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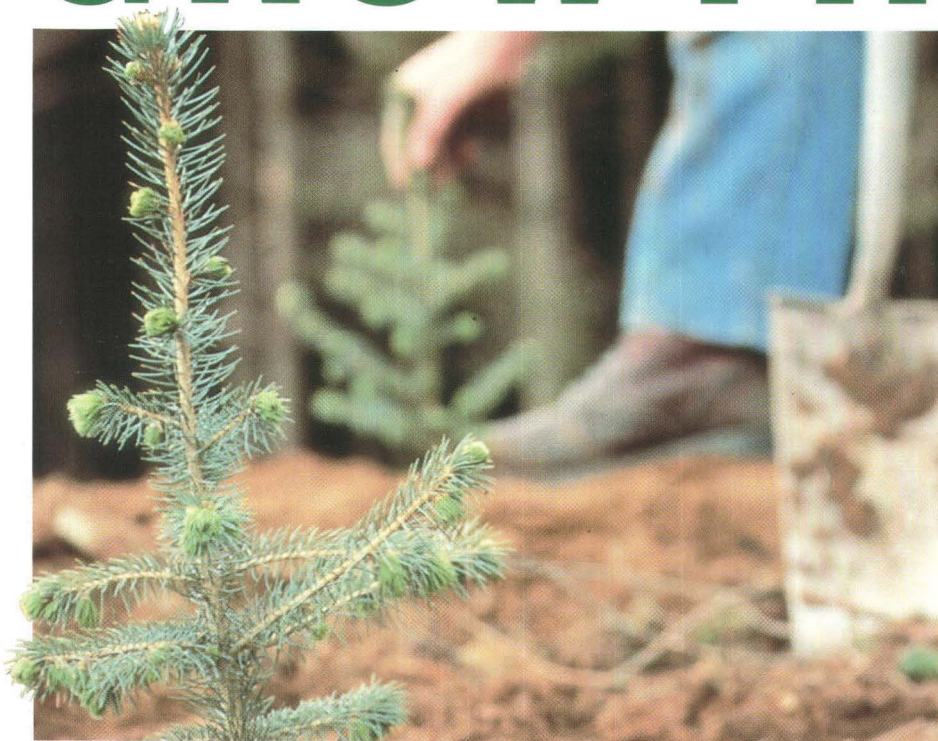
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Vol. 52 Nos. 1 & 2, 1995

- **Forestry – The Social Dimension**
- **Augustine Henry Memorial Lecture**
- **Society Tour**

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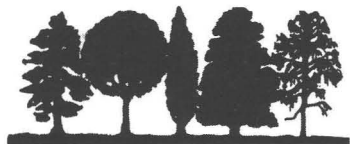
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The Society of Irish Foresters

The Society of Irish Foresters was founded in 1942. Its aims are: *to advance and spread in Ireland the knowledge of forestry in all its aspects, and to promote professional standards in forestry and the regulation of the forestry profession in Ireland.*

The main activities of the Society include:

- Organising symposia, field meetings and study tours on forestry topics
- Publication of the Society's journal *Irish Forestry*

In addition it organises forestry shows and exhibitions and has published two issues of *The Forests of Ireland* and *Forest Images*, *Fr. Browne's Woodland Photographs*.

There are three types of membership:

Technical (MSIF): Members who wish to promote the objectives of the society: at the time of election hold a degree or diploma in forestry of a recognised university, or who have successfully completed a full-time course at a forestry school or who hold the Foresters Certificate of the Society. Annual subscription (from January, 1990) £25.00

Associate: Persons not qualified for technical membership but who wish to promote the objectives of the Society. Annual subscription (from January, 1990) £25.00

Student: Persons studying forestry at universities or schools or colleges. Annual subscription (from January, 1990) £10.00

In all cases membership is subject to the approval of the Council of the Society. Enquiries regarding membership or Society activities should be made to: The Society of Irish Foresters, No. 2 Lower Kilmacud Road, Stillorgan, Co. Dublin.

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Two copies of each paper should be submitted in typescript, with double spacing and wide margins.

Diagrams and illustrations should be clearly drawn in black ink on good quality paper. Captions should be written on the back of each illustration. The approximate position of diagrams and illustrations in the text should be indicated in the margin.

Tables should not be incorporated in the body of text, but should be submitted separately at end (one table per page). Their approximate position in the text should be indicated in the margin.

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GALLAGHER, G. and GILLESPIE, J. 1984. The economics of peatland afforestation. *Proc. 7th Int. Peat Cong. Dublin*. Vol 3:271-285.

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A short summary of the paper should be included. It should precede the main body of the text and not be more than 300 words.

Submission of an article is understood to imply that the article is original and unpublished and is not being considered for publication elsewhere.

EDITORIAL

Species Diversification

Species selection has been governed by silvicultural factors for most of this century in Ireland. Simply put, foresters believed that if the right trees were planted in the right places and properly managed, economic and other benefits would automatically follow. It's against this background that Sitka spruce, our main species has proved an outstanding success. For much of post 1950s planting the limited choice of species reflected the limited choice of land available for afforestation.

Now, for the first time this century, diversification is possible. This is due to the availability of better quality land and grant incentives which favour diversity. However, the silvicultural and financial reasons for diversification have not been clearly defined. There are a number of obvious reasons why we should diversify. The threat of insect pest or disease attack to Sitka is one such reason, but to date much of the debate has been generated by media and environmentalist hostility towards Sitka domination. Today, if one was to ask for a checklist of factors which influence species selection it is likely that silvicultural factors would be joined – and in some instances superseded – by environmental and aesthetic considerations.

All these factors quite rightly play a role in forest planning and species selection but policy makers, planners and foresters must prioritise. Forestry, like any other industry, needs clear objectives. The Society of Irish Foresters advocates a controlled policy of species diversification but takes it a step further: "Planting incentives should be regionally and site directed for an initially narrow range of selected species in order to ensure an adequate scale of planting in relation to markets." Species diversification should be based on site suitability and a production strategy which is focused; clearly aimed at likely developments in the market place such as engineered wood products and the potential establishment of an indigenous paper industry. These developments justify growing high yielding versatile crops such as Sitka spruce with the objective of producing low cost quality fibre.

Achieving the right balance in a planned diversification programme will require further research and education particularly in the rapidly expanding private sector. Foresters need to play a central role in this programme: they need to maximise the wide range of expertise within their own profession and to embrace a number of related disciplines especially in technological, economic and environmental areas.

The forestry profession cannot afford to be reticent about its place in shaping the forests of the future. It is the only profession which has the expertise to develop an imaginative diversification programme which is sustainable and in tune with the environmental, economic and social needs of the community.

Submissions to *Irish Forestry* are welcome and will be considered for publication. News items, general articles and letters are particularly welcome. These should be addressed to:

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Forestry – The Social Dimension

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Over many centuries the primary aim of forestry as an activity was the sustained production of wood, either for fuel, building or other industrial and domestic uses. Forestry also had a variety of other functions: it prevented soil erosion, provided shelter and offered hunting facilities.

Wood production remains the primary objective of forestry but modern public opinion has to be considered in all aspects of national and international forestry policy. The objectives of forest management have been broadened in recent times to provide a wide range of social services, amenity and recreational facilities, employment, industrial development, wildlife habitats and global carbon sequestration.

The public have a right to demand multi-purpose forestry. Indeed, many of these demands are receiving generous subsidisation from Irish and European taxpayers. The following seven papers presented at the 1994 Society of Irish Foresters symposium explore ways in which foresters and decision makers can perform the broader range of social functions.

Editor

Forestry – The Social Dimension

Opening Address by Mr Liam Hyland TD, Minister for Forestry & Rural Development

The theme of this symposium is an interesting and timely one, as we face into a new forestry programme. Under this programme, we are set to reach 10% forest cover by the turn of the century, and to make a major investment in the forestry sector. We must ensure that this investment is of maximum benefit and that our forests will be a valuable basis for industry, an element in rural development and agricultural restructuring, and as an asset to our environment.

