seems to be nothing in farming which we want more to introduce into Ireland than the Practice of those I may say friendly crops, Beans Turnips and Clover, which Properly managed Restore the ground to the Vigours other crops Exhaust it of. I think little of the Beauty of this part of England till you pass High Wickomb. It then becomes one of the most Desirable (scones) I ever beheld, Lovely Rich Vales finely swelling till they meet Beechwoods crowning every little Hill and in other places Extended along as great screens to the chalky Ridges which would otherwise disfigure the fertile Bottoms. Situate amidst these wooded Hills lies Lord Le Despencers Of West Wickomb. We went there from our Inne at High Wickomb Tuesday Morning as this is a place I was not at in my last tour and Highly merits a travellers attention. I shall be more minute in Describing it, than I have been with I hope others mentiond by me in the little account I took of what I saw when last in England.

In approaching Ld. Le Despencers from London you pass by the gate of this Park which lies between two Pavilions Built uniformly but for Different Purposes, one being a Lodge for the Gate Keeper at the Park, the other a Pavilion in his garden which is separated from the Park by a sunk fence. You Pass by a terrace in the garden formed only by the Banking up of the Earth with a stout wall to the Road here you catch Views of the Buildings etc in the Improvements which gives the traveller an Idea that there is something great within. I do not Recollect that the Terras I mention to the Road is one of the walks you are carried thro' the Garden but only that the walker if he Pleases may take a view of it. Which here and there is more agreeable to the traveller than the custom too much Prevailing of shutting a Place up from Public View in all places with an Immense wall, screen of trees etc which I think too selfish. But a traveller has still more



*Lord Despencer's improvement at Cirencester.*

to amuse him from the munificence of Ld. Le Despencer than the Peeps of the garden I mentioned. He has on the top of a very steep hill over the town an object very striking tho' I think not as Elegant as might have been built for the same Purpose. It is a Mausoleum seemingly a sixsided Building with arches and Pilasters richly ornamented. At the Back is the church with a tolerably Pretty Steple but the Hill on which they stand is in itself a fine object, Smoothly Dressed, very steep and sprinkled over with Scots Fir and Yew which seem to have been transplanted about twenty years and were then great trees. These are scattered as by the Hand of Nature and numerous flocks amongst them unhurt it seems by the Yew and the Dress of Ground form a nice contrast to the other Hills in View closely covered with wood. I must here observe that I always thought a fine smooth Hill most Beautifully ornamented when its sides were just scattered with single trees and its top alone close covered with woods. If a Building is added just before you come to the summitt if the trees and top are not great or on the summit in that case it becomes one of the grandest objects that Imagination can paint. Just at the foot of this Hill lies the Porters Lodge which lets you into a field thro' which you ascend to the House which lies on the top of it but more to the Left in the Gardens which are Parted from this field as from the Park by an Aha.

This field seems a continuation of the Park Round the House and Gardens. There are great alterations making in this approach which is now to be brought to the End of the House which is new Fronting - There are an abundance of Offices Built a stableyard for its neatness struck me in a Perfect square surrounded by Low Buildings of Brick with flint Rustics frieze etc. which are better than any wrought stone. This contains nothing but stabling and four coach houses. There is no Lofts over the stables. The yard seems 20 yards square not more certainly and I observed as a singularity there was no continued Rack before the Horses only a great nich before Each Horse and a Rack just to front that nich I suppose three feet or three feet and half of Rack to Each Horse. The Rack did not reach quite as high as the nich so the Hay was throw (sic) in over it. This in a narrow stable if the walls were thick woud be a very good way - The scene Immediately before the garden front of the House is one of the most Beautiful home (scones) (not an Extended Prospect) I ever saw. The Hill with the mausoleum backs the scene to this - to the front a Piece of water, Backed with high trees and curiously concealed as to size and winding amidst wood and wooded islands with a Small Vessel completely Rigged but too great and too much of a Sea Vessel to give Pleasure on a moments Reflection tho certainly very Pretty on the first glance of the Eyes. To the Right Plantations are opening to the Deer Park covered with Deer and Sheep and backed by Hills crowned with Beechwood, which are the natural Product of this country opening here and there into dales fringed on the sides as far as the eye can reach give the whole a warmth of Picturesque Beauty that I scarcely know to be Excelled anywhere in the compass it takes in. The other front of the House is confined more as the House is on the side of a Hill one front of consequence can see no farther than the ground sloping to it Pleases to lett it as with us as Hayesville, and here I cannot help observing that I never beheld a Place so like ours as this front of Ld. Le Despencers with Respect to situation. He has his Deerpark coming just where our Lawn comes cross the windows. This is fenced by a stone faced aha from the House about three feet Deep and on it the most slender Iron Rails with Iron Wire between them to keep out the Horses. The rails are about three quarters of an Inch Broad and not above a third of an Inch thick. I mention this as an Excellent way of making Iron Rails where the prospect is to (be) taken in - as these flat Rails sett Edgeways to you interrupt not the sight the Least when painted Blue Especially. Between this little fence from the Deer Park and the House is a space about twice the size of our Lunette Deep'd artificially as that is to cause a little fall from the House but not with the sudden steep Rise as ours was injudiciously done but gently Sloping up to the Deerpark and spotted with flowering Shrubs. The front to this Rising ground is to the south and quite Italian, two Loggias one over the other. The offices are all on one side and contrived as I Laid them out for a new House at Hayesville viz. just touching one Corner so as to be (...) with the House and at the same time leave four fronts in the garden. I must remember that one End forms a sort of Garden Building when Viewed from the garden. Four fine columns and a pediment I forget what order. The walk from his House carries you on a sort of terrace Round the Pleasure Ground Banked up by a wall which keeps in the deer. This aha'd Park is a very Beautifull circumstance and makes the Gardens appear at once with the grandeur of a Park and the sweetness and neatness of a Shrubbery. I took notice of a Building in the Park like a little

Shepherds House which I thought had wheels under it. On Enquiry the man who Attended us told me it was called a Rambler and presented to Lord Le Despencer by the Late Duke of Cumberland to drive where you please to a pleasant spot and unfold out of its wagon to screw up and roof with sailcloth. It held twenty Persons and two servants – and makes a Pretty Object wherever placed. The Aha Round the gardens is carried Round in one part like a fort and Planted with small ship cannon which when fired amidst the surrounding hills I mentioned make an Echoing thunder (...) to Natural.

We dined at Letsworth, an ugly country and Bad Dinner and got into Oxford half past five in Tuesday evening.

Oxford just as I left it. The people as usual wanting me to stay for their fine Doings this week viz. an Oratorio which as they seldom have anything above a common concert appears to them great as a crowned heads Masquerade or what you will. They are surely the most confined poor beings the townspeople that I ever mett with in my life. We were politely Entertained at a Breakfast and at tea by FitzGibbons and Henry (McWards) And Jack Foster supped with us on Wednesday night.

On **Thursday morning** I sett out for Cirencester, horrid road to Whitney and the tolls – at Each gate as tho' they mended the whole with Pearl dust. Nothing Remarkable in the country Except that Every spot is Enclosed with Stonewalls here. Stone as plenty as it is scarce elsewhere and this vein of Stone Land reaches above forty miles. It is a short whitish Stone Resembling that in Bally(..)duff quarry Particularly in the gravel (...) as it is calld by The Mannings Gate and the soil in general Exactly Resembles the county of Wicklow this quarry of a Rottenish stone being everywhere within ten or twelve inches of the surface. The surface a (...) - the walls are mostly Dry. Indeed I may say all dry and generally coped with dry stones sett Edgeways. They are built Battering from two feet to twenty inches and about 4–6 inches high. Plenty of fine Beans in them. Great common tillage fields most of these sett with the Hand Dibble and Garden Line. I am sure I saw some Hundreds of acres together sett in this manner. They use four Horses in a line to their Plows which are large which Plows but all very neatly the land chiefly flat or in great Broad Worcestershire Ridges as Broad as Each man's Piece within common fields – (they) never (...) up a whitethorn and sow (...) pretty much which on this stony ground grows to perfection. The Blossoming of the grapes like a fine Bed of flowers-Broad Lands or quite flatt and only a little furrow where the Division of two mens share required it or swelling up in the Worcestershire manner seems to be the general Tillage of all those Parts of England I have seen where there are great tracts of corn land together and (that) chiefly what is called (...). Narrow lands with High close county of Killdare Ridges I have chiefly seen in Hertfordshire and just above London in fields (entirely) Private Property. These last look neatest the Broad swelling lands most noble Luxuriant and bespeaking a fine corn country.

We arrived in Cirencester about half past three and here Please God I purpose to Remain till I am Perfect master of Lord Bathurst's Extensive Improvement.

I waited only to eat my Dinner and Immediately after it went to see what they call the Home Park. I found it contrived the Best I Ever mett with to unite the Beauty of gardening with the advantage and ornament of a Deer Park. The garden takes in the Deer more perfectly than most Improvements take in their sheep and other Domestic cattle –

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this was a work I was particularly desirous of understanding as I though sometime or other I might make it useful to myself or Friends. Deer have been so prejudicial to trees since the Rage of Planting has prevailed many People have Dispair'd, Imagining a young Plantation and Deer Incompatible, so they would be or a young plantation and any of his cattle if we fenced out trees no better than we usually see gentlemens plantations fenced in Ireland. We in the county of Wicklow who keep the mountain sheep can never Expect a good Plantation if we do not fence full as securely as against English Deer. Their sheep here are so amenable that a Boy can manage hundreds. As I was so desirous of knowing how Lord Bathurst's Deer were kept in full view and seeming without any fence to the garden it may be well imagined I received great pleasure at finding the fence was simply a little wall four feet High facing an Aha of that Depth. The ground next the Park finely sloped off. On the top of this little Aha was a well kept quick Hedge about three feet high clip'd neatly and very thick as I had seen at Mr. Symes's of Ballybeg. The Earth thrown out of the Aha was thrown back so as to Raise the Bank Higher and by that means formed a walk more Elevated Drier and nearer the top of the Hedge consequently less apparent fence here and there where opens were necessary to unite the Pleasure Ground with the Park the Hedge was omitted and the Aha sunk another foot and had near the top of the wall a little cheveaux a frize against the Deer which made the Aha greater than a Plain six foot wall. A Walk thus Bounded by a Parapett Hedge to the Park and by tall Trees shrubs etc on the other Hand to hide the Inequality of the ground continues nearly the lenth of the Park to the Right hand side of the House. Behind the screen are Dark walks meandering thro' them so that even in this one side of the Home Park from the House you may go a mile and a half open to the South and the Park or wind for that lenth thro' thick covered walks only here and there coming out into Views of the Park (..) this at the side. What connects the Park to the Lawn immediately before the House is a sunk stone faced Aha with small cheveaux du frize and no Hedge. What forms the third side of this Park viz. opposite to what I have just mentioned is a Plain stonewall screened by Plantations etc not seen at all but overlook'd to the adjacent country. The fourth square I haven't yett gone so cannot say how it is Disposed of. The whole with outside the Plantation is Enclosed with the finest dry stone wall I ever saw – the stones thin very Broad and even like tiles. It is I believe 8 feet High not coped with Lime but a Broad flag on the top. The great Plantations called the Great Park are all surrounded with a stone wall. In the Lawn adjoining the House I observed a Remarkable whim of my Lords in planting his scattering trees he putts down thorn quick and thick as my thumb with every forest tree. This soon makes a guard Round the trees to Prevent the Rubbing of cattle when the stocks Round the trees decay I saw the same has been Practised in the Park with good success and small clumps made in which thorns have been thickly Planted as shelter and Defence to the other trees. The thorns I suppose taken out of the woods they look pretty while the trees are young in flower Round their stems and make a young tree a Better Object than its naked stem affords whilst so small as it must be when first Planted. I observed also a very Pretty mixture of Meadow and Pasture for when the trees were thickest. Bounding in many clumps several little Lawns I may call them in the great one behind the house which is (open in) of Different Vistoes.

One great one immediately fronting the House to the (...) of green and lesser side ones not formed of straight lined sides but Rather as accidental openings between

Patches of Plantation the ground amidst these trees I say where they stood thickest was (fild) with sheep - the Lawns amongst them showd so as a winding Path crossing in and out amongst shrubs and Plantations sometimes had a mowd field and sometimes sheep grazing on its side or one on one side and the other on the other. A shepherd indeed always attending with a Dog and Long Pole on which was a sharp chiggle like Instrument with which he cutts a weed or (fern) wherever he meets it. The keepers of the Park all carried the same. This Effectively keeps the ground free from weeds. There are many very Pretty Views terminated with seats which on approaching are only a Deception not near as Expensive as they appear.

Without the walls the grounds are clump'd or the single Planted as objects etc., for the Park and Gardens so that he has made his whole Estate a perfect garden subservient still (...) closer Improvements within the Wall.

I object to My Lord Bathurst's Planting in one Respect if so great a Planter may be censured by such a one as me. What I mean is in those Plantations which he means not to cutt his Planting though thick with trees which are not properly underwood which Produces numberless straws I may call them Equalling in hight the greater trees without thickness adequate to a Shrub three feet High. I hate any of these great tree species being made use of for underwood or used as thickening up clumps etc without a View of their ever coming to any good for this use there are Laurel Hostas Holly etc a hundred things which are Properly underwood. The country in general and especially the Park is very flatt which Destroys in a great measure the Effect of Improvements a quarter of what Lord Bathurst has done on an unfriendly spot would make a finer Place. Part of the quarries found here will burn to Lime but (...) is so dear that the Lime does not come under the price per Bushell without Drawing - I could not find much of Lord Bathurst's wall Built in the manner Mr. Whithead Described with a layer or mortar work in the middle all along. What is in general is a plain dry wall about 7 feet High Battered up. An Excellent flat but very thin stone which indeed you find quite from Detford across by Oxford Banbury Cirencester to Badminton. This serves them for most Excellent walls in common cutts easily like Bathstone for faces of Houses and the very thin ones they use as slates but very bad Rotten and heavy they are.

**Friday Morning.** We sett out in a Post Chaise for the Great Park as it is called which is only separated from the Home Park by the High Road and a (...) It contains natural wood, coppices, Plantations, sheep walk, corn etc etc., in the greatest perfection is a better and more Varied spot by nature for Improvement than the Home Park and I have drawn a little sketch of it. I shall say nothing of it further but that it is altogether a most noble profession. I believe full twenty miles of Riding on fine dressd grass walks thro' woods lawns etc in this (or great outwood) I shall mention hereafter. My Lord cutts about 45 acres a year which brings him in near £900. He has raised the value of his wood cent per cent within this thirty years. The Ridings thro' the thick Parts of the Starr of wood are winding and very beautifull. He leaves the adjacent shrubs and trees to these Ridings when he fells the coppice on their side by which you may ride as well sheltered as tho (...) side had not been cutt the number of (overstands) appearing over (...) side of the walks as a great wood. He fells the trees himself that there should be no Danger of the trees he wishes to stand being cutt and then sells the wood when fallen and makes the people who buy it pay for his cutting. On Returning from the centre of the great Starr in

the (...) we went to Alfred's Hall as he calls a Building in one of the (quarters) from an old tradition that Alfred signed a treaty with Cambratus or some such name. In this wood lies a Ruin with Gothic towers very well done mixed with Shrubs to hide the Bare walls where they are not broken Battlemented etc. and a spot Inclosed of about six acres cleared of underwood firmly mow'd and great old Beech trees and some Oak spotting it. There is in the ruin contrived a little House for a wood ranger and a fine Room for Dining in. I must observe that the oak in general does not thrive here, which surprises me as the Beech grows to great perfection. The soil seems not very shallow but the (...) is. The quarry which is with about Eighteen inches and if the surface is a flat one and the Roots can not go down as they can with us on our slaty kind of quarries which lying Edgeways (they) Roots penetrate to a great Depth but I must observe here that both Beech and Ash thrive well. Returning home I gott out of the chaise and mounted my mare which I brought with me for the Purpose and rode off into the thick of the wood in order to see his manner of cutting etc., I got into a Vale on the Right side the Park between the two sides of Rising grounds coverd with woods some newly cutt but long strips at the Vale side Remaining uncutt others left this 17 years to be cutt soon all of them full of good Reserves but the Beech which grows here naturally much the best. These Vales closing at last to about thirty yards wide and are just spotted with Oak or Beech single trees which I think with the Rising woods at each side form a most Delightfull scene for a contemplative Ride the ground for the space aforesaid a (.....) cutting trees being fairly Dressed. I would Recommend to every one who has either flats or Vales or glins amidst rising grounds in their woods but especially in their coppice woods to keep the ground amidst these Vales or Flatts as neat as possible the Rising ground then pickt coverd with Brusssh and overstands will appear like Immense high woods and the fine Dress'd Plains will be sett off by those thick Boundaries. I can conceive how great an Improvement this single act woud be by that pleasure I felt in this Ride. In my Return I struck out of the Vale and gott myself Higher up nearer the wall which I must observe in general is covered with the natural coppice wood and where not is planted against most sedulously here I think into a delightfull winding Ride, the trees closely arching over me. Closely mixed with Hazel which made it very Dark and solemn. Of a (...) I found myself at the gate of a great open which proved a meadow of I believe twenty acres. A Broad close mowed Road thro' the middle of which opened into a field of Barley. The same Broad Road thro' it (...) into a field of Wheat and so on, clover etc. Many acres in Each Part till at last I found myself in the great Lawn by the farm House and so struck into a track which lead me to the Porter's Lodge. This opening from close Dark walks into this lovely kind of farm The Inclosures appearing like stripes of natural wood had a very Delightfull Effect not a little Hightened by the contrast of Light and Shade. In the Evening I again walked over the Home Park and Explored every Inch of it, but had not gone quite Round the outward Boundary to the left of the House. I Reckon it nothing if I cannot see all the Boundaries of an Improvement as this generally shows me how the Improver has managed his grounds better than the inside which is meant more for show – (Accordingly)

**Saturday Morn.** Finding it inclined to Rain I took that opportunity of Postponing our journey to Badminton and mounting my horse attacqued (sic) the Great Park once

more fully Determined the ten or twelve miles Round that I would see it all if Possible before I left it. I took the way to the place I had turned back from the day before but wandering a little out of it I came to an Inclosure with strong stake Hedge which by the way is made to great Perfection. Here wattled close at top as a Baskett and in the same wove figure as the tops of garden Basketts usually over a gate lett into it and I found it a young Plantation with some Evergreen Edging or rather topping a swell of ground from the Vale which was kept for sheeps walk with a Road Laid out thro' this plantation for a carriage to lead into the woods beyond it at the Distance of about the eighth of a mile or more. I have learned a most Excellent lesson for Planting of their soils especially where you plan a Driving thro' it or even a narrow walk. You Pare off the soil from the Road or walk and from every ten or twenty feet of the side leaving ten or twenty feet as you like untouched on which you throw what you Pared off the Rest, this triples the Depth of soil for the young trees who by the time their Roots spread to the Pared Place will be strong enough to ( ...) thro' the Poor ground in search of better that Poor however will be mended by the atmosphere, Dropping of Leaves etc., on the prepared (...) spots you Plant a thick clump in order to be sure of two or three's growing. The rest are Either cutt away or transplanted after some time. The Intermediate spaces of ten feet are only what ought to be in the closed walks if twenty are open thro' which you may agreeably view what's beyond the Plantation Deer sheep cattle corn etc etc, etc., My Ride led me thro' vales with scattered trees in them as I mentioned and by several young Plantations which this fine old man with 85 years of his age is going on with Brisk as ever. All Inclosed with woven stake hedge, as there are no cattle in this whole Park but sheep of a quiet kind as all the English are a low one (...). All the Plantations some few things Excepted are of the skirting kind to great Lawns to fringe them with Drives thro' them and done in the manner just now mentioned. When I came to the other side the Park I got into other Vales such as before described and so by some Lawns clumped with young firs surrounded with Low Dry Stone Walls I came again to the great Lawn and thence to the Porter's Lodge well satisfied with five hours Riding without Ever once quitting a fine Turf. I am sure a man might Ride two days in these woods and never thread twice on the same ground, and gett full riding enough Each Day. The Different Vistos openings ridings etc are so numerous but tho the ten Vistos from the great starr open to Pretty Points of View (...) etc., yet still I cannot say nature had been Beneficent in the country. No River. No Distant Hills. Little or nothing above the Plain and Insipid. In the Evening I went again to the Home Park. I should have said that going out in the morning I Rode Round the back of it that I wanted so much to see the day before. Here I found the coarse kitchen ground and on the other side of the Road a piece of Hop Ground etc all tending to show that for Extensiveness Lord Bathurst had no bounds. The Aha which takes in a Barn and field or two before it into the Park and makes the Deer appear as just grazing at the House Door as the Back is ornamented, is well executed and a noble Design. This evening Saturday was the third I had been in the Home Park.

**Sunday Morning.** I sett out for Badminton but drove thro' the Great Park up to the round seat in the Starr and down a side Visto and out of the Great Park Gate next Tetbury and then Entered an outwood of My Lords with Ridings of three mile lenth cutt thro' them. Here I will leave a Blank to enter some things as they occur to me that I thought



when Viewing Trees, Parks etc., but now Escape my memory. Two things I must not forget in this country. The Badness of the Roads which indeed begin at Tetford in Oxfordshire and continue to (P...) near Badminton. They make a traveller pay an Immense Toll and afterwards nearly Break his neck tho there is some fine fields of (...) sown Broadcast which makes a lovely figure and is I believe the finest Pasturage Possible. I might add a third variety viz. wheat now about half the Hight of a field of Barley which the Post Boy assures me was to stand the next July twelvemonth the strangest time to sow wheat that ever man thought of and seems unnatural that any crop should pass by the natural time of coming in as this does. The Boy said that the ground was so poor it woud never come in early enough if not so managed. Here close adjoining was very fine fields of (..)

**Sunday Evening.** I walked up to the Duke of Beauforts great gate from our Inne thro' a Plantation that our Landlord lett me into at the Back of his House by a Private gate from whence we continued Inclosed in the Plantation up to the great gate. I believe about a mile and half or Better the fault to this fine Plantation was want of openings to Views which however I must say the country is too flatt here to Enjoy in any perfection however a fine sheep walk which is Enclosed by this Plantation might be taken in more than once which at Present is all the View you have thro' the stems of a Scotts fir grove. The rest of the Plantations consists of Birch Oak Larch Scotts Fir Spruce Fir Ionic Fir Weymouth pine Horsechesnutts well intermixed which has a very Pretty Effect and clumped up with Laurels and Laburnam, Syringa etc., which are Beautifull and Highly Proper as underwood, this delighted me as it was free from the faults in Planting I have mentioned at Lord Bathursts that of Planting forest trees as underwood to others which I once more Repeat shoud never be done if they are not to be Removed as out of a nursery or are the species that may be freely cutt for coppice wood and grow well from the stool but never such as will not spring up when cutt. This is only destroying trees meant for a Better Purpose and hurt the Eye of a Planter when he sees them thus Expiring in thin poles overtopd by those which have gott the mastery - but here we must observe that Lord Bathurst began his plantation near the House when the Variety of Evergreen trees and Hardy Exotics were not in general use by any means. Nay I questioned at that time whether a competent number of Laurels as underwood coud have been procured as they were then only cultivated for a Variety in a Little Evergreen garden or a Hedge at a Parsonage and I had just then (...) this last use as being Improper for (sheering?). The wood Lord Bathurst has used in his Home Plantation to thicken with is Beech which pruning up Leaves the Bottom naked and crowds all into the Head which is not wanted. Of those trees used for thickening what one wants is to leave the top free for the Heads of our master trees and just thicken the Bottom to Please the Eye.

But to return to the Duke of Beauforts – the outside wall next the Road is only in large lines nearly straight and the Inside wall (for the Plantation is in most places fenced with a stone wall at the Inside) follows nearly the outside in Large sweeps or Pretty straight lines yet the Drive thro the Plantation is so contrived as to shew you no more at once than about 1 or 200 yards. The sweep going Easy and as if thro' a natural wood this is formed by sometimes Bringing the Road nearer the High Road but never so as to leave it naked to the wall and at other times swelling the Plantation next the High Road and

approaching the Drive to the inside. This Road is about 30 feet Broad sloping up a little to the middle but grassy with water tables at 20 feet wide and cutt down to the Bare Earth what is taken off thrown at Each side to the Plantations and the grounds sloped up at Each side for about 5 feet from the water tables to the first row of Plantation which is judiciously enough composed of Laurels Syringa Laburnam Arbor Vita and such tall growing flowering shrubs that are Hardy and approach the tree species. The trees behind are Diversified as I said before, but with this Excellent contrivance that one species of tree predominates for suppose one Hundred yards, then another and then all (nicely mixed) this gives a Variety within itself and has a Bold Effect This Variety being certainly more striking and more felt when succeeding as after the Pale colours of the Larch and Spruce Firr we meet the Scotts Firr and Sycamore or Scotts Firr alone, this certainly has a better effect than thro the whole way mixing them alternately as generally done. This I can't say struck me till this night at Badminton. I owe this Hint to Badminton as I do the Excellent method of Planting in clumps by a drive or walk side and artificially Doubling the soil to my Lord Bathursts new Plantation. This at Badminton is really a very fine surrounding of his great Domain as near as I could measure it is about thirty yards or from that to forty Broad for near a mile between two Dry Walls which are of the same Excellent flat Stone that Lord Bathurst has six feet High to the High Road and four feet Built in an ahha two feet Deep at the Inside to the Domain. This way of sinking a stone wall in a small ah ha is surely an Excellent way and may be done as cheap as Building it on the sod you are surer of your foundation by it the walk is less Exposed to Storms and the Plow (...) of the edge where you sink the trench so that you may make one gradual slope for ten or fifteen feet to the walk which will soon in that part Recover the soil taken off by the cattle lying in shelter and the soil you take off making a little Terrass behind the walk or thrown where your Plantation is behind it greatly assists them.

The other Parts of this Plantation is fenced to the Domain with a little clipd Hedge and small trench before it as here nothing but myriads of sheep attended to by two Shepherds graze. They are Easily fenced out. The sheep had a Ring of Bells on some stout weathers which by their Different tones made a very Pretty Rural concert. I was twice Interrupted in my walk by Roads which crossed the Plantations fenced with Poles the lenth of the Plantations Breadth with gates opposite to Each other to continue the Drive. This lead me into Examining the ground enclosed by this noble tract of Plantation and from what I could observe it Extended round more ground by a great deal than the Duke's absolute Desmesne. I thought it a good hint and have no notion of a gentleman's confining his Plantations and Especially his walls or Drives to the absolute land occupied by him he may Extend in Process of time by artfull management his Improvement over half his Estate and Enjoy His drive thro' a Plantation of thirty yards Broad from one spot to another of his Improvements as perfectly thro the ground in the tennant's hands especially where he keeps the Plantation close at the sides (as for contrast sake his Improvement may require) as tho the ground were immediately in his own occupation. I am sure a third of the Duke of Beaufort's Drive is so. The Lodge at the Great Gate is Universally admired for neatness of Execution. I cannot say I think the Plan faultless – the Room over the gate is vastly Prettily finished and furnished – as any

Room at the House. From it you have an Extensive View of Butt an Insipid Country and on the other side down a magnificent lawn and thro' the Park to the House which I believe a mile and half off appearing at the End of an avenue the with the House and wings form'd not of Rows of trees but great clumps. This is rather old fashioned but is most allowable of any kind of avenue and Perhaps at so great a Distance from the Lodge the house could no otherwise by this sort of Visto have been connected with the Lodge and its adjacent Improvements so as to strike the Passenger at the Lodge with one great Domain. I am pretty sure no modern spotted Lawn of so Vast an Extend could have united the View, that the Lodge and House woud not have appear'd two Improvements. I am willing to Encourage this Idea as so great a work as this Vast Long Broad Avenue with its Platoons or clumps all Enclosed in dry stone walls to keep off the Red Deer whilst the trees are young should find favour in our sight and to say the truth straight Vistoes of so great a width and Extent 'spight of modern taste give pleasure to the beholder from any one point, tho indeed not much to the Journeyer thro' them, his (....) says wearily travelling over what his Eye has long measured before. The great Park Wall which crosses this avenue is fortunately Built in a glen so that the gate not wall appear not the least from any Part of the House or Lodge to interrupt the avenue which I am sure is more than a mile and half.

In the morning of **Monday the ? of June** we sett out to View the House and Domain with a keeper to attend us who went before the chaise which I find can drive to all parts worth attention. The gardens in themselves not being very Remarkable as yett tho I saw several men at work making some new Improvements. We struck across the Great Plantation out of the High Road thro' one of the Paled in communications with the Inner Grounds I mentioned above and lead us to a farm House which was one of the Duke's Tennants and woodrangers at some time his House built to terminate a view with a very fantastic gothic front. We drove thro' several wood Ridings with fine oak over stands of a good growth the Insides here and there coppice at last we came to a perfect flat apparently a Valley with several old trees scattered in it Pretty (...) without order and the chaise seeming to make its way among them only where it cou'd but the ground was smooth and the grass mow'd in this Part. There were some of the finest Headed Beech Trees I ever saw. Fine old thorns and other Bushes perfectly wild and very Beautifull beyond the power of art for a century to make so truly Romantic. At the Head of a little Lawn more level and open run than what we had come thro' for some time stands a Rustic temple or wood House. The Pillars to the front of Rampiked Oak which absolutely swell out just as Rustics are made to do and in stonework the cornices of the same with lumps of course Bask'd knobbs putt on for Dentiles or Modillions rather and thatch'd at top neat Pavement at bottom and the Back done with roots of trees, moss etc., the top thatch'd on the whole a most Perfect wood house. The Best I had ever seen for Execution and the (...) Retired and still made it as fitt a spot for such a Building as I ever saw. Certainly had it been a country as admitted of Variety Enough to have the Back of this Building open and Present You with a more cheerfull and Different (scone) it would have had a fine Effect but as I observed all here about is very flattish. We thence entered the Deer park full of Stags and great Herds of Hinds. I was surprised to see such great Hinds of Red Deer Inclosed in a park the walls of which was not above seven feet high

or seven feet six at most. They did no great mischief to the trees which were not fenced from them the clumps Excepted which form the great avenue the walls Round which were not five feet High but they never attempted to go over them as the keeper told me. They are a fine creature and a few woud ornament a Park Vastly – the Herds of fallow Deer were very great. The House contains sevrsl valuable Paintings the cartoon of Raphael is absolutely his first Drawing of the Bottom Part of his celebrated Picture of the transfiguration and not the woman taken in adultery as generally said to be. I believe it was only meant as a Draft for himself to paint by not att all for tapestry work as the other cartoons were. It is very much Damaged but a noble Spirited Performance in Black and White as I ever saw – after the House we went to the other side the Park, where an old grove or rather I should have said in a grove of Old Oaks stands another Root House of a singular form but not open on any side but a great Door which was kept lockd. The Thatch of this which has often been repaired comes over the walls so farr as to make an Excellent fantastic covering and may be calld a Burlesque of Inigo Jones' favourite Projecting cornice. It has realy a fine gloomy Effect which the Building requires. The Back of the Building forms a grotesque alcove seat looking thro' old oaks. I must observe that neither of the seats seem to have any absolute Point in View but rather to be themselves an ornament to the Place they stand in. It is surprising how the little Irregular Bitts of wood are joind together to form the walls (...) is moss put in between evry Bitt. The Inside is made quite gothic and the whole very well Executed with an Inscription over the gothic alcove at the Back looking into the great woods that Pleased me much. It was in Italian I believe from *Pastor Fido*. Memorandum. I must look. It began

*"O care, Selve, Beate  
e voi soligni e taciturne Orore  
Veri di Riposo e pace alberghi."*

There was an Inscription in the woodhouse in the valley in English but I forget it. 'Twas in praise of Retirement – I delighted in the Italian one and am Determined to use it and an English to the same Purpose in a seat Please God at Avondale and also that stanza from Tasso –

"In Licto Aspetto" etc with Milton's Imitation in his Description of Eden. If there are not English to the same Effect your seat is only fitt for Scholars not for the Pleasing Retirement of Ladies Haymakers, etc. which I would wish to make him.

Memorandum. Whilst I think of it I must say that the spot in Bally (...)duff or Glenwood as I shall call it for the future which looks to the River from a swelling field near the great quarry will be a delightful spot for a Turkish Tent as my Bottom under the wood for a wood House the Dog and Gun seat for a Chinese Building as fittest amongst the absolute rocks where the Chinese are apt to Place their odd temples. Near the wood House below I may have a Ruin of an Abbey and on the great Rock at top a Ruin of a Gothic Castle at the top of the great Visto an Hexagonal gothic Temple open all thro' out to be approached from the walk which leads from the House by Lord R. Bounds thro' a Dark Plantation which will come quite up to one side and have a twist in it just at the very Building that you shall not see it from Enttring this walk till absolutely in it. This will have an Excellent Effect. The Building will appear transparent and airy from the

House and little Lawn where the garden now stands at the same turn that by this collateral approach the Visto to the river will be approached with surprise (which always Hightens the Effect) whither company only will Round the garden meadow from the House to it or go all the walks and End there as I'll make a walk from the very Edge of the wood by the (...) Brook in coming up from the wood strike into this walk leading to the temple which shall be quite dark from the moment you Enter it till you gett into the temple where you will see either to the River or to the House as I would have this Building white and neat. I would have that Ruin on the Rock Perfectly as (...) as I can Build it and overgrown with Ivy – that two Buildings may not appear too near Each other that att the Rock need have no Room in it only on the ground in the first little sort of chamber may be a gothic form all Round only where you Enter by the Door and a little Parapett (supposed) of the Ruind wall to the front next the River – the sides Unseen, most Perfect to the side... where (...) Prospect.

We came into the great avenue in Returning from the last woodhouse went thro' the Park Gate in the Hollow before mentioned and Drove up to the great Lodge gate saw it and then Entered the Plantation thro' which I walked the Evening before. This lead us without the least Disagreeable spot Intervening just to our Inne where we Refreshd ourselves a little gott fresh horses and sett off for the Hott Wells Bristol where we arrived that **Monday** about five in the afternoon having just spent Eight Days from leaving London and made the whole journey a Party of Pleasure or so many airings Rather than fatigue of Travelling.

**Wednesday.** Rode to the Downs above the “Hott Wells” the Banks of the Avon Beautifull the Sides and Rocks Bold as at Rathdrum or the Meetings of the Water. The River an odious colour. Observe they make their Hay here as we do but keep it much in very little cocks. They were making (field) cocks here today as we do (Irish). In most Parts of England they make none. I saw men cutting short furze and Fern for Brass foundry. I know not for what use these but observed their manner of cutting woud be of great use in our country where small furze and fern are apt to over run Parks and Pastures. They had a stout scythe Handle rather thicker than usual at the End a very short scythe Blade not above two feet long, thick and strong with a Band or Tye from it to the Handle at about five inches from the Heel this Held it stoutly the (...) of the stalks etc., and a man in a Day woud cutt as much furze Briars and fern as in any other way in a week. It woud be Excellent for cutting of the young shoots of Irish Furze for feeding Horses with this and the chiggle tool woud Effectively keep the Lawns of a Park from Weeds.

The Mixture of Houses churches ships trees glens Rocks woods and coppices with steep Banks and opens to the Harbour or Severn's Mouth as seen from Round the South West of this town is one of the finest and most Variegated Beauteous scenes I have mett with. I think it equalls Marseilles Environs in most things and excells in the continued and Bold Inequalities of the ground. A charming Place to Ride on the downs are miles on the Turf Either to canter or saunter as the Rider Pleases free from Interruption with fine and Varying Views Every turn you make. I mentioned just now a Turkish Tent as a Pretty Building on the High Field of Bally(...)duff I think a Turkish Tent or a four Pillard Portion of an Octagon woud be very properly Placed on Part of Mr. William's grounds



catch the cattle, sheep, Haymakers or spotting trees in Different Views and also the wood and Belvidere tower peeping out of the very topp of it in Different Points. This is what ornaments the approach to the wood from the House on Enttring the wood walks they are close overarched and Exhibit for some lenth of way nothing but a shady path agreeable to ones wish in a Hott summers Day. They are covered first with the coarse Earth and Stones gott from the side of the Bank in making them and with sand or finer gravell to smooth their surface. Here and there you meet a fine old Oak Rather Larger but somewhat scattered thro' the wood as (they) occur at Hayesville – after Passing sometime thro' these Dark walks you Enter a still narrower Path on the Right hand which mounting up a little Brings you at once into what appears the top of a gothic tower Battlemented from the ground just breast High and over those you look to the fine view of King Road, the wooded glin and stupendous Rocks underneath you. You gain by this Building up of the Highest Rocks Even and into a Kind of tower a greater degree of perpendicularity over the glin then you otherwise coud have and the Battlement makes it agreeable to the persons looking down from the Idea of safety added to it. It was just common stonewall about a foot or foot and half thick toppd with cutt flag - and cutt flag in the niches of the Battlementing such as I culd have to great perfection at Corballis. Pressing on you meet another of those Platforms I will call them but not Breastwork only great stones laid carelessly to the front and here are the greatest cliffs under you I Ever saw for perpendicularity brought into an Improvement.. They gave me the Idea of the spire like Rocks in the glin of the Downes opposite to Mr Latouches – now whether Mr. Farr who I understand plans these Improvements for himself has left this amazing Bold stroke of nature without a Parapett Wall to strike the spectator with Horror which I have always found has a great Effect and Infinitely Proper to make the Pleasing appear still more agreeable after this specimen of the Horrid I cannot take upon me to Determine but as it just joins to a little Lawn about an acre to be Dressd Extremely smooth and surrounded with the trees which forms the walks as this spott is on the top of the Hill. In the midst of it stands his Belvidere which is not near finished and in clearing this spott what few trees of any size was on it were left to spott it. I greatly delight in this spot with its surrounding trees and a flatness in itself (is) like a little Lawn in a Vale and Round it as you walk from opens in the trees you may command some of the most pleasing Views in this most pleasing spot of England by having this Little Lawn round the new Building it will shew it to vastly more advantage than if closer surrounded with trees, tho' from the adjacent country on every side this gothic tower appears perfectly

“Bosom'd high in tufted trees.” (*John Milton's L'Allegro*).

From this Lawn you Descend as before you ascended pass by a cavern in a Rock and archd over with Huge stones. Indeed I was not so convinced of their masonry as to like to sitt in this grotto as the stones appeared to insecure to give one satisfaction tho' I suppose they are strongly putt together. I advised a greater weight to be thrown on the Haunches of the arches as in my conscience I thought the great weight on the crown was bulging the whole lot in - from hence you Entered another of those Battlemented platforms which must appear perfect towers from the other side and Extreme pretty objects. The steep glinn was here the Principle object and a Valley it Ended in opening to a Beautifull wooded country and Views of the sea but these less here than in the other

over the wood as it would command the finest view that is of our lands and at the same time be the most ornamental object to these lands.

**Friday June 30th.** I rode in the Evening to see a Mr. Farr's Place near the Hott Wells about 3 miles off. I had seen his Belvidere from the Downes as they call a spacious Common over the Banks of the Avon where the company of the Hott Wells generally ride for the air Every morning. The Prospects from it on Every side are most Beautiful and the turf a champagne galloping ground most Excellently suited for wholesome air and Exercise. Mr. Farr's Belvidere is taken from the Duke of Cumberland's at Shrub Hill but Executed in a Hard Blue Stone with white Bathstone for Battlements Embrasures and other Ornaments. The three Towers surrounding the main building are Round as is the (centre). I think the Best Room is 25 feet. The moment I Passed Mr. Farr's House (which is a little mean makeshift only till he has sketched his Improvements) I was struck with the similitude of the glin under me to Hayesville. They beat me in fine Views from the terminations of his wood walks but I beat them in the Picturesque and remarkably (Varigand) foliage of my Rocks and in a fine mountain River where they have only a little Dingle but as the walks are cut out with much taste thro' a natural wood as they are Perpetually on the Rise or fall and as they convey you to a great Height from whence you View a fine wooded glin. They have all the Beauties of Romantic nature desirable considering Especially that they open on one side to such a sweetly checker'd (scone) of Land and Sea or what is more Beautiful the great mouth of the Severn called King Road as I scarcely Ever Remember Except at Artramont. This Junction of wood walks and sea Prospect is a glorious circumstance in an Improvement and what my neighbour Mr. Symes has great Reason to be proud of at Ballyarthur where they might be both in greatest Perfection engaged by a little labour for a few days – I Profess conscious as I am of not seeing the sea from any part of my land. I should have been in a perfect fitt of despair at the Beauty of Farr's walks but that (D...) self love and natale solum (the land of one's birth) step'd in and shew'd me my great Rock Hanging down with tresses of Honeysuckle and my River clear and asure as an Italian sky foaming over the Rocks which his own Prowess appears to have carried there from his native glinns amidst the mountains of Glendalough. This Idea step'd into my (...) and I painted their Rocks as coarse and their water as muddy and by that means kept myself in tolerable contentment not thank God (had I thought otherwise) that I envy any their good, I only wish I have the same if I like it without hurting them. This I think the strictest moralist cannot blame me for but to Return to these walks, most of them are on the slant of the Hill on one side or the other for the ground of the Improvement consists of a Round wooded Hill perhaps about 12 acres surrounded on two sides with meadow and on the third with a glin the opposite sides swelling Pasture smooth and covered with sheep the fourth side a still deeper glin the sides covered with wood and Rocks as at Rockstown or (B...) The opposite the same very steep and Beautiful. There is an odd cavern or two in the Rocks of the opposite side which have a very pretty Effect. The Introducing these several Views is well managed. The meadow which joins without a glin this side of the Hill on two sides is separated from the Path of flowering Shrubs that lead to the Natural wood walks by Post and Rail this being a simple Plain object Requires something Particular to Enliven it. You have therefore the whole space open to you that as you walk you may

Views. The Path Descending Brought me to a Root House Executed Better ten to one than any of the kind I have seen in England. There are two Pillars of Rampiked oak and three arches formed mighty artificially. The roof too arches up and is Ribbed with Knots and coarse Bark'd pieces of Timber in an Extraordinary neat manner. The niches (answering) the three arches and two at the sides are mighty Pretty and the matts for seats in them Remarkably long and in their way well adapted. Near this is a gate formed in a gothic Pattern high and narrow with the same sort of (narly) knotty mossy (...) so as to look quite Incrusted with antiquity indeed the most of these odd knotty (...) are nailed on over a common Oak Rail all round this part is artificial shrubbery but (...) on too remains to give a wild appearance sufficient for the introduction of this wood house. The floor was Horse teeth ground down and sett in (terras) in mosaic with a Black tile intervening in figures. They look like Brockatello D'Espagna Marble. It struck me that the Rock in Jones's Coppice which looks towards (Bally...duff) where I am fond of sitting (not that by Gaffneys House tho it too might be so done) might be vastly improved by a Gothic Battlement in the manner of these seats here mentioned. I would have a Gothic Skreen or some thing in that way at the Back of the Platform so that in approaching it it should shutt out the View till you open a little gothic Door as if into a Building which the screen might appear and then the View would Burst on you to great advantage. The Battlements taking off the Dread otherwise caused by Perpendicularity.

**Monday July 3rd.** I rode with Mr. (Pusey?) of Cork, a great merchant of that city, his brother and Mr. (Bury?) of the county of Limerick to View the great copper works of Keynsham four miles and half from Bristol – they are Extremely worth seeing. You have here an evident proof of the great advantage of well contrived machines by water supplying many hands. There are above an hundred employed and yett Evry forceable thing is done by water. Nothing but the attendance of the men on these water machines Required and yet one hundred men Employed. What would be the consequence where no machines are wrought by water. There must have been a thousand men employed in the same place – here the Brass after being brought from the foundry where it is made from the copper smelted at this town from the oar (sic) chiefly Brought from Ireland by the addition of Lapis Caliminaris which abounds in some mines hereabouts is Brought thro' various stages from thin Barrs about 12 feet long and four inches broad to Barrs of five inches broad and eighteen feet long after passing thro' a pair of steel cylinders – then cutt into 16 stripes - then Each stripe passes thro' an Iron Eye drawn by a pair of working (pinchers) in a very (judicious) Manner cutting continually forward and Drawing to them about two feet at a time. Three of these Draw after one another till they reduce the 4 square wyre to a round thick as a straw then a great Brass cylinder turning Round, catches one End and winds it round it Drawing it thro' a still smaller Hole till at last it is Perfected in the 3rd cylinder wound Round it of the size of a corking Pin. Thus it is sent to the Pin Makers who use what they want for corks as it is and Hand Draw the Rest for middlings and minikins – in another House they beat out by Hammers (wrought) by a shaft with many notches so as to make quick Repetition of the strokes square Brass Plates into common flower pot shaped or (...) low Butter crock shaped pans for the Guinea (...) making four of them at once for annealing and tempering the whole they have a sort of Iron draw fitted to a frame from whence it slides into the mighty oven with

Ease by hooking two chains to and turning their windlass they Draw it out of the oven when they please a groove being made in the Bottom of this cast which runs on Ridges made to receive it on the moving frames and also in the oven. The frame turns about soon as the wagon of copper wire comes out of the oven so the men can more easily approach them hot as they appear from the oven and observe do they want Returning or are they perfectly finishd by the heat.