In the last few years we have started moving away from the idea of single-use forests based solely on commercial conifer species. While conifers are likely to remain the basis for commercial wood production in the foreseeable future - and indeed their commercial value is beyond question - we cannot ignore the other functions of the forest.

On a very basic level, the forest is such a visible element in the countryside that we cannot avoid the public's response to it, in terms of its appearance, its effect, real or imagined, on their homes and farms, its effect on wildlife, watercourses, local cultural or historical areas, its availability for amenity and recreation, and not least its success in bringing sustainable employment in the area.

We must work with and accommodate these concerns if we are to have good public support for our forests, and if our forests are to be accepted as

a benefit and enhancement to the lives of people throughout the country, particularly in the light of increased planting and indeed the new emphasis on farm forests.

Forestry and the environment

The immediate impact of forestry can be managed in a positive way to ensure compatibility with the environment. The increased planting of broadleaves, which is a specific element of the programme, will have a positive effect as well as increasing the amount of hardwood timber produced. A number of environmental guidelines are already in place, relating to the landscape and areas of scientific archaeological and fisheries interest. In addition, the environmental impact assessment procedure applies to planting of over 200 hectares. You may also be aware that I recently announced a review of the controls relating to the scale of forestry development and the effectiveness of planning controls, to be carried out in conjunction with the Department of the Environment. It is my intention that those involved in afforestation would be consulted as part of this process.

Public access to forests

Because of the long association of the State with forestry development, the public is accustomed to the idea of access to forests for recreation. The growing urbanisation of our population

increases the importance of, and indeed the demand for, this aspect of forestry development. As it can often be combined with commercial forestry, local tourism, education, amenity and leisure activities, I hope to be able to continue the recreational forestry scheme under the structural funds programme.

Forestry and farmers

The involvement of farmers in forestry is a major element in the new programme, which also ties in with CAP reform through developing forestry as an alternative land use and a source of farm income. The incentives under the afforestation and forest premium schemes, and particularly their structure in favour of diversification and broadleaves, should have a very positive effect, on farmers incomes, on overall planting levels, on the environment and on the quality of timber which can be produced.

The basic matter of the use of agricultural land for forestry is a particular issue very much to the fore in recent weeks. I think this may reflect the fact that forestry is not completely accepted as a serious alternative land use. The sale of land for forestry is sometimes an emotive issue, which can overlook the landowners right to use or sell land to his or her best advantage. Forestry is a viable option for farmers, not alone on marginal land, but also on good quality land which can produce high quality timber, particularly from broadleaved species.

Industry and employment

As I mentioned earlier, the potential of forestry to create jobs and earnings is the most important social dimension of all. Planting trees is not

an end in itself, but the basis for an industry, which can range from pulpwood, to high quality furniture, and from small local wood-based crafts to high technology sawmills. Naturally enough, areas such as Wicklow with a long forestry tradition and established industries are particularly well disposed towards forestry, while other areas with as yet no obvious immediate benefits might be less enthusiastic. Some recent comments which have been carried by the media would suggest that the Government is favouring forestry at the expense of, and to the detriment of other forms of agriculture. That is simply not true. Afforestation is a land use and income option for those who own agricultural land, and my Department battled hard, as the farming organisations urged, to ensure that the forestry option was available on the best possible terms to Irish farmers. Indeed the fact that the highest levels of support will be available to those who derive their livelihood from farming is evidence of the thrust of our efforts in this regard. Any comments critical of supports for forestry *vis-à-vis* other forms of agriculture must have regard to the specific characteristics of that support. Government support for afforestation is given in the form of grants and premiums. Grants are cost based and as such cannot offer comparative financial advantage in relation to other farm enterprises. Premiums are specifically designed to make good the farm income lost by farmers opting for forestry, and as such are very deliberately set at levels which approximate to what a farmer could expect to earn from alternative farm enterprises on the same land. It is clear therefore that these supports are designed to make farm forestry a viable option rather

than a dominant competitor to other forms of agricultural land use. We must be very clear, however, that in circumstances of CAP reform and of a timber supply deficit in the EU, a country with only 7% of its land under forest and large areas of marginal land available, must see and seize the opportunity which forestry offers to create jobs and generate wealth.

We cannot hope to get the jobs and wealth which forestry and forest-based industry can generate without planting trees. Nor can we gain access to the full range of potential benefits, in areas such as maximum added-value products, if we do not ensure diversity in our planting policies, to the extent of ensuring a good proportion of broadleaf planting, which necessarily requires better quality land. In time, when the trees being planted now can be harvested and we can realise the potential of increased production of indigenous timber, I would expect that many of the misgivings being expressed today about using agricultural land for forestry will be laid to rest, just as they have been in areas such as Wicklow which already reap the employment and local economic benefits of forestry.

Forestry strategy

The many facets of modern forestry call for a multi-faceted forestry policy. While this has been developing in recent years under the EU-supported forestry programmes, it is important to develop a long-term framework for the

integrated development of the entire sector, from forest nurseries, through growing and processing to timber end-uses and woodcrafts.

With this in mind, I recently announced the preparation of a strategy for the forestry sector to the year 2015. This will emphasise the creation of sustainable employment, the achievement of a balance of regional benefit throughout Ireland, and the generation of added-value. Special attention will also be paid to areas of export potential, the development in Ireland of new competences and market-oriented skills, the generation of a 'multiple benefit' return from investment in forestry, the maximisation of 'non-timber' benefits during the forest rotation, and environmental compatibility and enhancement. I might add that this strategic analysis will of course encompass issues such as land use, and the impact of forestry development in rural areas.

As part of the process of preparation, interested parties including many here today, and the public generally were invited to make submissions, and this will provide an important input into the strategy. So far I have received over 100 submissions including one from the Society of Irish Foresters, all of which will be taken into account.

The topics on today's programme take up some of the aspects which will undoubtedly form part of the strategy, and it should be interesting to hear the speakers and the panel discussion later in the day.

The Sustainable Forest

Hugh G. Miller

The road to Rio

The word 'sustainable', uttered at the political level as sustainable development and at the forest level as sustainable management, has rapidly become commonplace. Unlike its cousin 'biodiversity', sustainable seems to be easily understood and accepted. Unfortunately, upon analysis biodiversity is probably the concept most open to scientific definition and measurement. By comparison sustainability is an ideal that is characterised by a range of subjective interpretations. There might even be the fear that apparent agreement between parties, for example forest managers and conservationists, is illusory because the various sides differ significantly in their interpretation of 'sustainable'.

The concepts of sustainable development first came to prominence with the Brundtland report, which called for national development policies that would not advantage the present generation at the expense of future generations. The concept was given a sharper focus in the Rio Declaration on Environment and Development of 1992 which stated, among others, the following three principles:

Principle 1. Human beings are at the centre of concerns for sustainable development. They are entitled to a healthy and productive life in harmony with nature;

Principle 2. The right to development must be fulfilled so as to equitably meet developmental and environmen-

tal needs of present and future generations;

Principle 3. In order to achieve sustainable development, environmental protection shall constitute an integral part of the development process and cannot be considered in isolation from it.

These rather lofty aims were then backed by a thoroughly practical call in Principle 17 that 'Environmental impact assessment, as a national instrument, shall be undertaken for proposed activities that are likely to have a significant and adverse impact on the environment and are subject to a decision of a competent national authority'.

In signing the Rio Declaration states have effectively entrenched these ideas into their own national policies.

It will be recalled that that section of the Rio process regarding 'sustainable development of all types of forests' was eventually accepted only as a 'non-legally binding authoritative statement of principles'. Nevertheless, it carries considerable moral authority. These principles include the following on sustainability.

Principle 2(b). Forest resources and forest lands should be sustainably managed to meet the social, economic, ecological, cultural and spiritual needs of present and future generations. These needs are for forest products and services, such as wood and wood products, water, food, fodder, medicine, fuel, shelter, employment, recreation, habitats for wildlife, landscape diversity,

carbon sinks and reservoirs, and for other products. Appropriate measures should be taken to protect forests against harmful effects of pollution, including air-borne pollution, fires, pests and diseases in order to maintain their full multiple value.

Protection of forests in Europe – the Helsinki Process

Although the forestry principles enunciated at Rio are non-legally binding, the countries of Europe were more ready to accept essentially the same ideas when they attached signatures to the declaration of the Ministerial Conference on the Protection of Forests in Europe held in June 1993. In this the participants agreed that sustainable management 'means the stewardship and use of forests and forest lands in a way, and at a rate, that maintains their biodiversity, productivity, regeneration capacity, vitality and their potential to fulfil, now and in the future, relevant ecological, economic and social functions, at local, national, and global levels, and that does not cause damage to other ecosystems'.

To this end guidelines were adopted that state, *inter alia*, that 'human actions must be avoided which lead, directly or indirectly, to irreversible degradation of forest soils and sites, the flora and fauna they support and the services they provide... Forest management should be based on periodically updated plans or programmes at local, regional or national levels, as well as for ownership units... Multiple-use forestry should be promoted to achieve an appropriate balance between the various needs of society... Afforestation should be conducted in a manner that does not negatively affect ecologically interesting or noteworthy sites... Native species and local provenances

should be preferred where appropriate'.

Sustainable development

Thus, not surprisingly, sustainability encompasses more than sustained yield and stewardship. Not that sustained yield is rejected in this concept of sustainability, rather it becomes only one of the components. However, changing transport infrastructures in the twentieth century mean that there is little need to achieve sustained yield on a forest basis, rather on some greater area such as conservancy, region or even nation. Scale is clearly an important consideration.

The definition of sustainable in the Rio Declaration emphasises that human beings are central, whether of the current generation or in the future. In their discussion of forestry in relation to sustainable development the UN Food and Agriculture Organisation pointed out that such definitions of sustainable development implies acceptance of loss of forest provided that net human happiness, now and in the future, is improved. They state 'if sustainable forest management means an attempt to freeze the world as it is, it is clearly impossible... The aim must be to ensure that wood and other forest products are harvested sustainably, that forests are cleared only in a planned and controlled way and that the subsequent land uses are productive and sustainable'. Any other definition for countries where population growth and land hunger are major issues would mean the institutionalisation of starvation, which clearly must be rejected on humanitarian grounds.

Happily the political choices are not so stark in the countries of western Europe.

Sustainable management of the forests of Europe

The Rio and Helsinki declarations are now accepted parts, indeed legal parts, of the forest policies of the countries of Europe. An essential component of this policy development is management for multiple-use, including economic and social functions. Also the ecological and conservation aspects are to be emphasised, conservation including those factors responsible for the productivity of the site. The Helsinki definition of sustainability starts with a call to maintain biodiversity. Fortunately, the problem of what is meant by biodiversity (which if too closely defined could prevent us all getting out of bed in the morning) is being tackled in various ways by such activities as the Malaysia-Canada initiative, the Montreal Process and, of most relevance to Europe, the Helsinki Process. The latter is seeking to develop agreed criteria and 'most suitable quantitative indicators' for sustainable forest management. Such indicators as are being talked about (e.g. total volume of growing stock, changes in carbon storage, annual area burnt etc.) are to be perceived on a national scale, for scale remains a worry in this development. Clearly if biodiversity is to be assessed on scales down to a hectare interpretation in relation to an even-aged forest (plantation) becomes difficult because each stand as it ages passes through a sequence of stages of differing ecological characteristics and hence biodiversity. However, on a landscape or greater scale a shifting mosaic of age classes might realistically meet all requirements. Scale is important in any such definition, as it is when considering the realisation of multiple-use objectives.

Aside from biodiversity the Helsinki

definition of sustainability requires the maintaining of productivity and regeneration capacity of the site, preserving the vitality of the forest, avoiding damage to other ecosystems, and fulfilling relevant economic and social functions. Perhaps this can be reduced to soil, plant health, water and people.

Soil

Management cannot effect directly received sunlight or rainfall. Its main impact on the factors of production, therefore, work through the soil. Under natural conditions fertility normally increases under trees. Careless or inappropriate management can significantly reverse this process.

Inevitably the harvesting of produce from a site leads to an export of nutrients in that harvested product, whether it be a sheep carcass, grain and straw or timber. In comparison to all but the most extensive agricultural systems conventional forestry leads to little loss of nutrients. Various factors, however, can significantly change this. Most obvious is any trend towards whole-tree harvesting with its removal not only of timber but also of the more nutrient rich branches and one to four age cohorts of foliage. This problem is easily understood where these nutrient rich components are removed from the site. Similar problems, however, may result for part of the site if harvesting leads to major concentrations of brash, for example to provide the mat over which harvesters and forwarders will move or to provide bared land to ease replanting. Already fertility problems have been identified in Australasia as a consequence of wind blowing and burning. However, perhaps too much should not be made of this factor because it is only on the most infertile of sites that nutrient loss associated with brash removal

will result in anything other than a very transient reduction in the growth of the succeeding crop.

Of far greater concern is any action that leads to increased erosion. Erosion is a natural process that over geological time-spans ensures that impoverished surface soil is removed to expose the more nutrient rich horizons beneath. However, it is all too easy for management action to lead to accelerated soil loss, both of still fertile surface soil and sometimes of entire soil profiles. The steps to ensure that this does not happen are well known and are enshrined in best practice instructions around the world. All too frequently erosion is still the consequence of forest operations and for this there can be no excuse.

Perhaps less readily appreciated is the soil damage that can result from compaction, damage that is not easily rectified on a human time-scale. The risk is predominantly associated with harvesting operations and the necessary avoidance measures are generally well defined. Any harvesting operation should be preceded by rigorous risk assessment, should only involve well trained and responsible personnel and should be effectively supervised and monitored. It would be idle to pretend that this is always the case. Indeed, in some parts of the world damaging harvesting techniques continue to be the standard and excite little adverse professional comment. In many instances there is a need for new machinery that is less likely to compact, cut up or puddle the soil and fortunately machinery designers appear to be striving to provide these. In other situations it may be appropriate to consider reverting to modern versions of old means of extraction, such as horse, oxen, elephant or timber shute, that can be made economically viable while retaining their

environmentally friendly characteristics. Such decisions have to be based on rational analysis rather than emotion. It must be emphasised that the internal combustion engine will remain the main motive force for timber extraction, the challenge is to minimise the environmental impacts of the machines in which it is installed.

Plant health

This is an aspect of sustainability that seems to be attracting little comment and yet it is central, particularly to those of us who live on islands from which some diseases can still be excluded. The loss of elm from the temperate forests of the northern hemisphere, and the loss of chestnut from the American variant of this, as a result of imported diseases must be regarded as severe blows to biodiversity and sustainability. The forests of Britain and Ireland are free from the bark beetle *Ips typographus* and should this arrive from our continental neighbours change would be inevitable. There has to be particular risk to the valuable remnants of Scotland's native pinewoods. Continuance and enforcement of effective quarantine measures must be the single most important step that can be taken at national level to ensure sustainability. It follows that effective monitoring and control of indigenous diseases are also important.

The Helsinki Declaration included in this category protection from fire and pollution. Fire is a difficult question because it is a natural feature of our forests and intimately involved in forest succession and the nature of many of Europe's forests from the boreal to the Mediterranean regions. Indeed the Swedes have decided, on the basis of ecological and biodiversity arguments, to make greater use of fire in their forest

management. However, over much of Europe, and particularly in Mediterranean regions, fire frequencies are now artificially high leading to destruction of vegetation and, frequently, loss of soil through erosion. Biodiversity, therefore, entails the control of fire, not its elimination.

Pollution can and has damaged forests. The scare over acid rain notwithstanding, pollution probably did more damage to Europe's forests through the last part of the nineteenth century and the first part of the twentieth century than is the case today. However, in specific localities pollution is still a real threat, usually air pollution from local sources, and we are coming to realise our legacy of soil pollution in specific areas with industrial concentrations. Solution of these problems, if only to make the situation no worse, lies in the hands of governments rather than forestry departments and forest managers.