**July 12th.** This seems to be the Hight now of Hay in this Part.

Harvest – as far as I see no great Difference between the time they cutt their Hay here and with us. Only the quality of their meadow in general is Better. I never saw such fine natural grass as about Bristol. Their manner of making their Hay seems much as ours when made with good hands neatly turning the Hay in little wisps with the fork not Dispersing them and scattering them all about which I am confident parches up the Hay too much – but the essential difference in making the Hay is – they seldom or never make a field cock if they do ‘tis only on a Saturday night if what they think sufficiently made and fear may be spoild by rain at that time. The rest is constantly carried to the great Hay Rick which is generally made in a corner of some field where the cattle are to be kept in winter, and putt on it just as green as we make it into field cocks. Every Irish Person sees with amazement the fields which are mowed on Monday Perfectly cleared perhaps by Thursday no more sign of Hay than is in ours two months after cutting. With still greater surprise we see the Hay thus newly cutt making up into a great Rick without taking fire. I have in vain attempted to account for this from the Dryness of the climate etc., as in some places the Hay thus Putt up is made in Damp Soils much Damper than with us in the county of Wicklow. It must then be owing to what I am going to say, their manner of making it in these tramp cocks. At least I flatter myself there is something in what I have observed. It is this they are not made as with us in one or two Days but they are Increased still as there is a parcel of Hay fitt for putting on the Rick, perhaps this does not rise the Rick above three or four feet. It is laid level and Hurdles with straw wrought thro’ them like thatch is thrown on the Rick to secure it against rain. Thus the Rick goes on as the Hay is making beside this they are not near so large as ours are (...) great cocks with flues always through them. Sometimes two or three flues.

**Friday 7th of July.** About seven in the morning. We sett out in company with Mrs (S) Foster Miss Margaret Foster Miss Vaughan Miss Forster two Miss Burtons Captain Webber Mr. Tomasi a Portuguese gentleman of fortune Doctor Lee of Virginia and Doctor Orpin of Ireland on a party to Mr. Morris’s at Chepstow South Wales. We stay’d out till Sunday at two o’clock and had the Good Fortune of Passing those three days without the smallest accident Intervening to abate the Pleasure we received from a most Beautifull (scone) and fine weather. Tho’ I must confess there appears Difficulties sufficient on the way to Chepstow to make one readily allow a cross accident or two. As the ferries are Incertain and Inconvenient often in their times of Passage. We got to Aust by nine and Breakfasted found the ferry Proper for passing in two Hours, went over in the small Boat without Horses, four good Rowers and a steersman - took the only two Carriages to be mett with at Beachley, a little town on the Welsh side the ferry – one a Coach, the other a Post Chaise. Put six Ladies in the Coach, a Gentleman and two Ladies in the Chaise, the other Gentleman gott up behind and as well as we could proceeded

with no great Inconvenience and much mirth to the Three Cranes Inne in Chepstow. Here we dined and in the Evening walk'd out but not to Mr. Morris' contenting ourselves with our situation so near him for that night and Determining on an Early attack on his Premises Early the Ensuing morning. But this I must say for our walk that had we made the Party merely to take it it would not have been time Ill Bestowed for so Lovely Romantic a country so diversified with woods and Rocks and ornamented at the same time with the Proud remains of Chepstow Castle built on a promontory of solid Rock advancing into the River which forms a fosse Round two sides as a Natural glinne forms the third and a great artificial one the fourth. This situation added to the Venerable Ivy grown towers makes the whole a (scone) highly Picturesque as a man of the most Romantic turn could wish.

We spent the Evening very agreeably a good summer (sic) some singing and gay conversation. Ended the night and sent me to Bed well Enough disposed to make up the next morning for those hours of Rest, it may be Imagined we Broke in on the Receding night, but I was Determined not thus to Desert the chief Purpose. I set out on that of making myself Intimately acquainted with Mr. Morris's Place which I concluded I should never perfectly compass in any walks we might take in full company. I therefore arose at four o'clock on Saturday morning and calling on Mr. Lee the American Gentleman, a man of Letters and great naturalist walked towards Mr. Morris's Improvements the nearest entrance into which lies about half a mile from the house. Here we arrived about half past five and as the Ladies were not to Breakfast till nine we stayd in those Parts which we concluded less likely to be shewn to the Ladies above three hours and Returned to Breakfast after having in this our first Essay seen as much or more than most who go from the Hott wells on this Part etc., in the whole. By this means we were able to give some hints for the Better conducting our company thro' the Improvements and found that but for that we should not have seen what I think to be nearly as Beautifull a part of Mr. Morris's walks as any they generally shew viz. that Diversified Walk thro' the Lawn from the House to the first wood walk and which I insist on – It is the Proper way of a company being conducted, as by it you see the whole without traversing a foot of ground a second time and also the Views succeed one another in a grand series terminating with that most comprehensive and Beautifull Prospect from the temple on the Highest Spott of this Desmesne but as this has been a Place often mentioned to me as a Pattern of Disposition etc for a Romantic Brow with wood walks properly conveying you to seats which take in the finest Prospects or (scones) in the most favourable lights. I will go thro' with some account of methodically - the more so as I Perceive no one has as yet published an account of it. Mr. Youngs, in the six week tour being Deficient in his account of the Lawn and some other Particulars owing to the manner he was supposed to Enter them as he went at once to a Point of View he should not have seen till near the middle of this walk and by this means lost the winding Path thro' the Lawn or Park grounds as they soon will be. In most other things Particularly the Views from the Different seats he is very accurate in so much so that I shall Referr to him in most places for his Descriptions of the Views and strive to Excell him only in giving a general Idea of the grounds which I believe he spent but little time in – taking the Liberty (as I only write this for myself and my intimate friends) of Explaining my



meaning by References to two Places which I think Resemble Mr. Morris's more than any in the world, Ballyarthur and Hayesville. The House is (scituate) in a Lawn. (which surrounds two sides) and lies with respect to the great Glin in which Wey (*Wye*) Runs just as Hayesville, or Ballyarthur over their glinns but with this Difference that the ground rises up to the top of this glinne from the House at the glinside. On the other side of the House there is a gentle fall which forms a fine Lawn diversified with clump of small patches of woodland and in one spott lying open to a View of Chepstow beyond it the mouth of the Severn or King Road and on the other side of it Gloucestershire Beautifully Expanded to the Eye, this fine View of land and water seen as it is, apparently supported by an Immense chain of Rocks, Proudly Issuing from a thick growth of wood and Representing in Different Views the towers and Battlemented walls of a fortified Town. It is this View I say which dignifies Piercefield and Elevates it above any Place I have ever yett beheld – here then is the Difference in point of situation between Piercefield and Hayesville or Ballyarthur that the last Places have their Beauties chiefly or Rather solely at their glynne side – Ballyarthur Indeed has two glynnes but still the Beauties as I say are all on the glynne side. Now Piercefield beside its glynne has a fine waving Piece of ground as a Lawn Beautifully Diversified and what would be sufficient in itself to give the name of a fine situation could the House Boast no further appendage. I must observe that this Lawn lies Intirely on one side the house as Jones's field to Hayesville but the House is now going to be altered so as to front it to this Lawn and as this front will be of cutt stone and Elegant and looks over to the Severn and the prospect. I have before said it will of consequence make a fine figure in itself from those several points of View. The garden and offices lie at Present awkwardly between the House and glinne that's immediately at its Back but the offices are old and to be pulled down soon as the House is fronted and the ground on which they stand finely Dress'd so as to become part of a Piece of Pleasure ground to conduct you into the first wood walk just as the Part where our garden stands lies between the House and top of the wood. This Pleasure ground will only come as far as the side of the House divided from the Lawn, which will then be a Deer Park, by Iron Rails Ranging at their commencement with the new front of the House but sweeping towards the Park ground but, to go as I before said methodically thro' the Improvements I will take my Reader the Regular Path visiting those Parts I saw at five in the morning and afterwards in company with the Rest of our Party. Setting out then from the House you turn your back to the glin and front a fine champagne Vale spotted with single trees clumps, etc., This is all to be a Deerpark. The Walk thro' this is only a Path worn as by accident thro' the meadow but artfully conducting you to the most delightful Points of View where a seat under an old Oak or Elm invites you to sitt down and then feast your eye with some charming (scone) composed of this lawn and the wooded opposite Banks of the Wey (*Wye*) over which here and there you catch the Severn Prospect mentioned above. In another place the branches of trees thro' which you look as by accident Direct your Eye full on the town church steeple or Romantic old castle of Chepstow. These steeples castles and neat country towns are too scarce in Ireland to assist the generality of our Improvements and must ever give a superiority to the English ones. I was charmed with the contrast of this unaffected Path open to the Meadow and only made Dry and Firm with a little coarse

gravell or Poor Earth, these Paths thro' the meadows connected the walk in a more natural manner consequently more Pleasing than a still inclosed walk thro' a constant shrubbery would have done. Add that there is a greater contrast consequently a pleasing Variety between a walk thro' an open meadow leading you from one woodwalk to another than a shrubbery constantly attending which has too much the air of a low Wood in itself to contrast with a woodwalk, unless the wood be very old and closely overarched I know I have taken a very Round about way here to Express my meaning, but I was so pleased with this charming path thro' the Lawn that I think I can never be sufficiently strong in Expressing my sentiments of it. After passing as I before observed under the spreading Branches of single trees and thro' little clumps where you never faild meeting are open to some pleasing points of view the Path leads to a little gate which swinging on its Double Eyed Bottom Hinge shuts itself and opens Either way, as the company come in or go out. I mention this gate as being a very Proper one for the entrance into wood walk, shrubberies etc., Easily opened and always shutting themselves. They are constantly in use here. This gate brings you into a Close woodwalk chiefly of coppice Hazels which arch close (...) top and are from their Leaves and manner growing a very Pretty underwood for these sort of walks. The Path leads thro' a close wood till you find yourself in a little open with a windmill in the middle of it. This is only a mock windmill made in a spott where from its Hight you command a noble prospect of Monmouthshire and Gloucestershire and at the same time becomes a very pleasing object to the House just appearing over the little wood thro' which you approach it. I thought it an Exceeding good figure for an out Building on an Eminence – giving the Beholder many Pleasing Ideas – industry content health plenty etc., Perhaps if I may use the Expression it is the most animated building of Equall ornament can be thought of where small Expense Especially (is) to be bestowed – a gentleman with me said however that Mr. Morris shoud have made it a Dutch windmill which is much lighter and Prettier than those (seen) thro' this country – from Windmill Hill you Descend thro' a little Lawn into the wood again and still Descending come to the Point (of) the glin nearer Chepstow town, here is a sort or alcove seat which takes in the town, the castle etc., on the Right and on the left much such a View as at our Visto seat at Hayesville with this Difference that the glin does not lie so Extended from you but rather cross the Eye. I think not so pretty as with me but whin the tide is in Exceedingly Beautifull (...) a fine Lake of smooth water Hemmed Round with wooded Banks. When the tides out I saw it the first time Early in the morning. I never saw so nauseous a River muddy Bank. I believe sixty feet at Each side a Paultry Brook. On the whole I must say that as the Severn appears in most Views at the same time that you see the Wye, it would be much more Beautifull to have had the Wey (Wye) a mountain Rocky River such as we have in the county of Wicklow, but what is very Extraordinary is that there runs no such River or Brook here. They are all on the most muddy Bottom tho' their Banks above High water mark are Rocky beyond ours beyond conception Rocky up to their very tops. The trees seem to grow from the naked Rocks - from this seat which is indeed Beautifull beyond conception from that Variety and Beauty of the many objects it takes in amongst which I must not forgett a piece of ground on Mr. Morris' side the River stretched smoothly by the water between it and the wood Exactly resembling what we call George Manning's Bottom to Hayesville River.

From this seat the walks continue thro' wood lying to the House as the first Part of Ballyarthur woods adjoining Newbridge and much at the same Distance, this is the clearest way I can give an Idea of the Extent. The walk we took before thro' the Lawn (...) towards the House as a walk across Ballana woud to Ballyarthur the wood is merely coppice with here and there an old Reserve some very fine and old - views of the glin and River are Judiciously Excluded by the thickness of the coppice till the most favourable spots give them to you in full glory. Mr. Young has so well described them that I shall say no more but that you see here little more than the glynne and Huge tower like Rocks above it with coppice wood scattered amongst them which I find is common wood of the forest of Dean constantly cutt and as constantly springing up so its always very young but on such Steep Banks has an Effect good as the oldest woud have. I must observe that thro' the whole wood till you come to the other End of the walks near the cold Bath I mett no stream or Rivulet a great Imperfection tending to destroy the fine cool Effect the woods shoud have. Nor is there a Drop appears Running down the opposite Banks to the River as does with us at (Ballese), Tramullin and Rockstown. This also deprives the woods of the number of Hollies and aquatic Plants our woods produce in such abundance. I must also observe that the Rocks on Mr. Morris side viz. in the woods we walk thro' are not nearly so Beautifully Romantic as in my wood which for the extent of it I am convinced is as singularly adorn'd with rocks of a (...) Beauty as any I have ever seen. The Rocks at Piercefield are more (scald) and unadorn'd with Ivy and Tresses of Woodbine by nature than mine nor are the trees so odly growing out of them, one Rock which we meet with at the farr end of the Improvements excepted which I think most sublimely grand and at the same time Beautifully ornamented with Ivy and great trees growing on its Brow. The Rock on the other side the River on the other hand are more striking than any we see from Hayesville and Ballyarthur. They answer absolutely the Place of a fine town and a Huge Gothic castle or fortress

“Bosom'd High in Tufted Trees.” (*John Milton's L'Allegro*).

Here and there the wood walks lead thro' Part of the wood very old and great. The Huge oaks overgrown with Ivy are, on this steep Brow, the most sublime objects conceivable. I shoud be amazed at the growth of trees amidst such Rocks but that Examples in our own country had familiarized me to them however the fairest Beech I ever saw the greatest Ash and as fine Oak almost as I ever beheld grow on this Inaccessible Rocky Brow, in most Places but by the (single) walk made at great Expense I may say absolutely Inaccessible.

When you Rise up thro' a zigzag walk leading from that Part of the wood I mentioned youd ascended into from the alcove seat you find yourself in a sort of open wood or Lawn thickly spotted with old trees and some young Reserved in the clearing away the underwood which they are now doing for a strip about one Hundred yards following a sort of Bosom thro the wood which with the close coppices on either side and the many spotting trees will have a Beautifull Effect as I before observed at Lord Bathursts – but the trees here at Mr. Morris's are of a much better growth. It will cost a great deal of money making this little Lawn amidst the woods as there are stubborn Rocks here and there which must be smoothed in this kind of work a sort of Plain neatness being (the) Desired look of the ground in this Part of Improvement. It has so fine an Effect after a

close wood walk with Rough sides and stubbs of coppice wood to Enter a Piece of wood smooth as a Bowling green with all the advantage of shade at the same time that it should never be omitted when it can possible be made. The trees here may be in some places surrounded with Honeysuckle Roses if not too much shade and their Bases surrounded with wood flowers Periwinkle etc., these niceties woud not be proper in the more natural wood part. This Spotted Lawn or Irregular grove leads you towards the House and as the View of this Lawn with the house in it is very Beautifull from a Point of View near the House than the naturall wood of the top of the glin a Plantation is continued here from the natural wood which for greater contrast is of Evergreen trees and flowering Shrubbs which thrive surprisingly. The walk leads meandering thro' them from the glin to several Beautifull Points of View of the Lawn, house, Chepstow, and adjoining county. This shrubbery is fenced from the Lawn by a sunk trench and slight Iron work on the top of it. Uprights of Iron and strong wire Barrs, four of them. It is very Lasting and a neat fence. You wind thro this shrubbery till it Ends in a great screen of Spruce Firr confining the Eye to the Glin Prospect which is only lett in here and there thro' a fence which takes off the Horrors of the great Hight you are on after continuing the walk a time thro' this Plantation of Firr you Emerge at once into a circular Platform of well kept grass with a Parapett wall on the glin side and a gentle Slope on the other. This Platform affords a Prospect superior in Variety to any spott I ever beheld in any Improvement in England – on one hand the glinne shews in its utmost Beauty at a stupendous Depth Below you on the other hand the Lawn gently falls from you terminating with the windings of the Wey (Wye) and its entrance into the Severn which you View like a Lea held up by the great Rocks composing the Banks of the Wey (*Wye*) over which it appears Ready to pour and fill up the Great Glynne of the Wey (*Wye*), higher than which it seems to stand at least fifty yards tho' reason tells us it must be on a Dead Level as the mouth of the Wey (Wye) opens into it. This Deception has an amazing fine Effect for tho the Severn seems so high above the Wey (*Wye*) as to strike with wonder it is sufficiently under the spectator to appear in a natural bed for water to lie in. It does not appear at all unnatural but increases the apparent Depth of the Glin. At the glinside to left of the Plattform as you stand looking towards the glynne the glin widens into a circular form Inclosing a Piece of ground I believe about an hundred acres gently swelling up from the water which surrounds it to the middle where a farm house is Built as this seems absolutely Inaccessible but from the spott where you see the Road leading to the farm house mentioned the Rest being surrounded by Immense Precipices covered with wood and the River at Bottom. It appears the most Delicious Retreat the most unaccountable little country of a total Different Species from what surrounds it and so Beautifully cultivated in itself as presents, I think, a View I never beheld elsewhere. There are between thirty and forty Inclosures on this farm, the Hedges neatly kept, the Hedgerows in some places fine, in other fields scattering trees. Everything seems growing on it that are to be mett elsewhere in Different Places. There were fields of Wheat, Barley, Oats, Meadow Pasture, two Orchards, farmyards, gardens, a Piece of Old Wood for House etc., use, two little coppices and all as I observed before secluded from the Rest of the World by undoubtedly a chain of the greatest Precipices I Ever saw. Mr. Morris ground winding Round about a third of it. It is such an Extraordinary thing to occur in a glinne that none

behold it without amazement joind to Pleasure. To give an Idea of the way it (lies) by a small spot compared to it, the Rocks and River Run Round it as (Ticlash) and Rockstown and the River surround what we call Slaney's Vale at Hayesville. Mr. Morris differing in the (scite) of the River which Runs between him and this Vale. I know not what Properly to call it for it swells up in the middle to what would be call'd a Gentle Hill if it stood in a Plain but the mountainous sides which surround it are so much higher as to give it from them the appearance of a Valley. It is remarkable well cultivated and has every convenience within itself as I before observed. When you have sufficiently admired if ought can be called sufficient admiration of this delightfull (scone) on either Hand, you Enter a small gate opposite the gate which brought you out of the walk screen'd of the Park side with thriving spruce firr about 20 year old. The Path winds thro a natural coppice wood on the steep brow and comes pretty soon to an Immense Beech on the very Edge of the Precipice. This Huge spreading monarch of the wood is I believe 12 feet circumference which girth it carries up a great way for such a tree and then Branches out into one of the most perfect and ample heads I Ever saw on any old tree in my life. The ground is Dress'd behind him very smooth. Far as his Branches extend the wood and all Lumber has been cleared away and to the other side of him viz the glin there is a small platform made with Iron Rails or rather one hand Rail and supported at about 4 feet Distance painted green so as to take away terror but give the sublime prospect in all its grandeur. The seat is formed Round the Body of the tree about twenty yards or more from this tree still higher on the Bank behind him stands the trunk of an Oak nearly as large as I Ever saw but the Head has been disfigured by time, lopping etc. These two trees prove that some soils in the midst of apparently continued Rocks will produce Huge timber when other soils to the Eye much freer and Easier penetrated by the Roots will not produce an Oak of any Bulk. Witness the soil Round Cirencester – the View from the Beech is a still plainer prospect of the Valley farm etc., but nothing towards the Park side nor do you from Hence to a small light temple on the Very Extreme and Highest corner of the Demesne see any part of Mr. Morris ground but various Views of the Glinne and farm continuing the walk about the mid Hight or rather Higher of the glin side the River under you of the Right and Rocks wooded over you at the left, Resembling our WoodWalks at Hayesville but the coppice young as at Ballytrasna and the Rocks of a coarser kind and a great Dryness Prevailing which tho it keeps the Walks free from the (...) I am at with the Exuberant springs Renders the sides not so productive of herbs flowers, etc. which are a constant attendant on Irriguous Banks, you pass by a little Plattform seemingly hollowed from the steep Bank above you ( ... ) a collection of greenhouse plants brought here for the summer season and as the wildness of the glin and Rocks is here shut out, it makes a Pretty contrast from mere nature to the artificial productions of a GreenHouse and perhaps makes both Places in their turn more acceptable. After Passing several seats in Beautiful (Scituations) you arrive at one of the finest Rocks I Ever saw seemingly a single one I believe thirty or forty feet High overgrown with Huge Ivy to the front is a Plattform with gothic Battlements and a few cannon Planted which have a fine Effect here like thunder Rolling thro the winding Glinnes. The walk seems at an end and you are tempted to (enter) the cavern open to you in this Immense Rock here. Here evrything appears Rude and only the work of Nature,



and being tempted still to trace this Cavern for it will suffer you to penetrate amidst its Rocky Chambers you find your way out at the other side and the walk unexpectedly continues. It was all Excavated by Art and is the finest work in a Romantic Improvement such as Mr. Morris's that I Ever mett with worth an Hundred Grecian temples and other (...) which all who are used to the Expensive artificial Improvements round London are continually crying out for at Mr. Morris's. This Rock in point of simple grandeur and a sort of Horrid sublime Roughness as it is the glory of Mr. Morris' woodwalks so I believe Equalls any in the walks at Hayesville but for Picturesque Beauty and fortunate assemblage of circumstances meeting in one rock it must I think yield to mine, as it Runs up perpendicular, mine overhangs. It is Rude whitish stone at its Base, mine is broke into an hundred odd Irregularities overrun with Stone Plants add that the Ivy Running up Mr. Morris' Rock as up a wall has not that Beautifull effect which the overhanging of mine gives viz. the Ivy and Woodbine falling in tresses from its top – in Mr. Morris's sevrall shrubby trees Run to great Hight on the top of the Rock where I believe it meets the Brow of the Hill, on mine a single Oak growing from the Rock remarkably straight and Evidently detached from the Bank crowning the whole in a manner I say from conviction not prejudice that I never yet saw – but then on the other hand this fine cavern or natural grotto as it appears in Mr. Morris's is fine beyond measure and shewd as Bold a spirit in undertaking and Executing as good taste in the Designer. After this Rock there is nothing Remarkable in the walks, which I must observe are all a sort of coarse gravell with some sand thrown over it – till you Descend to a sort of Valley in the wood where first you meet a little stream of water following which you come to a sequesterd Little Plain in the middle of which stands the cold Bath\* an Excellent one but for a sky light just over the water a way that a Bath should never be lighted as that tends to heat the water but in answer to that I must observe that the water seems only lett in the House before you bath or less time as it is a good Stream which supplies the Bath lett into it from three or four little stone troughs through which it runs always filling up to the top before it gets out. In any (park) this to prevent the mudd, gravel etc., which runs in the Bottom of the Stream getting into the Bath. From the Bath you ascend a winding Road on the steep Brow made with great difficulty and vast Expense for a carriage Road from the House to (...) It is steeper and worse than from Ballyarthur to the River but winds more.