Water

The Helsinki Declaration calls for sustainable forest management that does not adversely affect neighbouring ecosystems. The main route for such adverse impacts is the stream and river water leaving the forest. This should leave the forest at least as pure as that reaching the forest, indeed in comparison to rainfall it should be purer. Contamination can take the form of pollution and chemicals, including oil, resulting from forest management operations, notably harvesting. With care, including pre-operation risk assessment and effective supervision of operations, such damage can be minimised, even eliminated. Other risks are associated with drainage and road building. The current Irish and British guidelines probably cover most

eventualities but further refinement might be needed, for example by developing design criteria specific to different soil types.

The vexed question of pollution-derived acidity remains, for in this case the forest is essentially being asked to remove from rainwater pollution derived from remote industrial operations. The efficiency with which this can be done will vary with soil type but the manager does have some control as outlined in the water guidelines. However, the international agreements are quite clear in placing the responsibility with national governments to tackle this problem at source, that is to control the industries that create the problem.

People

Forests interact with people on many scales and in many diverse ways. When talking about Europe's forests mention can be made of wealth creation, particularly locally, of recreation, of the conservation or creation of landscapes, of the conservation of flora and fauna (including that which is hunted), and of the provision of non-timber products such as berries, fungi etc. This effectively returns the debate to the commitment from both Rio and Helsinki for multiple-use management.

Multiple-use management is an important national ideal but its impact is essentially local. The concept embraces the idea that the people who live in and adjacent to the forest are those who interact most with it and who are therefore significant stakeholders who can reasonably expect to be consulted. It is all too easy to imply that calls for local involvement in forest management apply to the less developed world and have little or no implications for the forests of western Europe. This would be to profoundly misunderstand

the thrust of politics, both international and national. People expect to be consulted, and to be consulted sufficiently frequently for changing social aspirations to be reflected in forest management. The fact that society's aspirations are changing faster than our forests mature is a difficulty but should not allow avoidance of regular consultation and consequent adjustment of objectives. Consultation should occur at the national level in relation to forest policy and at the local level in relation to the realisation of objectives of management. Such consultation should be a continual process to ensure this at national and local level and should be enshrined in forest policy and legislation.

Inadequate consultation, and a reluctance on behalf of the forestry profession to respond to the change around it, has been at the base of many of the conflicts that seem to have characterised forestry in the four decades 1950 to 1990. Such conflicts should have been resolved through consultation and a willingness to respond to changing circumstances. In this context it should be emphasised that it is not the function of the professional forester either to write forest policies or to set the objectives of management for specific forests. Whilst the forester should inform this process, management objectives and policy aims should be established by the owners and the electorate.

Thus, the way forward chartered by Rio and Helsinki involves consultation in the search for sustainability. Quite how such consultation be carried out, ensuring that everyone from local housewives to national NGOs have their say, and that the views of no one group dominate over another, remains a challenge for which as yet few answers appear to be offered.

Concluding remarks

The concept of sustainability as currently being advocated embraces a wide range of ideas and aspirations, some of which seem to be only tenuously linked to a single definition of sustainable. It may be said to embrace the three goals of maintenance of biodiversity, multiple use and responsibility to the future. The more it is discussed the clearer ideas become and this process of developing and focusing of the ideas is essential if future conflict is to be avoided. There is still a very real risk that forestry policy formulation may be bedevilled by the fact that the various stakeholders are choosing their own meanings to ill-defined words (sustainable, multipurpose, local etc.) and so simply avoiding effective communication and hence stoking the fire of future conflict.

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Forestry And Industrial Development

John Kerrigan

What does forestry have in common with icebergs?

As this is a symposium and not question time, I don't expect an answer but let me tell you a story I heard recently which led me to ask the question. A member of the Council for Forest Research and Development was speaking to a farmer who had just observed harvesting operations in a forest near his farm. He said it took two men one week to clear 40 acres of forest and his conclusion was that, if that was the contribution that forestry made to employment, then he didn't think much of it.

Now, we can, of course, smile indulgently at the lack of knowledge displayed or, more realistically maybe, we can admit that the comment shows what a poor communications job we in the forestry industry have done. Isn't it disappointing to realise just how true the statement can be "we can't see the wood for the trees"? It's all the more disappointing when one thinks about just what a story there is to tell about forestry and about wood. Just like all that fresh water hidden beneath the surface in the iceberg, there is the great success story of Irish forestry which really should be communicated to a wide public audience. Of course, it's a complex, integrated story, and modern

media don't like that – the sensational headline or the ten second, talking-head soundbite is more effective in selling newspapers or improving the TAM ratings.

Yet, all of us working in forestry have to understand its many facets, make choices amongst conflicting demands and live with the consequences – in many cases, consequences that will last for generations. Indeed, I often wonder whether there is a higher proportion of gamblers in the forestry industry than elsewhere – not many sectors have to invest now and wait 40 years to see if they're right!

And just think about the number of different interests laying claim to a forest! How does one reconcile these claims so that the balance is optimised? What does "optimised" mean – that in itself could produce a long and detailed argument.

Other speakers here today are far more competent than I to comment on these issues but, when talking about forestry in the industrial development context, I think it is very important to say that no part of the forestry sector, – least of all those involved with the industrial exploitation of forests – can afford to ignore this complex and increasingly controversial backdrop. I use the word exploitation deliberately

because, although it is often used negatively and emotively in connection with industrial activity, anybody involved in forestry is an exploiter. Those who sow seeds are exploiting the ability to turn them into young trees. Those who invest in forestry are exploiting its ability to give a longterm return which will help to pay someone's pension; those who walk in the forests are exploiting the beauty and shelter of the trees; those who cut them down and saw them up and the customers who buy the resulting forest products are exploiting their profit potential, utility and aesthetic appeal. All of this activity in Ireland provides jobs for more than 10,000 people or – almost one in every 100 of the labour force. In other words, more than £0.5m is earned every working day of the year by people employed in the forestry industry.

I am sure that most of you in this audience, when you drive behind a load of logs (and you have 60,000 opportunities to do that every year!) will have a fair idea what forest it came from and you will be able to size it up very quickly in terms of diameter, quality and so forth. But give a thought as well to that £0.5m a day in wages and all the other economic spin-offs and I think you can be justifiably proud of the very significant contribution which forestry is making now in this country. Look at these figures:

Table 1
Forestry in Ireland
– Key Indicators

• 50,000,000	
plants grown worth	£3.5 m
• 529,000 hectares of Forest	
• 2,000,000 cu m of	
logs harvested annually	

• Employment 10,000 +	
(Sawmills, panel mills,	
harvesting, transport 4,000?)	
• Sawmill and	
Panel Mill output	£140m
• Exports	£70m
• Import Substitution	£70m
• 60,000 truck loads	
of logs to mills	
• 15,000 loads of	
processed timber exported	
• 15,000 loads of	
processed timber	
to home market.	

By way of comparison, here is a selection of export figures for some other products, to show where wood fits in:

Table 2

<i>Product</i>	<i>£m</i>
	<i>Exports</i>
Mushrooms	28
Glassware	55
Wood/Wood-based Panels	70
Fish	176
Cheese	228
Meat	1000

So, forestry is a major contributor to industrial development in Ireland. It employs thousands of people and helps create employment for thousands more through its demand for goods and services. For example, sawmills pay about £1.5m a year in insurance premiums, over £300,000 in telephone and postage bills and the same again in accountants' fees. They are big electricity users, paying to the tune of nearly £2m a year. The industry generates £70m in exports and £70m in import substitution. All in all, a considerable success story.

But no industry nowadays can

breathe easily if it is to survive - least of all one which is trying to match the needs of today's market on the basis of species selection and planting decisions made decades ago.

Essentially, forestry is a relatively low-margin, cyclical, commodity, mature, global industry. The good news, however, is that global demand for timber will tend to stay ahead of supply for the foreseeable future. Therefore, if – but only if – the Irish forestry industry can achieve and constantly maintain competitiveness, there will be a market for Irish forest products and the success story can continue. However, the next three years will have to see fairly dramatic changes in the structure, cost base and products of the industry, if it is to take on the formidable competition lining up against it in the global market place.

To put that statement in perspective I want to:

- Look at the major developments in Irish forestry-based industrial development in the 1980s and 90s.
- Review how the industry stands today in terms of its strengths, weaknesses, opportunities and threats.
- Do some crystal gazing on likely developments over the next 20 years.
- Outline some of the actions required for industry survival and development in the future.
- And conclude by suggesting a possible size, and shape of industry which might emerge over the next 20 years. Let's look firstly, then, at the main milestones in the industrial side of forestry during the 1980's and 1990's:

1980s

- Big investment in sawmill capacity and technology assisted by the IDA.
- Start-up, failure and takeover of big mill in Fermoy.
- Medite start-up.
- Finsa takeover in Scariff.
- Buoyant market position towards the end of the decade.
- Introduction of SRII Quality Standard for Structural Timber.
- Irish timber dominance in home market for pallet and fencing.
- Sawn timber exports grew from 17,000 cu m to almost 150,000 cu m.
- Share of home market in structural timber grew from negligible to 60%.
- Coillte established as commercial semi-State body.

1990s

- Severe market slump in 1991 - 1993
- Simons Report on export development for sawmilling
- Currency crisis, very high interest rates and high log prices led to massive industry financial losses.
- Market Development Fund assistance helped to stabilise the sector.
- From mid 1993, market turnaround; gradual improvement.
- Sawn timber exports continued to grow from 150,000 cu m to 250,000 cu m (estimated 1993)
- New investment underway in sawmills, Medite, OSB.
- Distribution of log harvest (1992)

Direct to Medite/Finsa	16.0
Log Export	11.0
Poles	0.5
Stakewood	5.5
Sawmills	67.0
	100.0

Next, I would like to summarise

what a "SWOT" analysis of the industry might look like. The SWOT technique looks at the strengths, weaknesses, opportunities and threats facing an organisation or a sector and is a useful way to get a snapshot of how things are at a given point in time.

Strengths

- Disease-free status of Irish forests.
- Several experienced and technically advanced production units.
- Well established in Irish and UK markets.
- Spectacular record of success in home and export market penetration over more than a decade.
- Some experience in other markets, e.g. mainland Europe for panel products and residues and Japan for machined timber. Medite, for instance, sells to more than 50 countries.
- Introduction of SRll and kiln drying for structural timber.
- Establishment of Coillte as a semi-State company with reducing cost base and commercial mandate.
- Simons Report and Simons Task Force have given more detailed knowledge of industry issues in sawmilling.
- Industry information database improving gradually.
- Medite expansion and OSB mill help to provide demand balance for pulp material and residues.

Weaknesses

- Quality of Resource.
- Supply limitations in the medium term.
- Mismatch of raw material cycle with the market/business cycle.
- Monopoly supplier.
- Inefficient, very time-consuming and sometimes unresponsive raw

material supply arrangements.

- Lack of independent industry disputes resolution mechanism.
- Log price is not linked to market prices and can move in contrary direction or in a disproportionate way.
- Conflicting demands for scarce raw material, e.g. stakes versus pulp
- Sometimes irrational competition for log supplies because of mismatch of available volume to mill capacity. High fixed mill overheads drives need for high capacity utilisation, even at uneconomic log costs.
- Commodity market characteristics.
- Relative size in relation to markets means Irish sawmills are price takers.
- Dependence on Irish/UK markets.
- Rigid/unclear/inconsistent public policy.
- Lack of cohesive institutional/organisational framework.
- Lack of timber education at Third Level.
- Production units scale, cost structure and relative lack of financial strength.
- Family-owned companies can be resistant to external pressures for change.
- High proportion of low value-added products (sawmills).
- Inadequate research and development effort, to develop value-added products.
- Inefficient harvesting, measurement and transport logistics.
- High transport costs to export markets.

Opportunities

- Projected growth in global demand for timber and wood products.

- Environmental and plant health difficulties for North American producers have reduced exports to Europe.
- Environmental factors favour wood over other materials.
- Opportunities in specific markets/niches.
- Opportunities for increased small-wood value-added through existing (e.g. fencing) and new (e.g. glulam, LVL) products.
- Further import substitution in Irish market.
- Opportunities for market cooperation in Ireland/UK.
- Expansion in demand for residues.
- Increased volumes of supply from Coillte in medium term.
- Growth in supplies from private sector/NIFS in long term.
- Opportunity to influence European Standards through CEN attendance/monitoring.
- Improved industry/education/research coordination/results dissemination through COFORD.
- Benefits from S.T.E.P. (Structural Timber Education Programme) in medium term.
- Establishment of National Forestry Institute.
- Forest Industry Strategy Study will help set strategic direction.
- Positive EU/Government/National Plan indications for forestry and wood processing sector.
- Implementation of sawmilling restructuring proposals.
- Utilisation of planned/recent new investments to improve competitiveness.
- Stable industrial relations environment through PESP/Programme for Competitiveness and Work.

Threats

- Adverse global economic or natural occurrences.
- Risk of heavy dependence on one species.
- Growth in demand for sawn softwood is projected to be less than for other timber products/uses.
- Potential competition in medium term (3 - 5 years?) from lower cost, more effective producers, especially Eastern Europe and from producer countries with increasing outputs, e.g. New Zealand, Chile.
- Increased volumes from UK forests.
- Saturation of UK market.
- EU membership for Scandinavian countries.
- GATT Agreement.
- Substitute materials may reduce demand for wood.
- OSB mill/Medite expansion may create over-demand for smallwood, adversely affecting supplies/prices for sawmills.
- CEN Standards may undermine Irish timber for some applications.
- Environmental factors.
- Lack of coherent policy for the sector/industry.
- Forestry/timber processing-sectors are under separate EU Structural Fund Operational Programmes.
- Competition Act threat to contract/restructuring arrangements.

So, with the perspective of where the industry has come from and where it stands now, let's look next into the crystal ball and think out loud about likely developments over the coming 20 years. In many ways, this is an impossibly long timeframe in the context of how quickly things change nowadays, but bear in mind that some trees which are likely to be turned into

structural timber at the end of that 20 year period are already standing in the forest for 20 years!

The Forest Service has rightly decided to ask all participants in the industry for their views on what sort of forestry strategy should be put in place for the next 20 years. In preparing its submission, the Irish Timber Council put forward the following as the principal forces which we feel are likely to affect the processing side of the industry over the timeframe of the strategy:

- Global demand for sawn softwood is likely to grow, but slowly; demand for wooden panel products is likely to grow more rapidly.
- The availability of logs is likely to be a limiting factor for several years for the Irish forestry industry.
- In the medium to longer term, the expansion in log supply will be very significant. By the end of the strategy study period, volumes in the 20 cm plus category will have tripled compared to 1992, while those in the 14 - 19 cm category will have doubled. Supplies from private forests will begin to impact on overall log availability towards the end of the strategy study period and supplies from Northern Ireland forests will increase by more than 50%.
- Supply of hardwood logs is unlikely to be a significant factor in the sawmill industry during the study period. Global forestry industry competition in the sawmilling industry will increase. Producer countries such as Russia, the Baltic States, New Zealand and Chile will be increasingly effective competition, necessitating an initial, major step improvement in Irish competitiveness and continuous smaller improvements thereafter. Examination of efficient sawmills in other countries suggests that output per worker, for example, should be a multiple of current levels as just one factor in competitiveness.
- Various factors will lead to pressure for new/revised CEN Standards, some of which may be inimical to Irish timber.
- Low-cost producers, changes in Standards and environmental factors will depress margins for pallet timber, probably to uneconomic levels, especially in export markets.
- Adequate profitability on smallwood processing will depend on adding-value by conversion of some smallwood to structural uses (e.g. studding; fencing; glulam/LVL and other reconstituted products).
- Later in the period, substantial extra volumes of residues will become available, indicating the need for further residue-using industries in Ireland.
- Given the projected growth in large sawlog, the product mix in most sawmills will tend to change substantially in favour of structural timber, driven by log supply changes but depending crucially on market demand to absorb the changed output.
- Matching the available supply to the market factors outlined will require serious commitment to research and development and to market expansion by substituting structural timber for other materials, e.g. concrete/steel.
- Reconstituted and engineered wood products can be expected to be of increasing importance.
- Growth in UK homegrown timber and increasing volumes of Irish

timber going to the UK will lead to competition and market pressures. Cooperation with UK producers will be required as well as success in other markets for Irish timber.