\*Memorandum. Here I could have an Excellent (...) Bath just on the (...) the water might be so contrived as to run constantly by the side of the Bath and lett in as I pleased in to the Bath. The Stream in passing from the House might fall in a very Pretty Cascade if artfully managed with Laurel etc., to hide the coming out of the House or rather the side of the House might be so built of Rough half moulded stone as to Represent a Rock. The water then in coming out of the House might gett such a turn as to fall fronting our Land and not sideways to it which would have a very pretty Effect – or it might fall from the End and a seat could be contrived under a tree in the wood which woud command a pretty full view of in this case the End only (might be....).

## Tree Planting in Ireland During Four Centuries

By A. C. Forbes

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In a previous paper<sup>1</sup> the probable history of forests in Ireland was sketched down to the end of the seventeenth century. It was suggested that this period marked the conclusion of a long process of destruction or exploitation which commenced in prehistoric times, and has been in operation down to the present day. The object of this paper is the gathering together of records, from the seventeenth century onwards, of the various steps taken to make good some of the loss incurred, and which have led to the present appearance of most parts of the country as regards woods and trees.

One of the earliest references to planting in a general way in Ireland is found in *Ordinances for the Government of Ireland*, issued in 1534.<sup>2</sup> It was "enjoynd that every husbände having a plough within the Englishe pale shall sette by the year 12 ashes in the ditches and closes of his farme upon payne of 2d to be forfyte to the Deputy." Whether this injunction was observed or not cannot be proved. It certainly shows, however, the scarcity of timber at that time. The specification of ash is also interesting, as the area covered by the Pale is naturally rich in this species, and if the planting of it was necessary, the country must have been practically denuded of native woodland.

In Petty's *Political Anatomy of Ireland*, published in 1672, the planting of 3,000,000 timber trees was advocated, which were to be on the bounds and meares of every denomination of lands, and estimated to cost 3d. each, or a total of £360,000.

There does not appear to be any direct evidence, positive or negative, as to the extent to which the above proposals were put into practice. They were probably recommendations made without any consideration of the difficulties which might arise in carrying them out, but as already stated, they show clearly enough that the country during the sixteenth and seventeenth centuries was extremely bare of trees, leaving out of account altogether anything in the nature of woods.

It is, of course, impossible to fix any precise date for what is popularly known as "re-afforestation". The operation of pulling up a seedling, carrying it to a chosen site, and again fixing it in the soil, is so simple, that it may have been, and to a certain extent probably was, practised in the Bronze Age. But before this practice could become at all general, protection of the planted tree must have been assured, and this was only possible in some corner or patch of ground fenced against grazing animals, whether wild or

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1. *Some Legendary and Historical References to Irish Woods and their Significance*, Proc. R.I.A., Vol. xli, Sect. B.

2. *State Papers (Ireland)*, 1515-38.

domesticated. Settlement in some form or other must therefore have preceded tree planting or the cultivation of crops, and that is as far as one can state with any certainty. The more immediate question is: When did settlement and the relative permanency of land occupation advance sufficiently far for planting to be regarded as a reasonable undertaking? So long as native trees abounded all over the country, there was little or no incentive to add to their number by planting, and this alone hindered the development of the work. But by the twelfth century, the Church had more or less permanently created enclosures in many spots throughout Ireland, and it is in these places that we must look for the first faint indications of that branch of rural economy, which we now call "arboriculture."

It is, perhaps, not inappropriate to note, so soon after the arrival of St. Patrick in this country has been celebrated, that the Saint is credited with having planted a yew tree on the spot now known as Newry. This incident is recorded in *The Annals of the Four Masters* as follows: – 1162 – "The monastery of the monks at *Iubhar chinn trechta* was burned, with all its furniture and books, and also the yew tree which St. Patrick himself had planted." Whether St. Patrick was ever at Newry is not clear, but the official seal of the monastery represents a mitred abbot in his albe, sitting in a chair supported by two yew trees. The monastery is also described in old records as *Monasterium de viride ligno* and the word Newry is undoubtably connected with yew. In connection with this incident, a statement made by Harris in his *Co. Down*, published in 1744<sup>3</sup>, is not without interest. This statement is as follows: – "In the year 1688, certain English soldiers, in burying their dead, discovered in the S.E. corner of the Abbey (*Newry*) the stumps of some trees of fine wood, and without regard to the place, sawed up and converted them to several domestic utensils, the wood being red and of a fine polish." Whether these stumps were the remains of the two yew trees represented on the official seal, it is impossible to say.

In a fourteenth century copy of *Topographia Hiberniae* it is stated: "Yew is commonly planted in cemeteries and for ornament." This statement leads one to speculate on the antiquity of the old avenues, walks, and single trees of yew still found in the immediate vicinity of ruined abbeys and monastic sites scattered throughout Ireland. The largest yew in the country is at Maynooth, and measures 18 feet in circumference at 4½ feet from the ground. This tree is credited with having sheltered "Silken Thomas" the night before he left Maynooth to join the Desmond rebellion. From its position, it is not likely to have been planted before the College came into existence in 1513, but tradition ascribes the planting to Maurice Fitzgerald in the twelfth century.

The avenues and rows of yews scattered throughout the country, and too numerous to mention, clearly indicate their origin by planting. The old yew at Crom Castle is undoubtedly a planted tree, and according to the Rev. Wm. Henry, the author of *Upper Lough Erne in 1739*, dates from about 1670. This tree is popularly regarded as of fabulous age, but neither its size nor appearance justifies this assumption. The authority quoted above gives its dimensions as follows: – Straight stem for about 10 feet, horizontal branches with a diameter of 75 feet. In the O.S. Survey Memoirs of 1835, Lieut. Durnford described it much as it is to-day. Johns in *Forest Trees of Great Britain*,

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3. *The Antient and Present State of the County of Down*, 1744. [17\*]

published about 1845, records it as being 8 feet in height and 3 feet in diameter – branches 75 feet in diameter. The Earl of Erne described this tree in Vol. II of the *Ulster Journal of Archaeology* in 1896. It was then 25 feet in height, 12 feet in girth, and the branches 77½ feet in diameter from North to South, and 70 feet from East to West, and the writer adds: "There is no authentic record of its age, but I have heard a tradition that an O'Neill, who was attainted in the reign of Queen Elizabeth, took leave of his ladye love under 'the old yew' at Crom." This tree is now (1932) of exactly the same dimensions as in 1896, and if Johns's measurement is correct, increased 3 feet in girth between 1845 and that year, or an increase in radius of 6 inches in 50 years. The question of interest is the probability of this tree being older than the date assigned, viz., 1670. This date is also that of the accidental burning of the old castle, and suggests a plausible theory. After the castle was burnt, the ground surrounding was maintained as a kind of rough garden, and it is quite possible that the existing tree was planted as the successor to one previously there in the time of Elizabeth. It is planted on an artificial mound which would encourage rapid growth, but the position of this mound has no obvious relation to surrounding objects. The interest taken in the tree to-day is not connected with its age, but with the fact that the branches are supported on posts which give it an imposing appearance. There is also fairly clear proof that the branches were artificially interwoven or tied down to form a canopy or roof, below which a walk followed the base of the mound. Under these conditions the tree might easily have been brought to its present condition in the 260 years assigned by the authority first quoted, although it certainly looks older.

Another "ecclesiastical" yew is the well-known tree at Muckcross Abbey which measures 9 foot 6 inches at 4½ feet from the ground, as measured by Major Phelps recently. This tree is the exact opposite of the Crom Castle yew, having been pruned up to a height of nearly 20 feet before the branches were allowed to spread. The planting is ascribed to the fifteenth century (1440) by the author of a *Tour in Ireland*, published anonymously in 1775, and to the founding of the Priory (1483) by the author of *The Compleat Irish Traveller*, published in 1788. This would make it between 400 and 500 years of age. Most of the descriptions and measurements of this tree are evidently copied from previous writers, and the recorded girth varies by 2 or 3 feet in the course of a few years. Arthur Young described it as the most prodigious yew tree he ever beheld and 2 feet in diameter!

The yews at Youghal, under which Sir Walter Raleigh is said to have smoked, are comparatively small, and certainly do not look their reputed age. Many other old yews and yew walks could be quoted if space permitted, but all indicating that the oldest *planted* trees existing to-day are of this species, and practically all are within the protecting influence of the Church, or a fortified residence of the past. They possibly go back 500 or 600 years, but the proof of this antiquity is lacking, and their exact age must be left to imagination.

Another tree (if that term can be applied to it) of great antiquity is the old Mulberry in Trinity College, stated to go back to the time of the monks of All St. Hallows. Dr. E. J. Gwynn has been good enough to furnish an extract from Provost MacDonnell's Inventory of Trinity made in 1860. This extract is as follows: –

"The foregoing plates (drawings of a table made out of different kinds of wood) derive their principal interest from that portion which is marked mulberry. It represents part of a mulberry tree which stood, and of which a part still stands in the Provost's lawn. The tradition is that that lawn is part of the garden of the old Monastick Establishment of All St. Hallows on the site of which the College was built.

"The mulberry tree consisted of three main branches springing from a common stem—The three branches existed when I was an under-graduate—One of them was wrenched off in the great storm of Christmas 1839, and a second in the remarkably curious storm of April 1850 during the Bursarship of Dr. Luby and the Provostship of Dr. Sadleir—From Dr. Sadleir both when he was a Senior Fellow and when he became Provost I often heard the following account which he said that he had from Dr. Barrett—Dr. Barrett told him that about 150 years before ('before' I suppose means before the time of his mentioning the circumstance to Dr. Sadleir) there had been an investigation as to the age of that Tree and that Evidence had then been laid before the Board showing that it was then at least 300 years old — and that an Entry of such investigation was made in the College Registry—Dr. Barrett died in 1821—Supposing the communication by him to Dr. Sadleir to have been made by him even so late as 1820 then add 40 to 450 and it will make the present age 490. So far all well—but I searched the Registry so fully for the said entry and in vain that I am satisfied that there is none such in the College Registry. Meaning by *that name* the official Book in which are recorded the acts and decision of the Board — Dr. Sadleir had never taken the trouble of searching the Registry for the matter — I did when I was Registrar—Now as to the accuracy of Dr. Barrett's memory there can be no question, and I presume that what Dr. Sadleir heard from him was that it was registered, meaning thereby that there had been a memorandum made of it in some other College Books — such as one of the Bursar's, or Senior Lecturer's books —

"As I believe that I am the only or almost the only person alive who had this communication, by only one stage removed from Dr. Barrett, I have thought it right to enter this memorandum of what I had heard.

"Few persons have searched through more College records than myself.

Richard MacDonnell,  
Provost Trin. College,  
May 21, 1860."

The vitality of this particular tree may be attributed to the fact that it repeatedly layers itself where the branches touch the ground, and this has apparently been assisted by covering the branches with earth from time to time. As regards its age, the efforts of James I to encourage silk-worm culture between 1605 and 1610 may have some bearing on the question. In 1607 one William Shellinge was granted a licence for 21 years to print a book called *Instructions for the planting and increase of mulberry trees, breeding of silkworms, and making of silk*, and in January of that year James I wrote to the Deputy Lieutenants of Counties to require landowners to purchase and plant 10,000 mulberry trees which would be delivered to purchasers in the March or April following at the rate of six shillings the hundred. Possibly the Trinity tree was one of the 10,000. The white mulberry is said to have been introduced in 1596, and the black variety in 1537 or 1548, so that the age of the Trinity mulberry is possibly less than 400 years at the present time. King James' efforts do not appear to have led to any permanent results, for we find W. Shellinge in 1611 asking for instructions about the nursery of mulberry plants he had



established at Westminster, and which had apparently become more or less a 'white elephant'.

Another tree, alleged to have been planted by St. Maelruain at Tallacht, may be mentioned in this connection. If this legend were in accordance with facts, it would make it the oldest tree in Ireland, as the Saint was living in the eighth century. An interesting point is the question whether it is one or two trees. Dr. Handcock, who wrote a little history of Tallacht in 1899, states "It looks like two trees arising from one stem, but it was originally one stem of about 10 foot in height, dividing into two branches, which, towards the end of the last century, separated about 5 feet from the ground." With due respect to Dr. Handcock, however, there is little doubt that there are either two trees, or one which has divided at or near ground level. One tree or arm was laid flat on the ground, and the other leans in the opposite direction at an angle of about 45 degrees. Neither of these trees or arms is much more than 12 feet in girth, and a single tree, which has been severely pruned, standing a few yards away, and apparently of the same age, is 11 feet 9 inches at breast-height. A liberal estimate of their ages would be about 300 years, which would roughly correspond to the earliest mention of walnuts elsewhere. The double tree was sketched about 1875 by Henry O'Neill, and is reproduced in O'Hanlon's *Lives of the Irish Saints*, but no measurement is given. The trees are in perfect health, and bear sound nuts more or less annually.

Apart from the examples referred to above, instances of extreme age in trees of artificial origin are very few: Harris, already referred to; Hayes, who wrote his interesting book *On Planting* in 1795; and various authors of "Tours" have all left records of trees which were undoubtedly of artificial origin before 1700, but the majority of these have disappeared. A few, however, still remain, and may be specifically mentioned. But perhaps, the most interesting, as showing the connection of the Church with tree planting, are the trees in the episcopal grounds at Kilmore, Co. Cavan. These are referred to by the Rev. Wm. Henry<sup>4</sup> in the following words:—"Between this garden and the south-west corner of the house, stands a venerable grove of sycamores, planted an hundred years ago by Bishop Bedell, the largest of them stands in the middle of the terrace, and from thence spreading its boughs into the churchyard, shades its planter's tomb." The same author refers to "large fir near an hundred years old" hanging over the lake at Castle Hamilton, and an avenue "shaded with large trees of an hundred years old." The phrase "one hundred years" is apparently a figure of speech, and must not be taken too literally.

In Harris's *Co. Down* several trees are mentioned which must have been planted by or before 1700. These were an evergreen oak at Bangor, and Robinia and Pinaster at Moira, all in or about their fiftieth year when recorded. The owner of Moira sent his gardener, James Harlow, to Jamaica for plants in 1694, but whether these were intended for the open air or not is left in doubt. An old walnut reputed to be 300 years old was reported by Dubordieu<sup>5</sup> in 1811 at the Maze in the same county.

In Smith's *History of Waterford*, published about 1750, no definite record of trees

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4. *Op. cit.*

5. *Statistical Survey of Down*, 1802.

being planted before 1700 is made, except the cherries at Affane planted by Sir Walter Raleigh, but introduced trees appear to have been planted very early at Tooreen and Ballyntaylor, elms, walnuts, and Newfoundland spruce being mentioned. In the same author's *History of Cork* (1750) a large fir brought from Newfoundland is mentioned at Ballyvirgone near Youghal, and a "Liquorice" tree. At Mount Uniacke, there were Cypress and Plane, and at Aghada an *Arbor-vitae*, 15 inches in diameter and 30 feet high. At Carrigrohin was a large sycamore with "branches 90 feet round, thickness of body very great." In his *History of Kerry* (1756), Smith states there were very few plantations in the county, either for use or ornament. He suspects that many of the trees round Muckcross were "laid" there by the monks of the adjacent abbeys. Near Castlemaine there was a "large apple tree, 50 feet spread, could shelter 72 horses." Near Ballybeggan were fine avenues of walnuts, chestnut, and other trees" which had escaped the universal devastation of the times." Some of these are now or were in existence a few years ago.

Pocock's *Tour in Ireland*, made in 1725, refers to a plantation of "20,000 firris on the south of Cool-na-Mucky which thrive much." He also refers to "firris" at Drummana. C-Loveday's *Diary of a Tour Through Ireland in 1732* has the following in reference to Thomastown, the seat of Geo. Matthews near Cashel : — "It is supposed there are more improvements in Planting at ye seat than anywhere else in Ireland. Large plantations of Fir." These, together with Henry's record on Lough Erne, are the earliest references to fir trees met with, and were probably Scots pine.

Loudon, in his great work, *Arboretum et Fruticetum*, published about 1835, makes occasional reference to trees of commendable age and probably introduced before 1700, but much of his information is second-hand. One of the most interesting is that of the Summerstown cork oak, growing near Cork, an appropriate location. The owner of this tree introduced a clause in the lease of the land imposing a penalty of £20 if the tree were cut down or injured. This interesting specimen, of which a full account is given in the *Journal of the Cork Historical and Archaeological Society* for September, 1893, died about 1850. It was then 10 feet 6 inches in girth at 3 feet from the ground, and 30 feet high. An English elm at Howth Castle was stated to be 250 years old, but the authority for this is not given.

Arthur Young's Tour was made in 1776-9, and his notes are chiefly valuable in showing the almost universal youth of plantations throughout the country. The oldest trees he notes were usually under 50 years of age. These will be dealt with later.

Hayes' book *On Planting* is not only of great interest, but is remarkable as being the first book devoted to the subject in Ireland. He was an ancestor of the late Charles Stewart Parnell, and owned the estate of which the demesne is now the Avondale Experimental Forestry Station. In addition to many interesting statements on native trees Hayes mentions several which must have been planted a century before his book appeared. A sycamore between Rathdrum and Shillelagh was 15 feet in girth and the largest he ever saw, the next largest being two at Kilmacurra, the larger of which was blown down only a few years ago. One still standing is 16 feet in girth. At Dunganstown, an old avenue of Spanish chestnuts of 110 years of age was standing in 1793, when it was felled on account of decay. The largest were then from 14 to 16.6 feet in girth. A silver fir at Mount Ussher was 100 feet high and 12 feet in girth. A cherry at Clonmannon

measured 15 feet and 5 feet from the ground, and must have been one of the largest in the British Isles. The great Elm at St. Wolstan's, blown down in the winter of 1776, was regarded by Hayes as the largest tree of its kind in the world, but unfortunately he does not indicate the species. From its exceptional size, 38 feet 6 inches in girth, it was probably the Wych elm, and tradition supposed it to have been planted by the monks of St. Wolstan's before the Dissolution. It may have been of natural origin. Other trees are mentioned, but were probably planted in the following century. Hayes does not mention two trees which are now of exceptional interest. These are the big Spanish chestnut at Rosanna, the largest tree in Ireland, and now 30 feet in girth, at 4½ feet, and the evergreen oak at Courtown. Both these places were visited by Hayes, and it is obvious that they had then attained no great size, or he would have mentioned them. In connection with the latter, which is a wide-spreading tree with many branches near the ground, a statement was made by Lord Courtown to the late H. J. Elwes in which he attributed the planting of this tree to as early a date as 1648. The probability is that it is younger, although this does not detract from its remarkable character. The Rosanna chestnut is probably about 200 years old.

The Statistical and Agricultural Surveys of Irish counties, carried out for the Royal Dublin Society about 1880, furnish a good deal of information about early tree planting, but unfortunately many of the reporters had a limited knowledge of trees, and were unable to discriminate between those worth recording and disregarding. These reports were filled up with any information which owners liked to give, while they missed a good deal of value from an arboricultural point of view. The two best reports in this connection are probably those for Kilkenny by Wm. Tighe, and for Galway and Clare by Hely Dutton. Most of the information refers to the eighteenth century, but an avenue of elms is reported by Tighe at Rosenarra, planted to commemorate King William's visit in 1690. He also mentions oak planted in 1700. Dutton's *Survey of Galway* mentions an immense "pinaster" brought to Killeen by Porter, one of Cromwell's soldiers, and also a large Scotch pine near it, said to have been planted at the same time. As Dutton imagined the bogs to be full of "pinaster," both trees were possibly Scots pine (*Pinus Sylvestris*).

Amongst other trees which probably date back to 1700 or before are Spanish chestnuts at Kilruddery, Powerscourt, Shelton Abbey, Burton Hall, and other places, and it is quite evident that the planting of avenues and single trees was going on from about 1650, and even before the country had become really settled. Woods and plantations of artificial origin must have been rare in this century, for reasons which are fairly obvious.

The species introduced before the end of the seventeenth century were apparently the pine (*P. sylvestris*), Stone Pine (*P. pinea*), English and Dutch elms, Spanish chestnut, lime, walnut, hornbeam, sycamore, evergreen oak, plane, robinia, and mulberry. Some doubt exists as to when the beech was introduced into Ireland. Hayes states that the earliest trees were planted at Shelton Abbey, and Wakefield<sup>6</sup> writes under date June 10th, 1809, "Lord Wicklow has near his house eight beech trees which were planted a century ago round a bowling green, and are now 11·6 ft. in circumference. A Spanish Chestnut is 17 ft. but scarcely 6 feet high where it branched." Hayes believed the seeds from these

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6. *An Account of Ireland Statistical and Political*, 1812.

beech trees were distributed over Ireland. If this is so, the spread of the species throughout Ireland must have been very rapid, and it is singular that one of the commonest trees in England should not have found its way here before the *Robinia* from N. America, or the Stone Pine, evergreen oak, or walnut from the Mediterranean region. A very old beech is recorded in Mason's *Parochial Survey* at Maghera in 1798, and in Lady Chatterton's *South of Ireland* she refers to majestic beech trees at Caha and Lord Bantry's in 1839. A letter from Dr. Molyneux, F.R.S., to the Rev. St. George, Lord Bishop of Clogher, is published as an appendix to Boate's *Natural History of Ireland*, describing swarms of cockchafers infesting some parts of Connaught at the end of the seventeenth century. The letter states "At Eyre Court, they did great damage to a well improved English plantation, and stripped the hedges, gardens, and groves of beech in 1697."

The Hornbeam is also a tree for which no definite date of introduction can be found. It is not a favourite with tree planters, but was certainly introduced before 1700, probably for hedges, as these are mentioned as having been planted by Bishop Bedell at Kilmore. The fine trees at Headfort, the largest of which is nearly 20 feet in girth, probably date from about this period.

The reintroduction of the pine is, of course, open to doubt. It may have survived as a native tree long enough to have been artificially propagated in nurseries, but the term "Scotch fir" universally applied to this tree rather throws doubt on the idea. There are several references to native pines existing at Cool-na-muck near Carrick-on-Suir about 1750, but the identity of the trees is doubtful.

Another tree whose introduction into Ireland is of rather doubtful date is the Lebanon cedar. Loudon asserts that the oldest in the country in 1830 were at Mount Anville, near Dundrum, and were brought there by an ancestor of Lord Trimlestown, but the date is not given. What are presumably the trees referred to are still standing, and the largest of these was measured by the late Professor Henry in 1904, and was then 14 feet 6 inches in girth. This tree is now 16 feet 7 inches at 2 feet from the ground. Equally fine trees exist at Carton, and still finer at Castle Forbes, which were planted about 1730. The largest, if not the oldest, Lebanon cedar was probably at Castletown, which in 1830 had a girth of 13 feet at 1 foot from ground and a clear stem of 30 feet. This tree was blown down some years ago. All the evidence available tends to show that this species was introduced into Ireland shortly after 1700, although it was brought into England in 1683. Many of the Carton trees could not have been planted before 1739, and probably not until 1750, as the demesne was only being laid out about that time.

Other records which are not very definite as to actual operations are those quoted by Gilbert in his *History of Dublin*. In 1664 sycamores *were* to be planted in building plots adjoining Stephen's Green (for what purpose is not stated). In 1669-70 lime trees *were* to be sold at reasonable rates in large quantities, and in 1671 elms and sycamores *were* to be planted between the bowling green and the Liffey at Oxmantown. Whether these directions were carried out is not known.

But before the close of the seventeenth century the inadequacy of planting operations to make good the losses of many centuries of waste and exploitation had attracted attention in Government circles, and in the tenth year of William III (1698), an Act was

passed entitled *An Act for Planting and Preserving Timber Trees and Woods*. This Act provided that all resident free-holders having estates of the annual value of £10, or tenants paying rents of the same amount, should plant 10 trees of ash, oak, elm, fir, or other timber trees each year for a period of 31 years, and that owners of ironworks should plant 500 trees yearly as long as these works were going. Occupiers of 500 Irish acres were required to enclose and plant one acre, and preserve the same for 20 years. All other land-owners were required to plant their proportion of the total of 260,600 trees laid down as the annual number for the whole country during a period of 31 years. In the fifth year of Queen Anne (1705) an amending Act was passed on similar lines, the chief point of interest being the extension of the list of trees by the addition of walnut, poplar, abele, and alder. This Act also substituted holdings of 30 acres for the £10 valuation laid down in the first Act. In these lists, the omission of beech and Spanish chestnut is peculiar.

It is generally assumed that these Acts produced few or no results, but it is impossible to prove this. At least one parish in Co. Down agreed to carry out the Act, for it is recorded in the parochial records of the parish of Seagoe that a vestry was held on March 9th, 1708, and it was agreed that 137 persons, holders of 30 acres each, should carry out the provisions of the Act.<sup>7</sup> This was probably not the only case in Ireland, but it shows how bare much of the country had become by that time to render action of this kind necessary.

But a great change in the wooded condition of Ireland was impending. In many respects the eighteenth century must have been Ireland's "planting age." Whether viewed from the political, social, or economic standpoint, the progress made throughout the country in rural matters was enormous, but the one feature of interest here is that relating to the development or laying out of demesnes. To trace this movement to its source it is necessary to dip into the general history of the country, as unless this is done the picture remains incomplete.

The original land divisions of ancient Ireland are stated by Keating and various later authorities to have been three in number, namely: – the *trica ced*, the *bailiebetagh*, and the *ploughland*. The *trica ced* is supposed to have contained thirty *bailiebetaghs*, and the *bailiebetagh* twelve *ploughlands*. The history of the first named has been exhaustively dealt with by Professor James Hogan,<sup>8</sup> who came to the conclusion that this division was based on some military organisation, more or less common to many parts of Europe. The *trica ced* corresponded roughly to the Norman *cantred* and the existing *barony*. The *ploughland* and the modern *townland* also appear to have had some common origin. But of the *bailiebetagh* no trace remains. The term itself means literally the place or land of the *betagh*, but who or what the *betagh* was no clear explanation can be found. Joyce<sup>9</sup> defines the word as "public victualler," Hardiman<sup>10</sup> as some official whose duties comprised entertainment of the chief or some other functionary. Donovan, in a footnote

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7. *Kilkenny Arch. Soc.*, Vol. 16, 1883-84.

8. *The Tricha Cet and Related Land Measures*, Proc. R.I. A., Vol. xxxviii, C.

9. *Irish Names of Places*, 1895.

10. *Statute of Kilkenny*, Ir. Arch. Soc., 1843.

to the *Four Masters*, interprets the term as applying to a farmer or landowner possessing one hundred head of all kinds of stock. Other definitions are equally vague and uncertain, and all that can be gathered from them is that the betagh was an individual of some importance, and holding approximately from three thousand to four thousand acres of land. Hogan believes that the bailiebetagh was a development from the ancient hundred, and supplied its quota of one hundred men to the military strength of the community. He connotes it with the Gaulish "pagus", the Latin "centuria", and the Welsh "cantref".

While no new theory regarding the bailiebetagh can be advanced here, it might be suggested that the existence in Ireland of two territorial divisions having a common origin in Europe at a very remote period might indicate that the bailiebetagh bore some relation to the manor, which was a universal feature in Saxon times, and survived the Norman occupation in England. When the Normans occupied Ireland, or at least parts of it, the bailiebetagh possibly disappeared through no convenient means being found by the newcomers for retaining it as part of their organisation. The *trica ced* or *cantred* was large enough to be handed over to barons or nobles, the ploughland was too small a division to be interfered with, but the bailiebetagh or the individual occupying it possibly disappeared with the functions it or he previously carried out. This is merely a suggestion put forward without any evidence to support it, and must be taken for what it is worth.

In connection with this particular subject an interesting point arises as to the period during which this ancient system of land-division reached its full development. Professor McNeill<sup>11</sup> states that the evidence points to the seventh and eighth centuries as a time of very great agricultural development, when much of the fertile land began to be partitioned among holders and fenced off for the first time. If this was the case, the diffused character of the rural population of Ireland can be accounted for. This diffusion lies at the root of many land problems of the present day, and has a very close connection with the early de-afforestation of the country, and the difficulties connected with its re-afforestation at the present day.

The Norman invasion does not appear to have interfered with the ancient ploughland distribution, but lands occupied by the native chiefs were transferred to the new-comers, and on these, Norman castles made their appearance, while the officials and retainers attached to these erections occupied the land round about. Possibly the "vills" on these lands were not greatly interfered with, but the occupants or "betagii," as they were subsequently termed, who remained, had to render services of various kinds to the new-comers. Monastic institutions also occupied a prominent place in the distribution made by the new landowners, and under Norman rule increased their possessions in many parts of the Country. Many of these Norman castles and Church lands formed the *nuclei* of what are now termed demesnes, but the probability is they were never developed by any high state of cultivation or process of enclosure, and only differed from the remainder of the country through their occupation by retainers or officials of the ruling powers. The country was never settled sufficiently long to encourage what we should

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11. *Ancient Irish Law*, Proc. R.I.A., Vol. xxxvi, C.



now call permanent improvement, and it is practically certain that tree planting did not interest anyone in a country still full of scrub and scattered trees, and which supplied all that was required for fuel and building purposes. The Elizabethan wars and Cromwellian disturbances during the sixteenth and seventeenth centuries maintained the country in perpetual unrest, and land improvement must have played a very small part in the rural economy of the country.

The extent to which modern manors were created after the Norman invasion of Ireland has always been an interesting problem. The word "manor" enters into various grants and patents, and from the days of Henry II down to those of Queen Anne it would appear that all land granted by the Crown was held under the forms and conditions of the manorial system, either by Knight's service, fee farm grant, or common soccage. But the large areas of land usually comprised in these manorial grants render it doubtful if the Irish manor was an exact counterpart of that existing in England down to a comparatively recent period. As an example of the Irish grants referred to as "manors," two may be quoted from the State papers of the seventeenth century. In 1619 a patent was granted to William Parsons, Surveyor General of Ireland, of land in Cavan, Leitrim, Tyrone, Wexford, and Wicklow and which together formed three manors, containing from fifty-three to one hundred and seventeen townlands. While the exact acreage cannot be ascertained with-out identifying each townland it is obvious that areas of from 100,000 to 300,000 acres were being dealt with in these manors. In 1668 four manors of a similar character were granted to the Duke of Albemarle in Wexford. In both cases large areas were specified for the purpose of demesnes.

To compare the grants quoted above with the typical English manor one need only quote F. W. Maitland<sup>12</sup> in his definition of the ancient manor in Saxon or Norman times. "When men spoke of a manor they thought primarily of the single group of tenants who worked in common at their ploughing and their reaping, of the single hall or manor-house whose needs were supplied, whose garners and larders were filled, by the labours or this group. An estate too large or too scattered to be managed in this way would not, according to the common use of words, be a "manor."

One fact comes out in these Patents, however, and that is the prevalence of deer parks, many of which survive to this day, but only a few are now used for their original purpose. In the Rolls, the words "liberty to empark" up to 300 or 400 acres are frequently mentioned. According to Fynes Moryson, the only deer parks he saw in 1618 were those at Carton and in "Mounster." These were stocked with fallow deer, and most of them must have been carved out of semi-waste land. The O.S. maps show deer parks in hundreds or places which no longer contain deer, and most of them are now absorbed into the present day demesnes, which are legally defined as land lands the hands of, and utilised by, the owners and not subject to the various Land Acts in the form of "tenanted" land. The interesting feature about these deer parks is the frequency with which they possess scraps of old forest or woodland, in many cases not more than a few acres, but sufficient to carry the mind back to a by-gone Ireland, when small patches of forest still existed in a natural condition. The earliest of these deer parks has already been dealt with

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12. *Select Pleas in Manorial and other Seigniorial Courts*, 1888.

in a previous paper, that of Glencree, formed in the thirteenth century, and under the name of Powerscourt still survives. Maynooth (or Carton) was in existence in 1540, when J. and T. Allan were made keepers of it on the King's behalf. The Earl of Cork created a deer park at Ballinatrach, near Youghal, in 1617, and an interesting account of the process by which it was stocked is given by Miss Dorothea Townsend.<sup>13</sup> Deer were sent to Portumna and Lisfinnan about this time. Many of the animals died in transit.

When demesnes came to be laid out in the eighteenth century, these deer parks doubtless enabled many of them to be designed with much greater freedom and space than would otherwise have been possible. They also enable the antiquarian to judge fairly closely the locality of old country seats which came into existence after many of the castles and monastic establishments of the sixteenth century had fallen into disuse, for there was little or no possibility of areas of 300 or 400 acres being obtained for this purpose when land became valuable and thickly populated.

In other cases, however, deer parks were quite separated from the demesne of the manor. Arthur Young points out this peculiarity and regards it as a look of taste. But he does not appear to have considered the condition under which these parks were created, and the late period at which they came into existence. In England, the park is an essential feature of a demesne, and in many cases part of the primeval forest land of the country. In Ireland, both demesnes and parks were converted from occupied or partly occupied land, and many holdings must have been absorbed into these systems. What became of the occupiers cannot be traced. Many of them probably became labourers on the estate, occupied lodges, or were moved to other sites. The park could not be formed out of thickly occupied land without a great deal of trouble and expense, and this accounts for the position in which they are frequently found and their comparatively small size.

The Ulster Plantations of 1609-20 appear to be the first indication of modern estate development, and in *Pynnar's Survey* of 1618-19, a great deal of information can be gleaned as to certain phases of this work. In that Survey one reads such items as the following: — Kilmacrenan, Co. Donegal, "Capt. William Stewart has built three houses in the English fashion." — Precinct of Tyrone, "The Earl of Abercorne built for the present near the town of Strabane some large timber houses, the groundsell of oaken timber, and the rest of allor (alder) and birch, which is well thatched with heath and finished." — Tullaghoge, Co. Tyrone, "Strong bawne of earth, with a Quick-set hedge upon it."

It is clear that down to 1620, the greater part of Ulster had nothing more than small semi-fortified houses, with bawnes or paddocks attached. No sign of demesnes is found at this stage, but the buildings erected were probably the originals of those stately mansions which replaced them 100 years or more later. The position in Ulster was probably typical of the remainder of the country.

It is supposed by some that one of the earliest demesnes in Co. Wicklow is that of Kilmacurra, subsequently called West Aston. From papers in the possession of the family, however, it appears that previous to 1715, this demesne did not exist. An old map of that date shows the land M divided into three holdings, and a lease of these lands was taken by the T. Acton of that time from Walter Byrne. A man of this name held

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13. *The Life of the Great Earl of Cork*, 1904.

Kilmacurra in 1619, and after the rebellion (in which Byrne presumably took part) the lands were allotted to Hugh Montgomery and Sir Richard Parsons. In 1669, a Thos. Leigh apparently paid hearth tax for Kilmacurra, and T. Acton tax for the townland adjoining. A Byrne again evidently came into possession of the lands after their forfeiture subsequent to 1640. These changes show how unsettled was the tenure of land down to that period on an estate which is popularly supposed to have been carved out of primeval forest. This T. Acton was one of the earliest planters in the county, for an old account, probably dating about 1730, has an item of £200 for "dibbing," trees. The same account shows that he purchased foreign timber for building purposes. A grant of £10 he received for planting from the R.D.S., probably about 1750, was spent in "foreign" trees which were planted at the entrance to the Deer Park, the wall of which was built in 1718, and "near Baucis and Philemon, so named long ago." The identity of these trees is not known.

But after 1700 and the beginning of the Georgian period, things begin to move with almost startling rapidity. Costly mansions sprang up in all parts of the country, a few retaining their castellated form, such as Lismore, Kilkenny, Howth, Malahide, Gormanstown, etc., but the majority were built in the style of architecture common to the period. These building developments were accompanied by the improvement of the private lands, deer parks, and demesnes round them, and it is during this period that tree planting on anything like a large scale began.

This work, which seems to have spread from one end of the country to the other in the course of half a century, was largely based on the principles enunciated by "Capability" Brown, a landscape gardener who flourished between 1750 and 1780. The chief characteristic of Brown's work was that of laying out a place by planting a belt round the circumference, and dotting the space in between with circular clumps and single trees, in contrast to the formal style of gardening introduced from France during the time of Charles II. In some places, the result was good, in others bad, but in course of time, persons of taste revolted against the stereotyped methods adopted by this artist. For many years, the results must have been extremely ugly, but time and natural thinning, added to the weeding out of marketable trees from time to time, have toned down and partly obliterated the unsightly efforts of the "Brown" school. One of the ruling passions of his disciples was that of destroying or breaking up avenues, or anything approaching formality, but in some instances in Ireland, sufficient courage was shown to set this principle at defiance, and avenues of limes and other trees are the chief features of many demesnes still. As far as is known, Brown never visited Ireland, but a disciple of his, James Robertson, had a good deal to do with Carton, Castletown, and, judging by their appearance, dozens of other places in Ireland about 1780. From the tree planting point of view, Robertson's work was chiefly remarkable for the practice of transplanting trees of from 10 to 15 foot in height by means of transplanting machines, diagrams of which are given in Hayes' book. The species used were chiefly beech, oak, elm, chestnut, lime, etc., with a mixture of pine, spruce, and silver fir. Labour was cheap, and the ground was probably trenched or thrown into lazy-beds to obtain quick results.

Simultaneously with these landscape plantings the laying down of young plantations was also proceeding. Ireland about this time was being visited by various persons who looked upon a journey through it as a great adventure, and who have fortunately left their

impressions on paper, and we can gather from these, not only the extent to which natural woodland had disappeared, but also the efforts being made to replace it. The most frequently quoted of these "Tours," is, of course, that of Arthur Young,<sup>14</sup> made between 1776 and 1779. Young's attention was chiefly taken up with agricultural matters, but stray notes refer to trees and woods. The plant which excited Young most was the old arbutus at Newtown Mountkennedy. Collon, which twenty-two years before Young's visit was a sheep-walk, possessed 1700 sorts of American trees and shrubs. The finest woods for their age of 35 years were at Strokestown, and the largest exotic tree was a silver fir, of *immense height and size*, of 48 years' growth at Ardfer. The best wooded estates were Inistioge, Adare, Castlemartyr, etc. The best wooded country was between Urlingford and Monasteveran, which must have included Durrow and Abbeyleix. Young's general comments on the condition of Ireland at that time represented a country practically bare of trees, except on demesnes, and he indicates that all the plantations he saw did not exceed fifty years of age, and the trees in general were young and immature.

He makes the following observations on Trees and Planting: – "The greatest part of the kingdom exhibits a naked dreary view for want of wood, which has been destroyed for a century past with the most thoughtless prodigality. Baltic 'fir' supplies all the uses of the kingdom, even those for which nothing is proper but oak. The profligate, prodigal worthless landowner cuts down his acres, and leaves them unfenced against cattle. If you could hang up all the landlords who cut wood without fencing, and destroy trees without planting, you would lay your axe to the root of the evil. [This sounds rather like an Irish bull.] The honestest boor upon earth, if in the same situation as the Irish, would be stealers of wood," – and so on. He would give premiums and specially favourable terms to all tenants who planted and preserved trees, but overlooked the fact that the Royal Dublin Society were actually doing this at the time he wrote. Young also condemns the practice of planting trees on banks, and using oak and other trees of too large a size in planting, and strongly objects to pruning. He states he never saw a good tree growing on banks, but commends the result of this very practice on certain estates he visited.

Like many other ardent advocates of reform, Young looked at most things from his own stand-point, and not from that of the person to be reformed. His advocacy of planting on small holdings might have been greatly modified had he attempted to plant on them himself. Goats, sheep, pigs, and limited space do not afford the best conditions for raising young trees, while the small holder in Young's time had more serious problems to solve than tree planting, however desirable it may have been.

Another writer of Young's class was J. C. Curwen<sup>15</sup> a Cumberland landowner and Member of Parliament greatly interested in the Irish land question. He toured a portion of Ireland in the autumn of 1813, and his remarks are more interesting than those of Young from a forestry point of view, owing to the fact that he was a landowner engaged in planting on his own estate. His observations were very similar to those of Young, and as his route was not the same, nor the places he visited identical, it may be taken for granted that these two observers give a fairly accurate picture of Ireland between 1780

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14 *A Tour in Ireland*, 1780. PROC. R.I.A., VOL. XLI, SECT. c. [18]

15 *Observations on the State of Ireland*, 1818.

and 1820. The only individual trees Curwen specifically mentions were larches at Baronstown, near Mullingar, and at Tullymore, both of about 35 to 40 years' growth, and 60 feet in height and 7 feet in girth, and a silver fir at Tullymore a few years older, 13 feet in girth at  $4\frac{1}{2}$  feet. At Collon he was impressed with Mr. Foster's nursery, and a weeping larch and oak, and he refers to the transplanting of large trees at Lord Louth's near Dundalk. He admires "the noble rows of elms on the banks of the Grand Canal" but his statement that "wood alone is wanting to make this a most beautiful country" demonstrates the general impression of Ireland he received.

Wakefield's<sup>16</sup> section on trees and planting contains general observations which support those of Young and Curwen. He was acquainted with no place in Ireland which "exhibited any of those magnificent trees, the monarchs of the forest, as frequently seen in England." The largest planted trees he saw were Spanish chestnuts and beech at Tralee and Shelton, and he considered Fermanagh the best wooded county in Ireland. He noticed elms at Adare, Tralee, Woodstock, and Avondale, and in the counties of Carlow and Dublin, but stated that in some parts of Ireland these were unknown. Wakefield refers to the difficulty of finding workmen acquainted with the raising and taking care of woods. Wood-rangers he considered were the "idlest and most drunken vagabonds in the kingdom." A list of nurseries in Ireland is given, but these appeared to be declining.

Sir Richard Colt Hoare in *A Journal of a Tour in Ireland*, published in 1807, remarks on the general lack of trees, although the country was admirably adapted for them. He regrets that a colony of Scotchmen were being transplanted to the base of Torc Mountain on the Muckross estate, but was informed that they were only intended as nurses. It is interesting to note that these same Scotchmen were cut down in 1917, together with some very fine larch beside them, and probably of the same age, for war purposes, and consisted of some of the finest timber ever produced in Ireland.

*A Report of the Agriculture and Live Stock of the County of Kerry*, by the Rev. Thomas Radcliffe, was published in 1814, and considerable information is given regarding the planting activities on the estates of the Marquis of Lansdowne at Kenmare, and those of Mr. Herbert of Muckross and Lord Kenmare at Killarney. This information is interesting as showing the prevailing, practice in nursery work at that time, and the species of trees used. At Kenmare (Lord Lansdowne's) cones and seeds were collected from local trees, and in the years 1801-1812, 1,100,000 transplants were supplied by the Kenmare nursery for planting out on the estate. These included most of the ordinary species now used in forest planting, and also trees for planting on farm holdings. At that time, however, Lord Kenmare, who was carrying on similar work at Killarney, was contemplating reducing or closing down his nursery, as "he found in his tenantry (whose interest he should particularly consult by keeping it working) a strong, but determined aversion either to the planting or protection of trees." On the Muckross estate, the nursery supplied most of the trees planted during the early part of the following century, including the "Scotchmen" referred to by Sir Richard Hoare. Details of this planting will be given later.

*A Memoir Explanatory of the Chart and Survey of the County of Londonderry* was

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16 *Op. cit.*

published by the Rev. Geo. Vaughan Sampson in 1814. References to various estates show that planting had been going on during most of the eighteenth century. The greatest planter in the county was said to be the owner of the Cannings estate at Garvagh, but the earliest planter was a Mr. Richardson at Somerset, near Coleraine. Reference is made to the injurious effect of the north-west wind on trees along the coast. None but the ordinary species is mentioned.

Between 1741 and 1808 the Royal Dublin Society gave premiums for planting and the stocking of nurseries. A summary of the results was given by Mr. R. J. Moss before the Departmental Committee on Irish Forestry in 1908. Premiums or medals were given for 10 to 40 acre plots containing a definite number of trees of specified species, but the conditions varied from time to time. The system was considerably expanded under Grattan's Parliament in 1783, when the plantations were required to be maintained for 10 years. In 1786 the premiums were paid in the form of agricultural implements to be obtained from the Society, not a particularly attractive method to some of the recipients one would imagine. The premiums were discontinued in 1807, it being subsequently stated by the honorary secretary of the Society that "the frauds practised were so numerous, that it was found expedient to abandon the system." The total number of acres planted by means of these premiums amounted to 2,800 during the period of about 40 years, or an average of 70 acres per annum, but the actual number of trees planted was probably greater than would correspond to this average. Of the total amount of premiums awarded, nearly one half went to Co. Galway. Inattention to fences seems to have been a prevalent cause of failure.

To Dublin citizens the conversion of the Phoenix Park from a mere deer park in a natural condition to a public park for recreation was an important event. This took place in 1740, when Lord Chesterfield occupied the post of Viceroy. One of the early references to the Phoenix Park in State Papers was in 1674, when Henry Allan succeeded Lord Dungarvan as keeper of all the King's parks and of Phoenix Park. A grant was made to Viscount Grandison and Edward Villiers in 1676, when lands of the annual value of £1,000 were transferred to these grantees in lieu of Phoenix Park and Newtown Walk. Where Newtown Walk was is not quite clear, but the 1835 O.S. shows Oldtown Wood a little north of the Fifteen Acres, as a scrub-covered piece of ground intersected by rides, doubtless the condition in which the park originally existed. The author of the *Compleat Irish Traveller* states in 1788 that "except for thorns and clumps of elms planted by the late Lord Chesterfield, very few trees in Phoenix Park." These elms were the English variety and were mostly blown down in the gale of February, 1903, although a few still survive and are about 12 to 15 feet in girth. The park was the subject of another re-planting scheme in or about 1850, and another after the storm of 1903. Four hundred elms along the Grand Canal were planted in 1766 by Patrick Edgar, as recorded in Gilbert's *History of Dublin*. These were 30 feet high, for which 3s. 3d. each was to be paid.