- The above factors suggest that, over the 20 year period, there will be a trend in Ireland towards large, integrated timber processing plants able to process small and large sawlog into a range of value-added sawn products and reconstituted timber products (utilizing both small sawn wood and residues) to gain optimum usage on one site of the entire raw material supply available to a particular processor.
- It is also likely that the larger Irish units will become international in character and scale through acquisition or establishment of processing units in the main markets or in timber producing countries.
- The commodity nature of the industry, coupled with the relative increase in the Irish share of total timber products supply will expose log prices to large cyclical swings and perhaps to a downward trend over time. As a response to pressures for greater competitiveness, improved efficiencies in the supply chain will be essential, including a stable, long-term supply and market-related pricing mechanism and greater efficiencies in areas such as timber measurement and harvesting/haulage logistics. Road improvements and major reductions in transport costs to export markets will be essential. The forest industry in Ireland will have to adapt to an "all Ireland" approach and work in close co-operation in order to achieve all possible opera-

tional efficiencies.

Having looked at developments over the last decade and a half, then looked at the current status of the industry and finally looked at the principal forces likely to have an impact in the future, we have some indication of the scope of the job to be done, if we are to gain optimum advantage from two facts:

- The supply of timber from Irish forests will show a very big increase over the next 20 years.
- Demand for timber is likely to exceed supply, worldwide.

However, despite what we sometimes seem to think, nobody will buy Irish timber products just because they love the Irish! Logs will move out of Irish forests, sawn timber and residues will move out of Irish sawmills and MDF, OSB and chipboard will move out of panel mills, only if those companies can offer a combination of quality, price and service at least as good as the competition - whether that competition is Irish, British, Eastern European, Chilean, New Zealand or any other.

Given the success of the industry to date, there is no reason why we should be afraid of this challenge - but there is certainly no reason why we should feel too calm about it either! I believe that success will depend primarily on the vision, leadership, entrepreneurship and energy of those who own and operate the forest resource, the sawmills and the panel mills and on the quality of the support they receive from education, business, research and the development agencies. I would have to say that, in many ways, ours is an industry that has succeeded in spite of itself, as the record of pulling together in a common direction is not that great. On the other hand, if it is true

that the track record of the last decade was achieved by a not particularly well-united-industry, just imagine what could be done if we could collectively get our act together!

I believe that the Forestry Strategy Review which is going on at present may provide a unique opportunity for industry-wide agreement and I hope all the players will take that opportunity in an open-minded, objective and constructive way. ITC has put forward to the Review Committee the following suggested actions to be taken in the short, medium and long term.

Short term: (1994-1997)

Action

- Conclude Strategy Review
- Establish institutional framework and agree Forestry Industry Strategic Plan.
- Develop industry forecasting model and database to enable optimum matching of raw material resource with existing and projected market opportunities.
- Finalise and implement log supply contract/pricing index mechanism.
- Proactively promote industry co-operation in transport, harvesting and marketing.
- Appoint Industry Regulator to ensure equitable treatment amongst stakeholders and to provide an important element of a balanced, comprehensive framework for development of the industry.
- Finalise 5 year research and development programme.
- Establish National Forestry Institute.
- Identify/test new markets.
- Improve Irish and UK market co-operation.
- Refine and implement sawmill

restructuring programme as an urgent priority:

- Substantial improvement in competitiveness.
- Reduce unit-costs.
- Reduce capacity/rationalise locations.
- Management development.
- Efficiency investment.
- No capacity expansion for five years.
- Agree on standard methods for timber measurement.
- Develop proposals for road improvements.
- Improve harvesting/haulage logistics.
- Review/report on possibilities of reduction of transport costs to UK/more distant markets.
- Support S.T.E.P. Programme.
- Include business skills dimension in Forestry Degree programmes.
- Explore markets for added-value/new product opportunities.
- Develop promotional programme for timber to include positive environmental aspects; comparisons with other materials; community benefits of forestry; information to politicians/ influencers/ communities re forestry/timber processing benefits. -
- Monitor/influence CEN developments.
- Ensure political understanding/support for forestry industry.

Medium term: (1997-2000)

Action

- Continue short-term activities where relevant.
- Evaluate results of first COFORD 5 year programme and update.
- Identify new added-value products.
- Reduce dependence on pallet timber.

- Introduce value-added uses for small roundwood e.g. studding, fencing, glulam/LVL, panels.
- Explore new residue using opportunities.
- Expand capacity utilisation through extra log supplies.
- More proactive involvement in EU/CEN/OES etc. Committees.
- Research/monitoring/dissemination of global trends.
- Co-operation with UK producers.
- Promotion of sawn timber internationally in co-operation with other producers.
- Increased output of structural timber.

Long term: (2000-2015)

Action

- Continue with short/medium term actions as relevant.
- Reduce monoculture dependency.
- Establish additional residue using industries.
- Evaluate results of COFORD programme and update.
- Expand industry capacity.
- Utilise private sector supplies.
- Review Coillte operations and ownership.
- Develop larger Irish units as integrated timber processing plants.
- Internationalise larger Irish units.

ITC has estimated that the once-off costs of implementing this action programme total about £110 million and the continuing annual costs are about £5.5 million. Some existing expenditure is duplicated in the continuing annual figure but, on the whole, if one spreads over the period the capital investments included, for example, for new residue-using industries, we are talking about net extra spending of

about £10 million per annum by all sources, public, private and EU. Of course, these figures don't include the existing and planned significant amounts projected to be spent under the Forestry Operational Programme, CAP Reform Schemes and so on. I would make two points in support of this proposed Action Programme:

- Without initial and on-going spending on efficiency and competitiveness improvement, the forestry industry is unlikely to have a successful future and sunk investment to date would be put at risk. There is therefore an element of "no choice" involved.
- Many of the actions proposed would result in incremental benefits arising from improved competitiveness, higher prices due to more effective marketing/promotion and higher revenues resulting from value-added products.

It has been estimated that the total value of output of the timber processing industry (i.e. sawmills and panel mills) should exceed £300 million by the year 2000. If, through the incremental investment incorporated in these actions, that figure can be substantially increased because of greater efficiency, added value, etc., then an overall net extra annual expenditure of £10 million covering both "no choice" and "incremental benefit" expenditure is defensible. Obviously, case-by-case justification should be demanded as each action is considered at the appropriate time.

I want to conclude the crystal ball gazing by looking at what the industry might look like in 20 years time.

Table 3
*Irish Forestry-Based
Industrial
Development – 2015*

<i>Key Indicators</i>	<i>1994</i>	<i>2015- probable</i>	<i>2015- possible</i>
Hectares of forest	529,000	740,000	960,000
Annual logs harvest (cu m)	2,000,000	3,500,000	4,000,000
* “Industrial” employment	4,000	5,200	6,050
Mill output (constant £m)	140	355	410
Exports	70	275	325
Import Substitution	70	80	85
Truckloads to mills/year	60,000	105,000	120,000
Loads exported	15,000	36,000	42,000
Loads to home market	15,000	17,000	18,000

* Sawmills, panel-mills, other primary processing, harvesting, transport.

Obviously, this must be highly speculative but the projections listed in Table 3 are attainable.

Finally, I want to return to my comment at the beginning of this address about the need for effective communications. There are at least four reasons why I believe there is an urgent need to get our act together on this issue:

- Forestry based industrial development is one of Ireland’s fastest growing industries and thousands of jobs depend on it.
- Together with tourism and the food industry, forestry will be a key contributor in coming years to rural development.
- Competing materials (concrete, steel, PVC) have done a much better job of convincing consumers of their benefits.
- Misinformation, misunderstanding and lack of information have positioned wood negatively from an environmental point-of-view, even though wood has a far better story to tell on environmental grounds than competing materials.

Over the past few years, some positive steps have been taken which should certainly be welcomed and acknowledged:

- The Wood Marketing Federation advertising campaign of three years ago.
- The Forest Service/Irish Forest Industry Chain videos for schools.
- Wood marketing Federation sponsorship of the ‘Our House’ TV series.
- The Structural Timber Education Programme.
- The COFORD “Irish Timber – Use and Applications”.
- The planned ITTA promotional campaign.