The additions to the forest flora of Ireland during the eighteenth century included Weymouth pine and silver fir, both of which were extensively planted during this period. The former never attained a great size, but silver fir is now the largest European conifer in the country, and many of the original trees still exist. Horse chestnut, tulip tree,



American red oak, Turkey oak, maritime pine, and a number of miscellaneous species of no great importance were also introduced during this century. Of more importance than any of these was the European larch, which was probably planted in many places as an ornamental tree about 1750, and a few of which may still be met with. The oldest tree encountered in the writer's experience was one cut down in 1910 at Greenmount, near Antrim, when this estate was swept bare of trees before sale to the Department of Agriculture for an agricultural training school. This tree had a clean bole of about 15 feet and a girth at breast height of 14 feet. The annual rings counted on the stump, which was perfectly sound, numbered 165, which would give the date of planting somewhere about 1745, and about the same time as the famous trees at Dunkeld in Perthshire. The oldest larch in Scotland is said to have been planted in 1725. A tree at Carton, supposed to be one of the earliest, was planted after 1750, and old trees reputed to be original larches occur at Abbeyleix, Doneraile, Headfort, and many other places. Owing to the value of this species in the timber trade, most of the older trees in the country have been felled, but it does not appear to have been used for ordinary planting in Ireland until the latter part of the eighteenth century. It was one of the most numerous trees being used at Kenmare in 1801 in Lord Lansdowne's nursery, and also in Lord Kenmare's at Killarney.

By the year 1800, the laying out of demesnes had been more or less completed, and planting operations henceforth assumed a more economic aspect. There is no doubt, however, that the extensive demesne planting of the eighteenth century is responsible for the present wooded appearance of Ireland. This is due, not so much to the extent of the woods, as to their uniform distribution over the surface of the country, and to the shelter belts and scattered trees which were associated with them. From a statistical point of view, Ireland has been poorly wooded for three or four centuries, but from the landscape point of view, she compares favourably with a great deal of Southern Europe, and many countries which show a much larger forest area. Demesnes cannot be kept under glass cases, nor can they be entirely hidden behind stone walls. Tourists and local residents benefit enormously by their presence, and they are not altogether useless from an economic point of view when run on rational lines. Their rapid disappearance during the last quarter of a century cannot be regarded as an unmixed blessing to the country, and no recent developments in rural economy can entirely take their place.

To epitomise the changes which have taken place on Irish estates, and the course of planting operations over a period of nearly 300 years, a typical example may be quoted. Kilruddery in Co. Wicklow is known to most residents south of Dublin, and is particularly interesting because its occupation can be traced from the Norman invasion down to the present day. Much of its early history is admirably set out in the Rev. Chancellor Scott's *Stones of Bray*, from which it appears that in the twelfth century it was part of the property of an Irish Chieftain named MacGillamoholmoc. After Henry II had reserved the two cantreds of Obrun and Othec from Strongbow's grant of Leinster, the Irish chief still retained possession of Kilruddery, but he subsequently leased it to a Norman of the name of de la Felde, who sublet it again to the Abbey of St. Thomas in Dublin. The monks again sublet it until the Dissolution, when it appears to have been in the occupation of a family named Archbold, who, by some means or other, failed to retain their hold on the manor, and it was apparently forfeited to the Crown. In 1618 a

grant of the manor was made to Sir William Brabazon, ancestor of the present Earl of Meath, and its history as a modern estate begins from that date. Apparently bits of it here and there had been leased or let to various parties by the Archbolds, and the first fifty years after the grant was made to Sir William were spent in regaining the scattered portions of the manor. From one of the legal documents still preserved in the Meath estate office, it is possible to gain some information of the condition of the lands in 1679. On the recovery of a portion of the manor at that date, six townlands had a total area of about 3,500 acres, and these were made up of 1,030 acres of land (arable), 800 acres of meadow, 600 acres of pasture, 600 acres of mountain, 200 acres of wood and underwood, and 200 acres of furze and heath. The lands possessed 4 castles, 1 water mill for grain, 40 messuages, 20 tofts, and 20 cottages. Tree planting appears to have commenced about 1680 in the form of rows and avenues of Spanish chestnut, beech, ash, and elm, the two first named surviving to the present day. In or about 1750, English elms, yews, evergreen oaks, and probably other trees were planted in the pleasure grounds, and a clump of Scots pine dates from about this time or a little earlier. In 1780, limes were largely used for filling up the avenues and additions to the pleasure grounds, and probably certain plantations, clumps, and belts were laid down about this time. During the famine times, more planting was done, and a good deal of money spent on roads, walks, and other improvements. About 1900, planting was commenced in the old deer park with the newer conifers, and is continuing to-day.

Almost every estate in the country shows much the same record, the dates varying from place to place according to circumstances and the views of the owners. They illustrate the gradual development of planting during the last 300 years, and show that, before that time, the occupation of land was too uncertain, and the means of protecting it too weak to encourage permanent improvements beyond the building of castles, and the raising of crops or cattle. It was not until round about 1700 that estate development commenced in earnest, or anything like the laying down of plantations began. The earliest plantings were undoubtedly single trees, rows, or lines of trees on banks, and short avenues. This was followed by planting for landscape effect, and after 1800 or so for the production of timber.

Between 1800 and 1845, no great developments are recorded in tree planting, except the clearing and replanting normally carried on, and the planting of a certain area of mountain land. The population was increasing rapidly, and most of the land was too valuable for plantations.

No statistics of a reliable nature are available until 1851, and in the earlier returns an attempt was made to enumerate individual trees on farms and in hedgerows. From a return prepared for the Forestry Committee in 1907, the acreage under woods and plantations was estimated in 1791, and in the five following decades down to 1841. Previous to 1791, the plantation area was supposed to be 105,000 acres, but this did not include a great deal of natural wood and scrub, much of which was subsequently cleared and replanted. For the five following decades, the returns showed an average annual planting or replanting of 4,800 acres, bringing the total woodland acreage for the whole of Ireland to 345,000 acres in 1841. Between 1857 and 1880, the additions to the woodland area by new planting amounted to 29,000 acres, but in the five years following

a decrease of 23,000 acres in the woodland area took place. In 1891 this acreage had decreased to 311,000 acres, and in 1905 to 301,000. The increase in the first period was probably connected with the Famine. During the years following this calamity, all kinds of works were in progress with the idea of giving employment in rural districts. Road-making, draining, wall-building and planting were pushed forward, and schemes of planting once inaugurated could not be stopped under two or three years. The increase during 30 years only averaged about 1,000 acres per annum throughout Ireland. The decrease between 1880 and 1891 were probably connected with the Land Acts and agrarian troubles of that period. These returns cannot be regarded as possessing any great degree of accuracy, however. They were mostly collected by means of voluntary returns, or by those made by the constabulary, and in any case accurate figures regarding woodland acreages are extremely difficult to secure.

At the end of the nineteenth century the first attempt at State afforestation was made with somewhat disastrous results. About 1885, and during the Chief Secretaryship of Mr. Arthur Balfour (later Lord Balfour) representations were made urging the Government to start afforestation on some of the waste land in Ireland. Mr. Balfour replied that the cost of land for this purpose would probably be prohibitive, as most of the mountain land was subject to grazing rights. This view was challenged by Father Flannery, the parish priest, of Roundstone in Connemara. Father Flannery called attention to about 1,000 acres of typical Connemara land, consisting of rock and bog well exposed to Atlantic gales, which he stated could be obtained without difficulty. After negotiations, the land, which was practically worth *nothing*, was obtained at a very reasonable price, experts of various kinds were called in, and eventually the work of planting was commenced under the Congested Districts Board. The reports of the Board for about ten years afford an illuminating record of the carting of young trees on to this remote spot, and their lingering death after planting. Every conceivable species was tried. In the words of Sir Henry Doran in 1907,<sup>17</sup> "They planted trees which were imported, and most of these failed. They planted various kinds that were grown in Ireland. They more or less failed. They planted trees raised from seed sown in a portion of the ground specially prepared on the area itself, and then transplanted. The forester tried every way he knew to get trees to grow, and the experiment must be declared to be a failure." The total expenditure on the scheme was about £10,000 and the result *nil*, as might have been foretold by anyone having the slightest knowledge of forestry in Ireland. But a prophet is accounted little of in his own country.

Of a somewhat similar nature to the Knockboy experiment, but fortunately confined to paper, was the scheme outlined in a report of a Mr. Howitz, a Danish "expert" engaged by Mr. Gladstone in 1884. This report was entitled *The Reafforesting of Waste Lands in Ireland* and is an interesting document, which recommended, amongst other things, the planting of a shelter belt along the entire West coast-line to exclude the Atlantic gales and diminish the rainfall to the east. Mr. Howitz also recommended the planting of every known tree, without respect to rank or fame, on about 5,000,000 acres of waste land. Fortunately for Irish forestry, the Knockboy experiment was carried out in time to

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17 *Minutes of Evidence. Departmental Committee on Irish Forestry*, 1908.

prevent subsequent futile schemes of the kind being put into operation on a larger scale.

Knockboy has been quoted without any idea of ridiculing the idea of planting waste land, but simply to illustrate the danger of technical problems being influenced by political considerations. In the long run it probably served as a useful warning, for had it not been tried and found wanting, succeeding generations of foresters would have, sooner or later, been under pressure to attempt something on more expansive lines, and with more serious financial results.

The most far reaching development, however, in the nineteenth century was the introduction of Western American conifers into Great Britain and Ireland. For some reason or other, the great forests of Western America had never been explored in a forest botanical connection until the middle of the century. Between 1835 and 1850, however, Scottish nurserymen and land owners interested themselves in these trees, and various collectors were sent out to obtain seeds of the more important species. The most outstanding of these were the Douglas fir and Sitka spruce, while several others, like *Thuia*, *Abies grandis*, and Western Hemlock, were all valuable timber trees in British Columbia. Oregon and Washington possessed the well-known *Sequoias*, usually known as Wellingtonia and Redwood, *Pinus insignis* and *Cupressus macrocarpa*, and all of these were expected to be valuable for planting in the British Isles. Subsequent experience has proved the accuracy of these anticipations, and specimens of all those mentioned above can be seen throughout Ireland, many of them from 15 to 20 feet in girth. But the most important from a forestry point of view are undoubtedly Douglas fir and Sitka spruce, the one adapted for dry and the other for damp ground, and if no other American tree had been introduced, the loss would not have been serious in the economic sense. Of almost equal importance in its way was the introduction of Japanese larch towards the end of the century, practically the only Asiatic species to make any serious impression on Irish woods.

During the last eighty years these conifers have been planted in increasing numbers, and are almost as familiar to the ordinary observer as the native oak or ash. Whether their planting has been overdone, is largely a matter of taste. Quick results are so attractive to the ordinary human being that it is almost useless to expect him to consider any other feature, but there is no doubt that many of these species have been planted in places better fitted for broad-leaved species so far as permanent landscape effect is concerned. Their economic value is another and more complicated matter.

The end of the nineteenth century witnessed another incident in the political world which was destined to have an important influence upon Irish re-afforestation. In 1895 a committee was hastily called together by Sir Horace Plunkett to discuss the rural economics of the country, and suggest measures for their improvement. This committee, subsequently known as the "Recess Committee," drew attention in its Report to the activities of foreign countries in developing their agricultural resources and technical possibilities, of which forestry was regarded as one of the most important of the former. It recommended that a public department, to be known as "The Department of Agriculture and Technical Instruction for Ireland," should be set up. Unlike many other committees of this nature, it resulted in almost immediate action being taken, and what is familiarly known as "The Department" was created in 1900. This new body had many

functions to perform, and would no doubt have been glad to have left forestry alone for a few years, while more easily solved problems were being dealt with. But a small body of enthusiasts, banded together under the name of the "Irish Forestry Society," and led by the late Dr. Cooper, M.P., were continually calling attention to the subject of afforestation, and urging the Department to take action. This Society was inaugurated in 1900 by a few politicians who had been nursed in Utopian dreams of an undeveloped Ireland, which only required the wand of an economic wizard to make its waste places blossom like the rose. A school of academic foresters also existed in Great Britain who believed, or affected to believe, that trees would grow anywhere, and who obtained the few practical ideas they possessed from visits to Central Europe, where climate and soil conditions produced forests on hill ranges apparently similar to those found in Ireland. The Society's ideas were largely borrowed from this school, and were widely broadcast, and a benevolent Government having provided a Department for the purpose, it was only natural for innumerable demands to be made upon it. The Irish Quit Rents, derived from revenues partly received from forfeited lands, and fee farm grants over several centuries were also demanded by the Society for afforestation purposes, but these had nothing directly to do with the Department.

Although possessing no technical knowledge, this little Society was probably responsible for State Afforestation being inaugurated in Ireland. Its views were, of course, chiefly of an abstract nature, but its insistence that something should be done in Ireland to create Crown woodlands of a similar nature to those existing in Great Britain was not altogether unreasonable.

The reluctance of the Department to take premature action was, however, also reasonable. The example of Knockboy was still fresh in the minds of many, and there was no great desire to repeat the experiment. But like the importunate widow, the Society never ceased to make demands of a more or less impracticable nature, and in the end they bore fruit—not exactly the fully ripened fruit asked for, but something which may ripen in due course. In 1904, the Department arranged for reports on Irish woodlands being made by an ex-Indian forestry official and an Irish land-agent, which led to no definite result. It probably did not know quite what to do nor how to do it, and in any case the funds at its disposal were quite inadequate for any large scale afforestation work. Then, again, the problem of land purchase was a thorny one for a newly created Department to deal with. What kind of land should be purchased, and where was it? Every county in Ireland imagined it had the first claim to an experiment of this nature, and every owner of useless land insisted that he had the very best for the purpose. With the whole country divided up amongst some half million occupiers this question was not easily answered.

After careful consideration, a decision was made to start a school for training working foresters as a preliminary to any afforestation which might be subsequently adopted. Several possible sites for this school were suggested, but the choice finally fell upon Avondale in Co. Wicklow, the old home of Charles Stewart Parnell, and previously of Samuel Hayes, already referred to. It is rather a strange coincidence that Avondale, built and chiefly planted in or about 1779, should have been the scene of two distinct pioneer movements in Irish tree planting, one by a private owner, and the other by a

Government department. Hayes, of course, was by no means of the first generation of planters, but lived early enough to see their work and place it on record.

Avondale was, in many ways, not too suitable for its purpose. It was only about 550 acres in extent, consisting of a long narrow strip parallel to the river Avonmore, and the bulk of it fairly good tillage land of a class not usually devoted to tree planting. It happened to be in the market at the time, however, and possibly its association with Parnell had something to do with its purchase. For training purposes it lacked a sufficient area of existing woodland and was too limited in size to enable work to be carried on for long on economic lines. Having been acquired, however, and opportunities for training installed, the problem of laying it out had to be solved. The writer was selected by the Department for this task, and rightly or wrongly, decided to turn it into a forest experimental station on the lines of a Continental forest garden. The ground was laid out in plots of about an acre each, and on these, various mixtures were planted, typical of ordinary plantations on different types of soil. About 100 plots in all were planted between 1906-9, consisting of some 40 species either pure, or in mixture with the commoner trees of the country. In addition to these plots, about 50 species were planted singly or in small groups for purely experimental purposes and these were added to as opportunities occurred. Several reports on this station have been published, and there is no necessity to repeat them here.

In 1907-8 two important events occurred affecting Irish tree planting and arising out of the following facts. The duties placed upon the Department in connection with forestry development, and the pressure being brought upon it to exercise its powers were becoming a difficult problem. For several years the Estates Commissioners had been acquiring properties with plantations and woodlands upon them, but having no statutory power to retain these, were frequently under the necessity of selling the timber, and throwing the woodland in which it stood into small holdings in process of creation. Not only was this denuding the country of much immature timber, but the land so dealt with was frequently of little value to the recipients. Offers made to the Department of these woods were refused for financial reasons, although a small area in Co. Wexford had been taken over pending some arrangement being arrived at. But while the offers were increasing in number, the funds of the Department were being absorbed in other schemes and enterprises, and it was evident that if forestry was to be a serious feature of the Department's work, money would have to be specifically provided and ear-marked for the purpose. It was also necessary for the Department to have a clearly defined policy and programme of work. What could be done, and how to do it had never been seriously considered by the advocates of afforestation. Estimates of land suitable for the purpose usually included all the waste land and turf bogs of the country, and varied from 5,000,000 to 2,000,000 acres, all assumed to be capable of growing timber and at anyone's disposal who happened to come along.

Questions of title, private ownership, grazing-rights and customs, methods of acquisition, and dozens of inevitable obstacles were never considered, and discussions, schemes, and proposals were all in the abstract, and usually drew their inspiration from some thickly wooded country in Northern Europe. The prevailing conditions in the British Isles, whether climatic or economic, were usually ignored.



The then Vice-President of the Department, the Rt. Hon. T. W. Russell, thought the best way out of the difficulty was to appoint a Departmental Committee to deal with the whole question, and in 1907, the Committee began its enquiries under the chairmanship of Mr. T. P. Gill. Evidence was given by all persons in any way interested in Irish forestry, and this evidence was extensive, and in some cases peculiar. One witness, for instance, thought that the whole of Connemara might be planted if it were first cropped with potatoes! After everyone had expressed their opinions, a Report was presented which advocated the purchase of 300,000 acres of mountain land, of which two-thirds would be plantable, within a period of ten years. Forty years was allowed for the planting of this area. Financial requirements amounting to nearly £3,000,000 over 40 years were specified, and many other details given which need not be recapitulated, as they can all be found in the Report<sup>18</sup> itself. These few items have been given to allow a fair estimate to be formed of the work actually done. The fact that the Report was not entirely ignored by the British Treasury is an interesting one, but, needless to say, the amount suggested for adequately developing Irish forestry was not granted, and probably never will be under existing conditions of financial stress and uncertainty.

It is seen from the Report that the estimates of nominally waste land suitable for growing timber had been steadily decreasing for nearly one hundred years. Sir Arthur Griffith, in his Valuation Report of 1845, put the total area of waste land at 6,000,000 acres, half of which was considered suitable for planting. Howitz, the Danish expert, added another million acres to this figure, but his estimate could scarcely be taken seriously when considered in the light of his other proposals. Sir William Schlich, Dr. Nisbet, and others brought the figure down to about 2,000,000, but possessed no definite data, outside agricultural statistics, for their opinions. These estimates were repeatedly quoted for some years, but it was not until the Forestry Committee was set up that serious efforts were made to get down to solid facts as regards not merely the existence and extent of land available for afforestation, but the possibility of obtaining it in fairly large blocks. Practically all estimates previously made had assumed that acquisition could be effected almost automatically. The fact that Irish land was divided amongst 500,000 or 600,000 owners or occupiers, each one of whom had his own views about parting with it, was entirely unrecognised, and the idea lying dormant in the minds of most advocates of afforestation was that what was usually termed "waste land" could be had by asking for it. The necessity again for securing land not only suitable for growing trees, but securing it in large blocks, never entered the minds of enthusiasts. The latter appeared to have a vague idea that planting was the only operation involved, and that this planting could take place anywhere outside enclosed holdings with little or no preliminary bargaining. Investigation showed that all those premises were erroneous. Land purchase, when confined to individual holdings, was largely a question of price, but the essential principle of State afforestation is based upon the condition that it should not be carried out on land suitable for agriculture, and this condition rules out a large proportion of every holding in the country, whether the latter is large or small. Experience quickly proved that acquisition resolved itself into a question of give and

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18. *Report of the Departmental Committee on Irish Forestry*, 1908.

take, and to enable the average price of a block to come within the accepted figure of £4 or £5 per acre, useless land had to be taken over as an offset to the better quality found in any area of adequate size. The former class could be obtained without difficulty, but was practically useless for timber production. The latter could only be taken in limited quantities owing to political and economic reasons. Taking everything into account, the conclusion was reached that about 250,000 acres of land might be obtained of the class required, and at a price within the limits of a forest policy. So far, about one-fourth of the Irish Forestry Committee's estimate has been acquired, but only by including a fair proportion of old woodland, which was originally planted regardless of soil quality. From a technical point of view this is rather an advantage than otherwise, but it adds little to the forest area of the country, being simply a transfer from private to State ownership.

The first fruit of the Forestry Committee's report was a Vote of £6,000 per annum from the Treasury for acquiring estate woodlands passing into the hands of the Estates Commission. This sum was never intended for ordinary forestry development, but merely to tide over the difficulty already alluded to. The first item of expenditure from this grant was the purchase, for an almost nominal sum, of 1,200 acres of woodland, with the timber thereon, in Co. Tipperary, and another area of 600 acres in Co. Wexford was taken over shortly after. In these transactions, the Department was simply carrying on work previously done by private estate owners, and no question of afforestation was involved, although clearing and replanting worn-out woodland had to be undertaken. The function of the Vote, however, was soon being interpreted with sufficient elasticity to enable any land to be acquired which was passing through the hands of the Land Commission, whether wooded or otherwise.

On the heels of these developments, a Commission was set up in Great Britain with power to grant sums for the advancement of enterprises in practically any form which could be discovered, provided they were not directly remunerative. This was known as "The Development Commission." There was little difficulty in qualifying for grants, and forestry, whether in the practical or academic form, was brought within the scope of the Commission's activities. After a great deal of discussion on matters of principle the Commission agreed to finance the afforestation of three centres in Ireland in which the Department were negotiating for land, provided that 5,000 acres could be secured in each centre, the money, of course, being advanced annually as required. In this particular direction, Ireland was the first part of what was then the United Kingdom to receive any money for afforestation. Both England and Scotland talked round the subject, and had various differences of opinion with the Commission which acted as obstacles to progress.

By the time work had actually started on these areas, however, Europe was thrown into a state of chaos by the outbreak of the Great War. This brought everything in the form of planting to a standstill for four or five years, both on public and private estates. During the War period, home-grown timber was felled in all directions, and the woodland area of Ireland was reduced by about 30,000 acres, and a much larger area was cleared in Great Britain. When reconstruction became a problem for Government consideration, the question of these derelict or devastated woods was dealt with by a

Sub-Committee of the Reconstruction Committee set up in 1918. The work of this Sub-Committee was followed by what is usually known as "The Acland Report," so-called after the chairman. It recommended the acquisition and planting of  $1\frac{3}{4}$  million acres of land throughout the United Kingdom in the course of 40 years, following in principle much the same lines as the Irish report of 1908. The programme already laid down for Ireland was not interfered with, and when the Forestry Bill of 1919 was passed, the Forestry Commission took the forestry work over as a going concern. From 1919 to 1922 afforestation was rapidly speeded up by the enlargement of nurseries and acquisition of land, and when the Free State came into existence, it merely had to continue the programme already in existence. This programme was roughly the acquisition and planting of 3,000 to 4,000 acres annually, together with purchase, through the Land Commission, of the larger woods coming into their hands from year to year. It is satisfactory to note that no material change has been made in this programme during the last twelve years and if steadily continued, it should eventually accomplish all that is possible in the direction of State afforestation in the Free State. In the opinion of many it is not proceeding fast enough, but few appreciate the various difficulties in the way.