But there must be a more consistent and better co-ordinated approach in our industry so that the positive image which wood should enjoy on the basis of objective criteria is put before the public.

John Kerrigan, Director, Irish Timber Council

The Impact of Forestry on Rural Communities

Áine Ní Dhubháin

Since the foundation of the Forest Service and particularly since the instigation of the expanded forestry programme in the late 1940s, the social functions of forestry have been an objective of afforestation in the Republic of Ireland. The expansion of the forestry programme at that time was based largely on the social advantages of forestry, coupled with the belief in a return being forthcoming on the investment (Durand, 1969). These social advantages of forestry were, in the main, related to the acknowledged employment generating capacity of forestry. More recently, the expansion of the forest estate, coupled with the major changes in agriculture has focused attention once more on the role that forestry plays in rural areas. This paper outlines some of the impacts of forestry on rural communities and will identify means of maximising the positive impacts and minimising the negative ones.

Employment

Employment past and present

Undoubtedly the most important impact that forestry has had on rural communities is employment generation. Indeed, the provision of extra jobs has often been regarded as the most important role of forestry in place of extensive farming in remote areas (Grayson, 1993). Successive Irish governments have acknowledged the attraction that forestry offered in relation to employment (Anon, 1958; Anon, 1964). The fact that it could contribute to employment in areas where other employment opportunities were limited and where emigration was rife made forestry particularly attractive. At its peak, direct (in-forest) employment in State forests was some 5,000, all of which were rural jobs. With an increase in mechanisation and labour productivity coupled with an

increase in the amount of work being done by contract, the number of forest workers employed directly by the State (i.e. by Coillte) has fallen to a present level of 1,000 with a further 1,000 or so employed on a contract basis (Coillte, 1994). The reduction in the number of public employees has coincided with an increase in the number employed by the private sector. However, no official estimates of private sector employment is available.

One of the significant aspects of employment in forestry is that direct employment accounts for only part of that generated from each hectare of forestry (Aldwell and Whyte, 1984). Downstream employment is generated in the timber processing sector as well as in the timber transportation sector. The most recent official estimates indicate that the timber industry employs 3,455 persons (CSO, 1994). Forestry also has strong linkages with

other industries which supply the forest industry with its various inputs. Research has indicated that for every five direct jobs generated in forestry in the west of Ireland, one job is generated in the sectors providing inputs (Psaltopoulos and Thomson, 1994).

Future employment

The employment opportunities that forestry creates vary according to a number of factors. Most important is the influence of the age of the forest, with the employment potential being high during the establishment phase, falling during the post establishment phase and rising again at the harvesting phase. On a national level, forestry is still at a relatively juvenile stage of development with over 50% of the forest area less than 20 years of age. Over the next 20 years or so the large areas of forest that have been planted since the 1960s will be harvested. At the same time the area under forest is increasing by approximately 16,000 hectares per annum. The employment impact of this increasing and maturing forest estate is now examined.

Establishment and management

The increase in planting has generated employment in both the establishment and management sectors. Official figures on the number of jobs in the various forest operations are not published but it is estimated that for every 1,000 hectares of coniferous forest established, 46 jobs are generated (Phillips, *Per Comm*). If the jobs generated as a result of the recent increase in planting rates are to be sustained, the present high rates of afforestation must continue. The anticipated increase in broadleaf planting will not only benefit biodiversity but may also influence labour requirements. Firstly,

labour requirements for establishing broadleaves, particularly oak and beech, will be higher than those for establishing conifers. At the same time broadleaved woodlands require more intensive management than conifers thus labour requirements during the management phase of the rotation should be greater than those for conifers. Another development which may also impact employment at the pre-harvesting stage is pruning. Concerns about timber quality in fast growing Sitka spruce have fuelled the debate as to whether to prune or not to prune. In addition to the benefits of improved timber quality and timber value, a policy of pruning would also generate employment during a phase of the rotation where employment requirements are low.

Harvesting and transportation

Harvesting and transportation are the most labour intensive phases of the overall timber production cycle. Over the next 10-20 years, the volume being harvested from Irish forests will increase dramatically. The employment opportunities that will arise as a result of this increase in output will depend on how it is harvested. At present approximately 22% of harvesting is carried out mechanically. One major factor encouraging this trend towards mechanisation is the availability of grant-aid for purchasing harvesting machines. Another factor that is encouraging mechanisation is the unavailability of timber cutters. If the maximum employment impact is to be gained from the increase in output from the forest estate, greater emphasis must be placed on making motor-manual felling more competitive and more attractive to the rural work force. Part of the reason for this lack of interest in

motor-manual felling is that it is a physically demanding and poorly paid job. However, the selection of fellers and the subsequent training of these fellers would reduce the physical demands of the job. Selection and training would also make motor manual felling more competitive with mechanised harvesting particularly when the effects of the subsidisation of the machines is removed.

Processing

The impact of the increase in volume production on employment in the processing sector is not clear. The sawmill industry has been going through a process of rationalisation and automation over the past decade and most production is now concentrated in the 10-12 largest sawmills. Thus it would seem unlikely that new large scale sawmills will be established throughout the country. Instead the timber industry will respond to the increase in output by increasing the processing capacity of the existing large mills. At the same time, there has been a large increase in the volume of pulpwood harvested and by the year 2000 pulpwood production is expected to double. Already one community has experienced the benefits of this increase in timber output with the new oriented strand board plant in Waterford expected to generate 125 jobs in the plant and a further 375 jobs in the forest. Within the next twenty years or so another pulpwood processing industry in the west is likely to be established.

Assessing the employment impact

As indicated above the national forest estate is relatively young and is expected to approach the structure of a normal forest in the next 20 years.

Throughout the country however, this national trend varies with a normal age distribution of forests in some counties such as Wicklow while in the west of Ireland much of the forest area is still at pre-harvesting stage. Where forests are more mature, timber processing industries have been established. Communities in which this has occurred have benefited considerably from an employment perspective (Kearney and O'Connor, 1993). In other parts of the country, e.g. Clonmel, Scarriff, and Longford, forestry is a very significant employer. At the same time there are areas where forestry occupies a considerable proportion of the land area and employment in forestry is almost negligible. Thus it is clear that the employment impact of forestry is influenced by the definition of the impact area. Assessing the employment impact at a national level provides a useful indication of the total number of jobs generated from the entire forest estate. When the regional approach is used (either using counties or groups of counties) the national trend in employment can vary significantly. At a case study level, such as that used in the recent ESRI report (Kearney and O'Connor, 1993), the huge disparity between the employment impact of forestry on individual rural communities can be highlighted. A factor that contributes to the variation in forestry employment in communities is that forestry labour is very mobile and transitory. Thus employment from forestry may not bring worthwhile benefits to many individual communities but may instead bring benefits to the rural economy at large (Grundy *et al*, 1989).

While the employment potential of forestry has been appreciated, it has

been noted that some of the argumentation in favour of forestry is as tenuous as that against it from conservationist circles (Grayson, 1993). A critical issue in this regard is whether forestry jobs displace jobs in other sectors (Pearce, 1991). One of the features regarding employment in forestry in Ireland is that much of the employment has been additional. This can be attributed to the high levels of underemployment on farms, particularly on marginal land. As a result many forest workers in the past were small-holders whose main source of income was their forest job but who still continued to farm. These small-holders would have been underemployed and thus would have the capacity to maintain a job in forestry. In other instances, forestry would have employed young men who might have otherwise emigrated. Underemployment on farms remains a pervasive feature in many parts of Ireland, but particularly in areas of marginal farming (Kearney and O'Connor, 1993). Consequently, many of the jobs that are to be created in forestry might serve to reduce underemployment in agriculture rather than creating new jobs. However, for many, the additional income generated from forestry employment will be the necessary incentive to remain in rural areas. Thus a large part of the employment that forestry generates may not equate to the creation of new jobs but will instead play a significant role in stabilising the rural population.