The position in Ireland to-day is, of course, greatly affected by the existence of two Governments, those of the Free State and Northern Ireland, approximately three-fourths of the country being under the former, and one-fourth under the latter. This division has led to the work of afforestation being divided since 1922, when Northern Ireland took over the work initiated and land acquired within the six counties up to that date. The practical effect of this division, however, has not been very great. The policy laid down in the Forestry Reports of both Ireland and the United Kingdom in 1908 and 1919 respectively has been generally followed, and both parts of the country are at present doing their best to increase their woodland areas.

The results up to date are, without going into exact figures, an afforestation of about 25,000 acres in the Free State, and 5,000 acres in Northern Ireland on bare or mountain land not previously under plantation, and the transfer from private to State ownership of about 15,000 and 8,000 acres respectively of estate woodlands for the purpose of replanting.

Against this State development, however, is the serious decline in private planting which has taken place during the last fifty years, and which shows little sign of abating. The various Land Acts since 1884, and the increase in taxation during the last fifteen years, have greatly affected the opportunities for planting and the spending capacity of private owners, and the larger the estate, the more severely have these deterrents been felt. Grants for planting, and other forms of assistance to private planters have done something to encourage a revival during the last ten years but the fact remains that tree planting and diminished incomes are not good companions, and it is to be feared that planting on an extensive scale must either be carried out by the State or remain undone. In a country like Ireland this is a misfortune for one very good reason. The private planter can and does work on small areas of five, ten, fifty, or more acres, and every square mile contains a few patches of ground suitable for the purpose. The State can only work in large blocks owing to administrative requirements. Without the co-operation of

the private planter, therefore, the wooded condition of the country as a whole must diminish, and the final result will be that few woods will be found in districts which do not facilitate State enterprise. Economically this may be an advantage, but it certainly does not tend to make the country more attractive to its inhabitants, or to the casual tourist. To the rural resident and small farmer, the absence of woodland in his immediate vicinity is a more serious feature than many suppose, whether considered from a fuel or timber point of view, and this is already being felt where demesnes have disappeared within the last half century.

In connection with this point, the extent to which the State can carry out its programme has to be considered. The objective aimed at by the Irish Forestry Committee was a woodland area of 1,000,000 acres, equal to 5 per cent. of the entire country. This was estimated on the assumption that the private owner would do his share, amounting to roughly three-fourths of the total. There is no indication at present that anything like this proportion will be attained. The planting activities of the landlords are rapidly being brought to a stand-still, through causes already referred to, while the estates themselves are being abolished by the operations of the Land Commission. The existence of the Forestry Department allows a certain number of woods to be taken over and maintained, but of the total area of approximately 300,000 acres of privately owned woods throughout the country, probably not more than one-third are capable of economic transfer in this way. The obvious remedy is the acquisition of more unplanted land, but so far as can be judged, the opportunities for this are gradually being reduced, unless prices are paid well above the economic value of the land. The intense division of the country into small holdings is making it more and more difficult to find blocks of two or three hundred acres in the hands of one individual with whom negotiations can be carried on. The greater the sub-division the more complicated the process of acquisition becomes, and the more difficult the task of making satisfactory bargains on a uniform scale. Every occupier of a holding has his own views about sale, price, and the reservation of various rights, while in the vast majority of cases, an agricultural holding cannot be abolished until the occupier has found accommodation elsewhere, and this is almost an impossibility under existing conditions. The occupier has seldom the power to take the necessary initiative, while the inducement to do so can only arise from financial considerations. These factors are gradually but surely bringing acquisitions to small proportions, unless a policy of buying up entire estates can be adopted, as is being followed in Great Britain. A policy of this kind in Ireland is out of the question, except through the Land Commission, and the latter has its own functions to perform before taking forestry into account. The forestry administration is, therefore, handicapped at the outset, either by political, administrative, or economic causes. If its programme is to be carried out, it must secure an adequate area to work on, and this area must be free, not only from physical disqualifications, but from objections of a political, social, and financial character. Politics impose considerations foreign to technique; social conditions hinder freedom of barter and exchange; and financial restrictions act as a brake on a machine already clogged with rust, and attempting to surmount an upgrade. The possibility of increasing the already limited area in hand is, therefore, becoming more and more circumscribed by factors which were never contemplated in the original conception of

the afforestation programme. Another feature of modern State planting is the tendency to use the faster growing conifers in place of broad-leaved species. Economically, again, this is probably sound, and for purposes of winter shelter, it is difficult to overlook its merits. By lovers of the picturesque and students of natural history, the rapid conversion of oak and ash woodland into dense crops of Douglas fir and Sitka spruce may be deplored. But the productive capacity of these latter species is too great to overlook their commercial value, and provided oak and ash are retained where nature intended them to thrive no great harm will be done. The twentieth Century has been marked by another wave, as it may be termed, of introductions, owing to the discoveries of Wilson and Forrest in Western China. These are now being tested by experimental planting in the pineta of the country, much in the same way as Douglas fir and Sitka spruce were tested 100 years ago. Whatever the results may be they are not likely to seriously affect the composition of Irish woods for many years. But enough evidence has been produced to show what has been done to alter the general appearance of Ireland during the last 300 years. On the whole the benefits have been vastly greater than the drawbacks. Timber, increased shelter, and the interest attaching to growing trees of unknown possibilities have all to be placed on the credit side of the account. To briefly summarise the facts brought together in this paper, it may be stated that –

1. The Church was probably a planter of trees in Ireland as far back as the fifteenth century, and the yew appears to have been the chief species used. The statement made in a copy of *Topographia Hiberniae* to this effect is probably correct.
2. The laying down of plantations did not take place on an appreciable scale until the eighteenth century, and then chiefly in conjunction with the creation and improvement of demesnes.
3. The present tendency in tree planting is that of using Western American conifers in place of European species. This will undoubtedly alter the appearance of the country during the present century.
4. During the last fifty years a serious decline in planting is shown on private estates, and energetic State action becomes imperative if the woodland area is to be maintained.

*Note.*— In preparing this paper, thanks are due to Miss Irene Ball-Acton and Mr. V. C. Le Fanu for information regarding Kilmacurra and Kilruddery respectively.

## Book Review

**Forestry in Ireland – A Concise History.** Niall OCarroll. COFORD, Dublin. ISBN 1902696379. €20.

Besides being concise as its name indicates, this history of forestry in Ireland is also comprehensive, in that it treats within its 100 pages virtually every aspect of its subject in appropriate, that is to say proportionate, detail. Its appearance is timely for two reasons, coinciding as it does both with the centenary of the beginnings of the modern Irish forestry renaissance and the announcement of the imminent commencement of the most comprehensive survey of Ireland's forests since the establishment of the State.

Although he deals with the entire period from the primaeval forests of ancient times to the present day, for reasons that most readers will understand in advance, Dr OCarroll focuses attention on the 20th century which opened with a new and hopeful chapter in the fortunes of Irish forestry. This came about as a result of the wide acceptance at that time of two beliefs, namely, the need for both a serious reafforestation programme and for state involvement as the only means of ensuring its viability over the long period between investment and return which characterises forestry, as distinct from agricultural development.

The preceding centuries had been marked by intensive exploitation of the country's forest resources which, though deplored by many thoughtful people, including Jonathan Swift, and made the object from the 18th century onwards of remedial efforts by the Royal Dublin Society and some enlightened estate owners, continued to go largely unchecked up to the end of the 19th century.

As the nature and scope of his material, evident from the extensive literature reflected in the exhaustive bibliography, were not amenable to chronological treatment, Dr OCarroll was obliged to present it by means of a series of separate headings such as Learning, Silviculture, The Product, etc., a method not without its risks that happily he has largely succeeded in avoiding.

The appearance of a dedicated English forestry scientist, Arthur Charles Forbes, and the acquisition of the Parnell Estate at Avondale under the aegis of the recently-established Department of Agriculture and Technical Instruction in 1904, marked the birth of modern Irish forestry. Thereafter the new Irish Free State from 1922 onwards maintained the impetus with an annual planting quota determined principally it would seem by the ability, often limited enough, of the exchequer to find the money to pay for it. It is doubtful, from what Dr OCarroll has found, that there was ever a forest policy in the sense of a formal statement of intent to operate in a consistent fashion on a long-term basis. The nearest to what could be regarded as such were the decisions, taken on an ad hoc basis from time to time in the light of prevailing circumstances, to plant a certain acreage each year and to thereby ultimately achieve a total acreage within a certain stated period. Even the difficulties of the so-called Economic War of the 1930s', the even greater problems created by World War 2 and the hardship of succeeding decades, did not deter successive governments from pressing on to at last achieve in 1991 the million-acre target set by the first Inter-Party government in 1948, "a creditable achievement in



respect of a long-term government target”, writes Dr OCarroll, “which surprisingly was not accompanied by any overt publicity or jubilation”. There is a curious irony in this writer’s view in the fact that this phenomenal target could not have been achieved had it not been for the chronically depressed land values that prevailed throughout the country up to our entry into the EEC in 1973.

Different readers, whatever their particular interest in Irish forestry, will all learn something of interest in these pages. My own favourite is the chapter on silviculture with its fascinating detail about such matters as the choice of species, methods of planting, etc. Another attractive feature is the variety of characters encountered in the course of the narrative. While only forestry professionals will recognise such names as Daniel Howitz, Gifford Pinchot, Augustine Henry and John Mackay, the general reader will be interested to find Edmund Burke, William Bulfin, Lady Gregory, Horace Plunkett, Sean O’Casey, Bulmer Hobson, George Russell, James Joyce and Theodore Roosevelt mentioned or quoted.

Politicians, scientists and administrators all contributed to the saga of 20th-century Irish forestry. Many are mentioned by the author, some as remarkable for their shortcomings as for their successes, most who in the way of men everywhere disagreed as often as they agreed among themselves, though always in good faith, concerning the complex issues that their task presented. I would like to have seen more attention paid to the wider social aspects of forestry history and in particular to the roles of the forester and the forestry labourer. At the very heart of this significant national enterprise, and vital to its success, was the forester who bore responsibility for day-to-day management, the supervision and welfare of his labour force and for so many other operational details including the vital task of choosing the species to be planted. Can the work of these men, forester and labourer, working for long hours daily, the year round, on bleak hillsides and remote bogland, establishing and tending plantations on thousands of acres, be ever adequately appraised? I believe that the author had them principally in mind when he generously dedicated his work “To the memory of those who worked hard for little reward and less thanks to create the asset we all now enjoy”.

*Gerry Brady*

Gerry Brady is a barrister practising in Dublin who served in the Forestry Division of the Department of Lands from 1952 to 1969

## Society of Irish Foresters Study Tour (Ireland) 2004 Galway/Mayo 11-12 June

The year 2004 marked the centenary of state forestry in Ireland. To mark the occasion the Society held a Study Tour in the Galway/Mayo area, where state forestry was very active in the 1950s and 60s. The tour was based at the Atlantic Coast Hotel in Westport.

### Day 1 Friday 11 June 2004

#### *Coillte EU LIFE project at Eskeragh bog*

On Friday morning, the 11 June, the group headed north to Eskeragh bog, located west of Crossmolina. Tour Leader, Tony Mannion, welcomed everyone, and opened by giving a brief history of forestry in Ireland over the 100 years since 1904, with an emphasis on Co Mayo. He stated that the wheel had come a full circle, from the extensive planting on peats in the 1950s to the peatland restoration work currently being carried out at Eskeragh. In the 1950s the area was used for rough grazing and forestry; today it is seen as a site of international ecological importance.

Frank Nugent, Forest Manager Coillte, welcomed the group to the North Mayo Forest Management Unit (FMU). It is 25,000 ha in extent, 19,000 ha of which is planted. The main species is lodgepole pine, the highest percentage in any FMU. Very little native woodland is found in the general area. The surroundings have the lowest population density of any area in the country.

Kevin Donnellan, Coillte, Project Manager for the EU LIFE Blanket Bog restoration project introduced the team working on the Eskeragh Bog complex. Caroline White, who is responsible for project administration and public relations, outlined the size and scale of the project. The total budget is €4.2 million, funded jointly by Coillte and DG Environment. The project focuses on the restoration of 1,200 ha of blanket bog at 14 sites in counties Clare, Donegal, Galway, Kerry, Mayo, Offaly and Sligo. Five of the sites, including Eskeragh, are demonstration areas. These are designed to enable people to understand the concepts involved in restoration. Notice boards and boardwalks will be provided to explain the work that is taking place. A car park has been provided at Eskeragh to facilitate visitors to the site and the associated boardwalk.

Kevin Donnellan outlined the main work that will be carried out:

- fencing to keep out grazing animals,
- removal of planted trees,
- blocking of drains and
- monitoring of the water table.

Dr John Conaghan, Project Ecologist, outlined the importance of conserving blanket peatlands. While in Ireland we think of peatland as an extensive resource, in fact in international terms it is very limited in extent. Furthermore, blanket bogs found abroad are not the same as those found in Ireland, so it is imperative that we conserve a portion of this unique landscape.

The peatlands of the west of Ireland are among the most important intact areas of active blanket bog found in Europe. However, it is estimated that only 20% of blanket

bogs in Ireland are intact, while some 30% are cutaway and severe erosion caused by overgrazing has caused significant damage. Mayo has 30% of all the intact blanket bog in Ireland. Since 1997, 135,139 ha of active blanket bog have been proposed as candidate Special Areas of Conservation (SACs) under the EC Habitats Directive. Proposed blanket bog SACs are located mainly in the Atlantic Seaboard counties, especially Co Mayo.

In the project, special emphasis will be placed on sites in the Coillte North Mayo Forest Management Unit (FMU), where the full range of blanket bog types occurs, from lowland to mountain blanket bog (encompassing sensitive river catchments). In other FMUs, the sites are representative of afforested peatlands around the country.

In the past, blanket peatlands were extensively afforested, with unfenced open areas often heavily overgrazed. This has resulted in degradation and drying out of the habitat. These threats are the focus of this project.

The problems being addressed are:

- overgrazing of open bog,
- drying out of the open bog by forestry drains lowering natural water-table levels,
- reduction of the area of blanket bog by afforestation,
- regeneration of forest plantations on adjoining open bog SACs.

The project will reverse these processes and over time will create an area of active blanket bog by:

- fencing to control grazing on 719 ha of open bog,
- drain blocking to restore the integrity of the bog hydrological systems,
- restoration of some 494 ha to enlarge the blanket bog area,
- removal of naturally regenerated trees from the open bogs.

Restoration techniques for afforested peatland, pioneered in a similar LIFE project in the UK (*The Border Mires Active Blanket Bog Rehabilitation Project*) will be further developed in the project. Links with other LIFE-funded projects that have an emphasis on tree clearance have also been made. The project will build on conservation management plans for the sites developed by Dúchas (now the National Parks & Wildlife Service), which was previously supported by EU LIFE funding. At the end of the project a significant amount of blanket bog restoration will have occurred, which will serve as a to demonstrate it as a management option on afforested peatlands.

Kevin Donnellan outlined the Eskeragh site, which is located just south of the main Ballina to Belmullet road, 10 km west of Crossmolina, Co Mayo. The site encompasses two separate afforested areas, comprising areas of 12.3 and 28.3 ha. They lie within the extensive Bellacorick Bog Complex Special Area of Conservation, one of the finest examples of a relatively intact lowland blanket bog landscape in Ireland. The SAC is notable for the widespread occurrence of flush and fen vegetation, derived from mineral-rich and often calcareous groundwater seepage areas. These are some of the best alkaline fens in the country, notable for their diversity of structure and species, especially the rare boreal relict fen mosses, such as *Leiocolea rutheana*. *Homalothecium nitens* and *Paludella squarrosa* are also found on the site.

The majority of the site was planted in 1983 with lodgepole pine, which grew well, and Sitka spruce, which grew poorly.

Peat develops only when the soil water-table is high, when it is lowered the vegetation changes. The presence of ling heather indicates that the site has dried out to some extent. However, throughout most of the afforested areas trees have grown poorly in places and, as a result, the bog vegetation is still present; many drains are already infilling with a luxuriant growth of *Sphagnum* moss. Overall a relatively well-developed bog/heath flora has remained comprising *Molinia caerulea*, *Calluna vulgaris*, *Eriophorum vaginatum* and *Myrica gale*. Mosses such as *Hypnum cupressiforme*, *Sphagnum capillifolium* and *Rhytidiadelphus loreus* are also frequent. It is expected that peatland regeneration will be rapid.

The Owenboy Nature Reserve lies to the south of the larger forestry site at Eskeragh. The plantation on this site has been felled by chainsaw. About 5 ha of felled trees have been chipped by machine to clear the bog surface. On the remaining areas an excavator has gathered the trees into windrows in order to maximise the area of bare ground for peatland regeneration. Drains in have been blocked by plastic dams in about one third of the recently felled areas. Further restoration work is planned and drains in the remainder of the site will be dammed.

Eleven water-table depth measuring devices - Walrags - have been installed. Five permanent vegetation-sampling points have also been set up to monitor vegetation recovery.

### *Forestry and fish in the Burrishoole catchment*

Following lunch we headed to Nephin Beg Forest where we were first met by Tony O'Keeffe, formerly of Coillte and now a Consultant Forester, who outlined the difficulties of forest management in a sensitive catchment. In the 1990s there was extensive clearfelling in the catchment. However, a good partnership developed between the fisheries interests at the Salmon Research Agency (now the Marine Institute) at Burrishoole, Newport, and Coillte. He outlined the characteristics of the catchment:

- steep slopes,
- high rainfall (>2,500 mm per annum),
- very thin layer of peat over mineral soil,
- forest cover mainly Lulu Island lodgepole pine.

The change from chainsaw felling to harvesters posed new challenges for forwarders as the brash was unevenly spread: they had great difficulty climbing the steep slopes, and as a result rutted the soil along the extraction racks, which developed into watercourses. This alarming development necessitated consultation with the Marine Institute.

The solutions tested were as follows:

- silt traps were installed - a new development and
- harvesting was confined to the period from the beginning of May to the end of October.

Kieran Mc Loughlin, the Harvesting Manager with Coillte outlined the current harvesting situation in the catchment. The catchment comprises some 12,500 ha of which Coillte owns 30%. Over the next six years 133,000 m<sup>3</sup> will be removed by clearfelling. The major challenges remain steep slopes, low yield class pine and high rainfall. However, harvesting machines have become more environmentally friendly;

forwarders now have twin wheels. The management of timber sales has also been modified, with less concentration on one area. In areas with very severe slopes cable extraction is being used, and areas of low productivity (yield class 14 and lower) are no longer felled. A discussion took place on the size of individual clearfelling areas, with agreement that an area of 25 ha was the most suitable.

Reforestation also poses difficulties, particularly with cultivation. Solutions, again developed following consultation, include:

- silt traps should be in position prior to any cultivation,
- mounding will be used for cultivation,
- water quality is continuously monitored

Brendan O’Hea from the Marine Institute praised Coillte for the cooperation received in dealing with the water quality issues arising from clearfelling; both sides had learnt a lot during the consultative process. He pointed out that at the reforestation phase long down slope drains were a problem, as the velocity of the water increased and silt was deposited in the main watercourses. Drains should be short, leading to a silt trap. The lessons learned were that planning and consultation on all felling and reforestation operations, involving all interested parties, was essential.

At the Marine Institute research building Brendan O’Hea gave a presentation on the Burrishoole catchment and work being carried out at the Newport Research Facility. The catchment is situated 9 km northwest of Newport, off the Newport to Mulrany/Achill Road, to the north east of Clew Bay, and lies in the heart of the Nephin Beg mountain range. It has a total area of 8,949 ha, with the main land uses being agriculture and forestry. The catchment contains three large loughs, Furnace, Feeagh and Bunaveela and is drained by 45 km of shallow streams. The Burrishoole Fishery, a world-renowned amenity, is primarily based on the two lower loughs, Feeagh and Furnace. Ownership of the fishery and lower catchment transferred to the state with the formation of the Salmon Research Agency in 1990. The agency was amalgamated with the Marine Institute in 1999.

The facilities comprise a laboratory and administration block, freshwater hatchery and fish-rearing facilities, fish census trapping stations, a salmonid angling fishery and a comprehensively monitored freshwater lake and river catchment. A wide range of the institute’s freshwater and inshore fisheries programmes, including work related to eels, sea trout, and salmon are hosted at the site. National and international co-operative research and development programmes on aquaculture, inshore fisheries, and environmental issues are also conducted at the facility. It forms one of the greatest natural laboratories for studying Atlantic salmon in Europe and is a prime location for integrated freshwater and marine research. It is also within easy reach of Clew Bay and Connemara, where a large part of the Irish salmon farming industry is located.

## **Day 2 Saturday 12 June 2004**

The group left the Atlantic Coast Hotel and headed south through Connemara to our first stop at Cloosh Valley.

### *Coillte forest management policy and practice on peatlands*

The Coillte District Manager, Myles Mac Donnadha, welcomed us. Cloosh Valley has an overall area of 6,500 ha. Currently, 85% of the catchment is planted, mainly with a 50:50 mixture of lodgepole pine and Sitka spruce. The average growth rate of the pine is better than the national average (yield class 12 v 10 for the national average). Sitka spruce productivity is, however, lower than the national average (yield class 13 v 17 for the national average).

Dr Dermot Tiernan, Coillte, gave a presentation on how to optimise the productive potential of low production forests.

Social forestry was important in 1960s - 19880s when Cloosh Valley and many other forests in the west of Ireland were established. At that time peatland was regarded as wasteland but today their ecological importance and value is recognised.

Coillte Red Areas (designated as uneconomic tree crops growing on poor soil) comprise 10% (43,500 ha) of the Coillte estate nationally, with some 8% (34,800 ha) on the western seaboard. Mayo and Connemara hold 15,000 ha of Red Areas. Under the current legislation, the 1946 Forestry Act, reforestation following felling is legally binding. Research examining management options on Red Areas is currently underway, part-funded by COFORD.

The main forest management challenges facing Coillte today can be termed the Big Five:

1. water quality – siltation, nutrient enrichment, bank erosion and acidification,
2. biodiversity – perceived reduction from afforestation
3. peatland – loss of the resource, 94% of raised and 86% of blanket bog damaged/destroyed (Heritage Council 1992)
4. landscape – landscape design not taken seriously in Ireland,
5. social issues – viewed more as a hindrance than an opportunity to engage with communities.

Operational methods to meet the challenges (in brackets) include:

1. planting without cultivation (water quality),
2. natural regeneration (water quality and biodiversity),
3. environmental planting (water quality, biodiversity, landscape and social),
4. bog restoration (biodiversity, peatland, landscape and social),
5. buffer zone management (water quality, biodiversity, landscape and social),
6. restructuring of forest age profile (biodiversity and landscape),
7. visual redesign (landscape and social),
8. long-term-retention of stands (biodiversity, landscape and social),
9. extend rotation to age of maximum mean annual increment (biodiversity, landscape and social).

Management options for low productivity forests are:

1. optimise the productive potential,
2. designate for environmental management,
3. fell with no reforestation.



1. Optimise the productive potential

Financial analysis (using Coillte investment appraisal package ForFin) under current economic conditions indicates:

- the threshold yield class will depend on the prevailing economic conditions of the day,
- the threshold yield class is currently  $14 \text{ m}^3 \text{ ha}^{-1} \text{ yr}^{-1}$ ,
- discounted revenue from timber sales is sensitive to yield class,
- all crops with a yield class of 14 or more with normal inputs are economic,
- yield classes 10 and 12 can also be economic with reduced inputs,
- revenue from timber sales is more sensitive to changes in yield class below 10,
- reforestation areas with a yield class below 10 is currently not economically justified.

In summary, the site productivity basis for operational decisions are:

- yield class  $\geq 14$ , normal inputs, conventional forestry,
- yield class 10–12, reduced inputs, no cultivation/natural regeneration,
- yield class  $< 10$ , minimal inputs: designate for environmental management.

2. Designate for environmental management

All sites with a yield class less than 10 are evaluated for their suitability to be designated for environmental management. If there is a net environmental gain then minimal inputs can be justified.

3. Fell with no reforestation

The majority of low production forests occur within sensitive environmental catchments. Actions that require minimal inputs include felling with no reforestation of the site. The current situation regarding reforestation is:

- the reforestation obligation is being considered by the Forest Service as part of the Red Areas project and the Bacon review;
- 43,500 ha of low production forests would not be grant-aided today;
- there is provisional agreement that 13,000 ha (1/3rd of the low production forests) should not be reforested (generally the 'poorest of the poor', in sensitive catchments);
- there is a debate about maintaining carbon stocks in forests on blanket peat v their low productivity and environmental benefits of blanket peat restoration.

### Forest Management Plans

- The agreed framework for the management of all forests, including low productivity areas, are Forest Management Plans (FMPs).
- It is Coillte policy to develop FMPs nationally.
- FMPs will increase operational efficiency by integrating day-to-day business management activities with the long-term management objectives for the forest.
- A comprehensive FMP will capture all the economic, environmental and

social functions of the forest.

- FMPs will be the vehicle for future strategic and operational planning.
- FMPs will be fully integrated with the Coillte Integrated Planning (IP) system.

Sustainability is the key principle on which plans will be based as embodied in the Forest Service Code of Best Forest Practice and Guidelines and the Forestry Standards for Ireland (National and FSC).

Dr Tiernan then presented a Decision support System (DSS) for the assistance of forest planners (Appendix) in determining the most appropriate management prescriptions to apply in low production forests.

### *Ecosystem monitoring and research on afforested blanket peatland*

#### Ecosystem monitoring under the EC Forest Focus Regulation and rainwater chemistry

Professor Ted Farrell, Forest Ecosystem Research Group (FERG), University College Dublin outlined the group's work on ecosystem monitoring and research at Cloosh Valley, which has been underway since 1991. The core work has been long-term ecosystem monitoring. This work has provided a basis for research projects and background information for other studies. The quantity and chemistry of water passing through forest ecosystems has been monitored, almost continuously, at the site since monitoring began. Two other sites have also been monitored by FERG over the same period: Roundwood, Co Wicklow (as at Cloosh Valley in pure Sitka spruce) and in a semi-natural oakwood, at Brackloon, Co Mayo. The programme at the three sites forms part of Ireland's forest health and vitality monitoring under the EC Forest Focus Regulation.

Water chemistry samples (throughfall, stemflow and at three soil depths) are collected at Cloosh Valley throughout the year. Rainwater is collected nearby the forest. Analysis of the samples provides information on the chemistry of the rainfall and how this interacts with the forest. Rainfall chemistry is dominated by sodium and chloride derived from sea salt. Although pollution levels are low, inputs of acidity in the rainfall can have an impact on surface waters in this acid-sensitive ecosystem.

Individual storm events have a very significant impact on rainfall chemistry in the west of Ireland. Large storms can result in very high deposition of sea salt: pulses of acidity in streams, following such events, have been reported in other studies.

#### Carbon sequestration in peatland forests

Dr Ken Byrne, formerly of FERG and now a post-doctoral researcher at the Centre for Hydrology, Micrometeorology & Climate Change at University College Cork outlined the carbon sequestration potential of peatland forests. The ability of forests to sequester atmospheric carbon dioxide ( $\text{CO}_2$ ) is well known. As a result forests are recognised as having an important role in mitigating greenhouse gas emissions. Despite this the carbon balance in peatland forests remains poorly understood. Pristine peatlands sequester small amounts of  $\text{CO}_2$  and release methane ( $\text{CH}_4$ ). Drainage from forestry reduces or stops  $\text{CH}_4$  emissions while soil  $\text{CO}_2$  emissions are increased. If these emissions are offset by  $\text{CO}_2$  sequestration by the forest crop there can be a net uptake of  $\text{CO}_2$ .

### Forest management operations and streamwater chemistry

Tom Cummins, also formerly of FERG had researched the impact of management operations on streamwater quality. Catchment level is the most important landscape unit for water quality. Accordingly a large-scale experiment was run at Cloosh Valley during 1996-2000, using catchments at several scales up to 1 km<sup>2</sup> (100 ha). While streamwater quality was being continuously monitored, catchments were subjected to harvesting, reforestation and fertilisation.

Concentrations of some nutrients increased in streams following harvesting operations. However, these increases were not a problem for water quality, as the aquatic ecosystem productivity is limited by phosphorus, so only an increase in phosphorus can lead to eutrophication. Phosphorus fertilising was clearly associated with increased streamwater phosphorus. Surprisingly, forest harvesting (without subsequent fertilising) led to similar effect. Because the site is totally peat covered phosphorus in runoff is an ongoing hazard.

### *Woodland Improvement Scheme at Brackloon Wood*

We passed through Connemara to Co Mayo, to arrive at Brackloon Wood. There we were met by Jerry Hawe, Sylviron Limited who is a consultant to Coillte, the owners of Brackloon Wood.

The project at Brackloon is funded under the Forest Service, Native Woodlands Scheme.

Although Brackloon is classified as semi-natural Atlantic oak woodland, some 50 of the total area of 74 ha were planted with conifers in the 1960s. During the 1990s, knowledge and understanding of the woodland, its functioning and importance increased (due mainly to the monitoring work carried out by FERG (see *Ecosystem monitoring and research on afforested blanket peatland*). As a result, from about 1995, Coillte began the removal of conifers.

In 1998, Sylviron drew up management guidelines for the wood and applied for Forest Service under the Woodland Improvement Scheme (WIS). *The Woodlands of Ireland* also supported the application, as it would act as a pilot project for the proposed Native Woodlands Scheme (launched by the Forest Service in early 2001). (The Woodlands of Ireland had been working with the Forest Service in drawing up guidelines for the new scheme.) Brackloon provided a testing ground for management operations typical of those that would be necessary in any woodland restoration project.

The objectives of the project are:

- to restore and conserve the semi-natural status of the entire woodland,
- to ensure the sustainability and longevity of the woodland, and
- to maximise its biodiversity.

Management operations were broken down into distinct phases. Stage one was to remove any remaining exotic species. These included conifers (other than Scots pine), sycamore, beech and, most importantly, rhododendron. The negative impact of rhododendron on biodiversity and woodland regeneration is well known. A cutting and control programme is in operation, with 20 ha having been cleared.

In addition to the removal of exotics, native species with poor form and those that are partially windthrown are being felled. Cut material is stacked to supplement the

deadwood habitat within the wood. Mature windthrown trees, for example large mature oaks, with extensive epiphyte communities are left untouched, as these are a normal part of semi-natural woodland, and have an essential role in the maintenance of biodiversity through the creation and maintenance of deadwood habitat. Livestock have been removed and excluded from the whole area using stock-proof fencing.

Having removed exotics the second phase involves establishment and regeneration operations. Where natural regeneration occurs, seedlings are being identified and marked and protected. In other areas enrichment planting is taking place, using native provenance material grown from seed collected in the wood, or from the neighbouring Eriff oakwoods. Enrichment planting is carried out in specific areas to fulfil specific objectives, including habitat integrity. For example, planting of oak seedlings in areas between outlying oak woodland blocks and the main oak woodland (an intact area of 11 ha) is designed to reconnect all areas of existing oak woodland to provide habitat connectivity, essential to the maintenance of biodiversity, as it facilitates the mobility of species dependent on oak.

Another objective of planting is the creation, and recreation, of specific woodland types, particularly those which are poorly represented. This involves planting, for example, ash and Scots pine in mixture with secondary species such as hazel, holly and rowan. This is essential to the maintenance of biodiversity in the securing of specific habitats and their related species.

The identification and appropriate management of wet woodland areas, riparian woodland areas, streams, water bodies, deadwood habitats is central to management operations. This involves adaptation of traditional forest management practices to promote biodiversity. For example, an area mounded prior to planting has had a silt trap installed on the mound drainage system before it outfalls to the Owenwee River, an important salmonid spawning watercourse. Rather than having a rectangular shape, the silt trap was installed as an irregularly shaped shallow pond, which promotes colonisation by aquatic species. In addition, it is located such that it has a spring-fed inflow to prevent stagnation.

The second phase to woodland regeneration/establishment involves identifying suitable areas suitable for regeneration, carrying out phase one operations, and in conjunction with ongoing rhododendron control allowing the climax forest to develop.

In adopting proactive and low intervention approaches to woodland regeneration, a minimum of two distinct age and size classes will be created and conserved, and therefore further promote the longevity and sustainability of the woodland.

Biodiversity, be it at the species, habitat or woodland structure levels, is central to all management operations. Diversity also extends to management regimes such as group regeneration, coppice-with-standards and low intervention. Adopting these distinct management regimes promotes the maximum biodiversity.

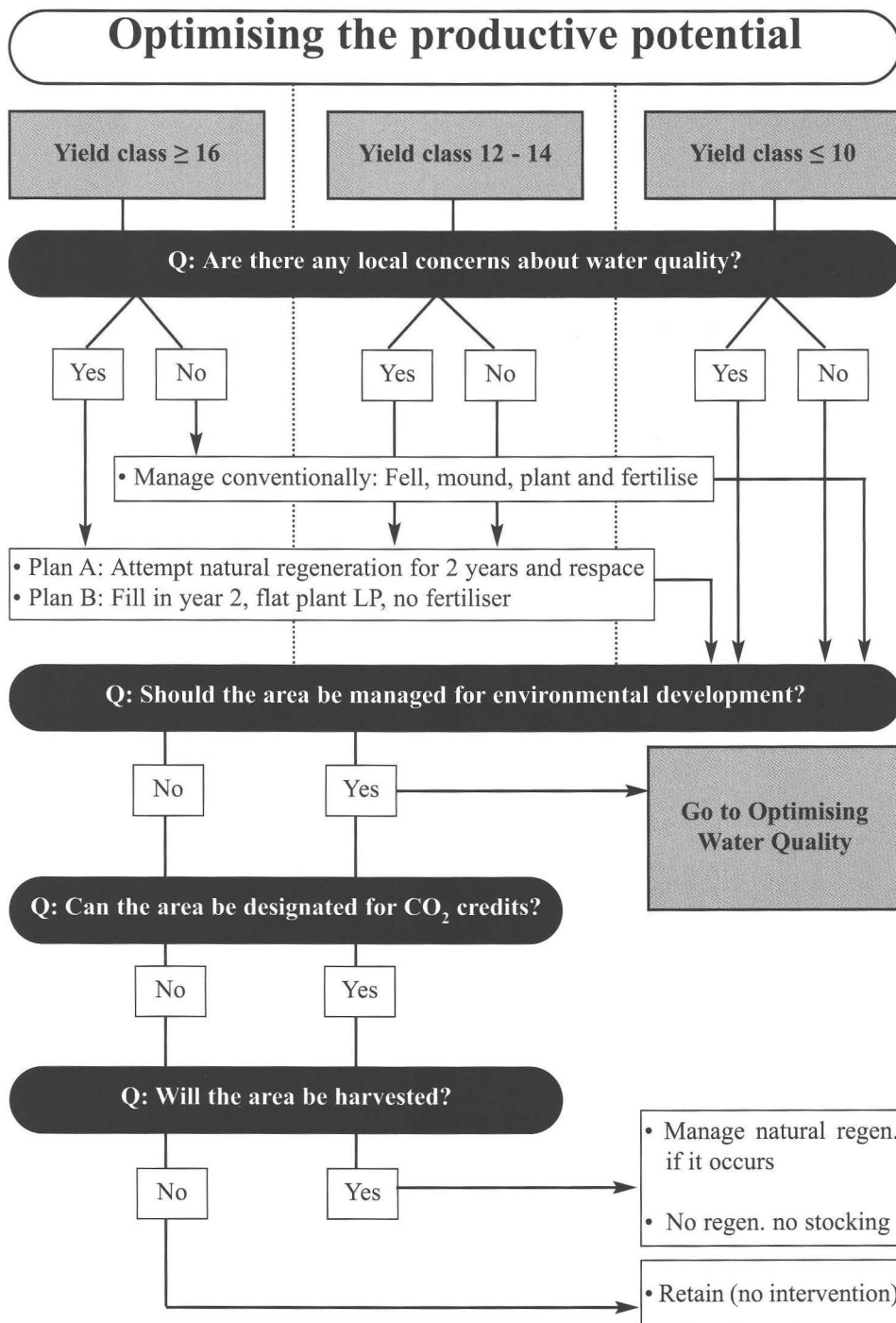
The first year of the five-year project has elapsed, with about half phase one works completed. The third to fifth years will be given over to maintenance operations. These are necessary to ensure the semi-natural status of the woodland and maintenance of biodiversity through the continued control of exotics. Coillte has expressed its commitment to the project, particularly in view of the ecological importance of the site.

Furthermore, the ecological, environmental, and amenity benefits of the project have been widely recognised.

### **Attendance**

Séamus Breslin, Tadhg Collins, Tomás de Gruineil, Joe Doyle, Orla Fahy, Pat Farragher, Joe Finlay, Jerry Fleming, Brigid Flynn, Matt Fogarty, Len Gallagher, John Griffin, Michael Hoban, Tom Kavanagh, Gerard Keane, Noel Kennedy, Vivian Kenny, John Higgins, Tony Mannion (Tour Leader), John Mc Loughlin (Tour Convenor), Gerard Moroney, Dan Murphy, Frank Nugent, Niall OCarroll, Brendan O'Neill, Eoghan O'Riordan, Tim Regan, Dermot Slevin and Trevor Wilson.

## Appendix





## Protecting Water Quality

**Q: Is the watercourse sensitive?**

Yes

No

Follow Forest Service Guidelines

### *Consultation Checklist*

Consult for appropriate buffer width	<i>In m</i>
No planting in buffer zone?	<i>Y/N</i>
Targeted group planting in buffer zone?	<i>Y/N</i>
Daple shade plant in riparian zone?	<i>Y/N</i>
Dams required slowing water?	<i>Y/N</i>
Low impact silviculture in adjoining lands?	<i>Y/N</i>
Is there any fertiliser restrictions?	<i>Y/N</i>

• Incorporate into the FMP

## Conserving Biodiversity

**Q: Are there any opportunities to conserve or enhance biodiversity?**

Yes

No

Go to Restoring Bogland

### *Biodiversity Checklist*

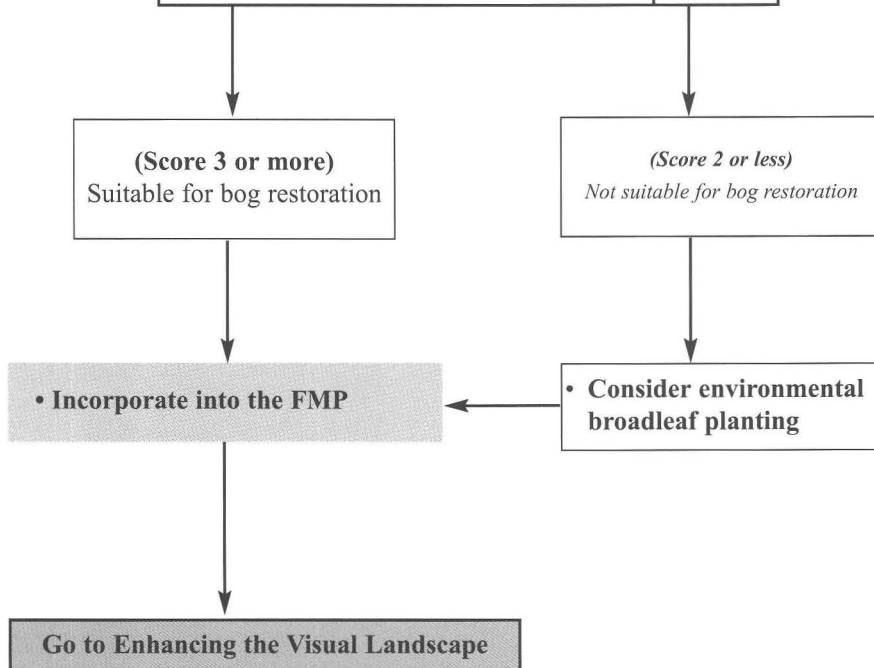
Does an ecologist report exist?	<i>Y/N</i>
Can existing biodiversity be conserved?	<i>Y/N</i>
Any local wildlife merits in extending rotations?	<i>Y/N</i>
Do spatial connectivity opportunities exist?	<i>Y/N</i>
Are restructuring opportunities present?	<i>Y/N</i>

• Incorporate into the FMP

# Restoring Bogland

**Q: Is bog restoration worthwhile?**

Description of area	Score
In or adjoins an SAC (blanket and raised bog)	2
Not in or adjoining an SAC (blanket and raised bog)	0
Hydrologically linked to SAC	2
Bog vegetation present	2
Timber crop has not closed canopy	2
Timber crop has closed canopy	1
Little restoration work needed to restore bog	2
Extensive restoration work needed to restore bog	1



## Enhancing the Visual Landscape

**Q: Is the landscape sensitive?**

Yes

No

Follow Forest Service Guidelines

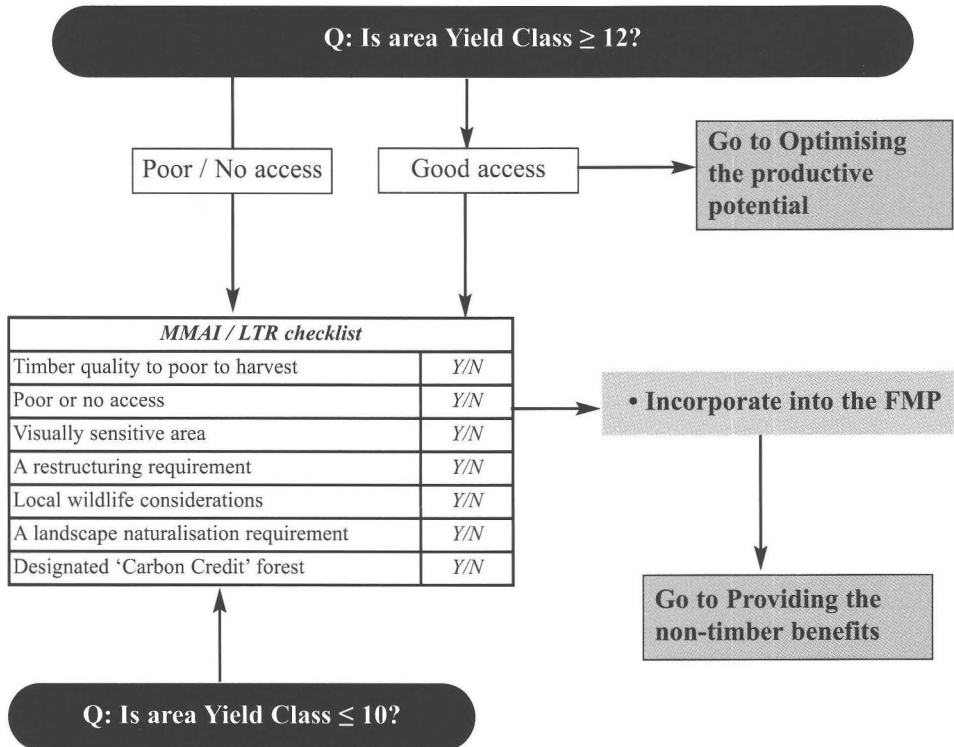
### *Visual design checklist*

Is there a plan for landscape naturalisation?	Y/N
Are external margins to be redesigned?	Y/N
Will the tree line be lowered from the slopes?	Y/N
How will the restocking plan aid visual design?	Y/N
Will there be environmental broadleaf planting?	Y/N
Do spatial connectivity opportunities exist?	Y/N
Is area used extensively for recreation purposes?	Y/N
Is stand retention required?	Y/N
Will restructuring aid visual redesign?	Y/N
Will buffer zone management aid visual redesign?	Y/N
Will biodiversity management aid visual redesign?	Y/N
Will bog restoration management aid visual redesign?	Y/N

**• Incorporate into the FMP**

**Go to Optimising MMAI / LTR**

## Optimising MMAI / LTR



## Providing the non-timber benefits

Q: What are the non-timber benefits?

Recreation	Game shoots	Y/N
	Angling	Y/N
	Hill walking	Y/N
	Pony trekking	Y/N
	Other	Y/N
Alternative land uses	Wind farm potential	Y/N
	Quarry	Y/N
	Commercial/domestic developments	Y/N
	'Carbon Credit' forest	Y/N
Cultural merits	Archaeological heritage	Y/N
	Ecological heritage	Y/N
	Local heritage	Y/N

• Incorporate into the FMP

- NOTES -



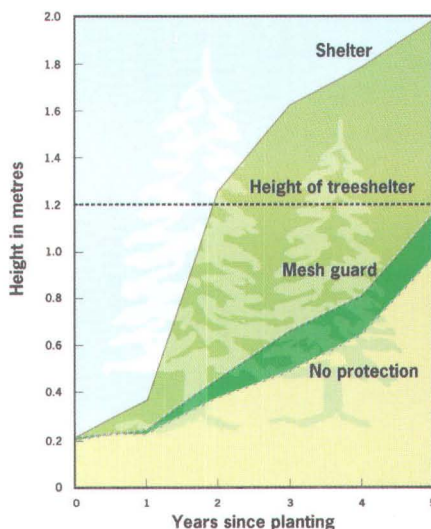
- NOTES -

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