Income and rural development

Concerns about the problems facing rural communities throughout Europe focused attention on the need for integrated rural development programmes. The role that forestry could

play in such programmes was acknowledged as early as 1964 when The Second Programme for Economic Expansion saw part of the solution to low income farming in the development of industry, forestry and tourism (Commings, 1993). More recently the role that forestry can play in rural development was highlighted in The Future of Rural Society, published by the European Commission (Anon 1988). The development of woodlands and timber processing industries were deemed to represent a promising niche for rural development. The role that forestry can play in diversifying rural economies has been an important underlying objective in promoting forestry development both nationally and at EU level. The first scheme of EU funding was introduced as part of an overall package of grants for the less-favoured areas of Ireland, i.e. the Western Package grants scheme. The overall objective of this grant package, which included forestry, was to raise farm incomes in the less favoured areas so as to ensure the continuation of agriculture, thereby maintaining a minimum population level and conserving the countryside (Nugent, 1985). EU funding for forestry under the Forestry Operational Programme has been primarily targeted on providing farmers with an alternative line of production, thus diversifying the rural economy.

The impact of funding for forestry on the development of farm forestry has been quite phenomenal. Planting by the private sector has risen from a mere 300 hectares in 1981 to 11,000 hectares in 1991. It is estimated that 70% of planting in 1991 was carried out by farmers. Converting part of their farm to forestry has provided farmers with an alternative income source, in

the form of the forestry premium. Much of this income has been additional and has not merely replaced part of the farm income from agriculture. This has been possible because many of those who have converted land to forestry have done so without reducing their agricultural output (Gardiner and Ní Dhubháin, 1993). Planting has been carried out on very marginal parts of farms. On this type of land the predominant farming systems were extensive and many of those planting, intensified grazing on the remainder of their land. Thus the forest premium can play a significant role in raising farm incomes and in this way make it financially possible for some farmers to remain in rural areas.

Much of the forestry development since the 1980s has had little impact on agricultural production (duQuesne, 1993). Most of this planting took place on marginal land of which an estimated one million hectares is distributed throughout the country. However, the recent increases in grant-aid for forestry, particularly on non-disadvantaged land, will bring about changes in how farming is influenced by forestry. There is now a greater incentive for farmers of good quality pasture/tillage land to convert some of this land to forestry. At the same time many tillage and dairy farms have pockets of marginal land and it may in fact be these parts of farms that are converted rather than the good agricultural land. From a forestry viewpoint, the forests created on good land will be composed of diverse species and indeed broadleaves in many instances. As EU policy is firmly focused on reducing agricultural production, the main thrust of funding will be directed more and more to afforesting better quality land. Indeed

it may be that one of the measures of success for the new grant programme will be by how much it reduces agricultural production. While planting trees on good quality farmland may not be welcomed by the farming community, forestry is a productive use of the land in comparison to the sterile practice of set-aside. Much of the recent planting has been carried out by land holders who have very little tradition and expertise in forestry. Very few of these landholders had any training and knowledge before they planted. In most cases they remain without training. If the returns from the considerable investment in forestry are to be maximised for both the grower and the nation, the new farm plantations must be well managed. Fostering a knowledge and an appreciation of forestry practice should be encouraged so that it becomes part of the rural culture. This is particularly true in those communities engaged in substantial afforestation programmes where traditional land uses have not heretofore included forestry. One means of encouraging good management of these woods would be to make management requirements a prerequisite to the receipt of the forest premium. Another possibility would be to introduce a scheme similar to that operating in the UK whereby persons who afforest land can apply for management grants which are payable for 5 years from age 10 to age 15. The aim of this scheme is to encourage the improvement and maintenance of woodlands. Yet good management of Irish woodlands will not be achieved without the provision of a comprehensive forestry extension service staffed by forestry professionals. To date the Forest Service has provided the rudiments of such a service but there is now a need

to develop a more comprehensive and independent service. A factor that will make management of farm woodlands difficult is that most are small and isolated. The forest management techniques at present in use were devised for large scale forest management. In the same way most of the harvesting techniques and machinery will not be suitable or cost effective in these small woodlots. Thus devising methods of managing, harvesting and marketing produce from these small woods is one of the most important challenges facing the forest industry.

Social impacts

There are many less tangible and indeed less quantifiable impacts of forests on rural communities. These impacts have been highlighted recently and have received some media attention. Forests are perceived by some to generate a sense of isolation in rural areas. Others have indicated that forestry is perceived as a sinister depopulating force (Gallagher, 1991). There has been a traditional antipathy towards forestry in Ireland, stemming from the time that forestry was associated with large estates and the small farmer "looked enviously across the walls of these estates at the recreation forests" (Gallagher, 1991). In the beginning of the 1980s this antipathy was directed towards commercial private forest development carried out mainly by institutions. Much of this development took place in the north west of the country where competition for marginal land was limited. The primary impact of the increase in institutional interest in forestry was to increase the demand for land and thus the price for land. Indeed it has been estimated that the price of forestry land doubled from 1984 to 1991

(O'Connor and Conlon, 1993). This increase in forestry land prices has had the two pronged effect of providing a higher price for those farmers wishing to sell part or all of their farm and at the same time making land more expensive for farmers wishing to buy land to consolidate their holdings. Gallagher indicates that as a result of farmers not being able to afford to buy land, forestry was perceived as a "sinister depopulating agent, moving across the countryside and removing home-steads in its path". In a recent article on the decline and depopulation in rural Ireland (Shiel, 1994), forestry is described in very emotive and negative terms, e.g. "the insidious onward march of afforestation... empty houses caught fast in the grasping fingers of afforestation". These perceptions of forestry are a reflection of the apprehension of the farming communities regarding the future of agriculture. The past decade has seen major changes in the Common Agricultural Policy and considerable uncertainty surrounds the future of agricultural supports with GATT negotiations recently completed. For many the development of forestry is probably the physical manifestation of the decline of agriculture and criticism of forestry is probably not so much a reflection of traditional antipathy toward forestry but rather a reflection of the concern about the changes in the rural and agricultural way of life. One fact that the statement by Shiel outlined above reveals, when he refers to empty houses being grasped by forestry, is that many of the areas where forestry is developing have already experienced depopulation. An examination of population trends in a number of western counties, e.g. Mayo and Leitrim, clearly shows that rural

decline has been occurring in these counties for over a century (CSO, 1991). Indeed since the 1960s the rate of decline in these two counties has decreased. At the same time much of the afforestation in these counties occurred since 1960. Thus there is no evidence to support the claim that forestry development causes rural depopulation.

Forests because of their size and height have a major impact on the landscape. Irish forests have a particularly large impact on the landscape because they are predominantly monocultures of Sitka spruce located on hills and mountains and in large open spaces. This structure of Irish forests is a consequence of the overriding priority given (for much of this century) to safeguarding fertile land for agricultural production. Forestry was effectively confined to marginal remote areas in the hills and on bogs and only Sitka spruce and lodgepole pine could thrive on these relatively infertile soils and exposed sites. As the emphasis was mainly on economic objectives, planting usually followed the block outline in straight lines. Designing forest plantations to suit the landscape is now an important part of forest management in most EU countries including Ireland. Landscape guidelines have to be complied with if grant-aid for forestry establishment is to be received. While the effects of landscape design might not be felt for another decade or so it is important that foresters should take account of the impact of their actions on the landscape. Proper landscape design will be welcomed by the general public and should make the forestry landscape less alien to those living close to it. One particular aspect regarding the design of forests that has received some nega-

tive comment is the sense of isolation that forests can generate. This impact has been highlighted by farming organisations. The Irish Creamery Milk Suppliers' Association (ICMSA) in one newspaper article (Anon, 1993), claimed that "afforestation is dividing rural communities, the forests are creating barriers and neighbour can no longer see neighbour". While neighbours in rural areas might live some considerable distance apart (and thus are already isolated) forests by their very size and height increase the sense of isolation in these areas. In recognition of this impact the present Forest Service landscape guidelines indicate that planting must be kept a minimum 30 metres from occupied buildings and 10 metres from public roads. It may be necessary to increase this distance even further if it is to be effective.

Over the past decade, society's awareness of environmental issues has increased. Emphasis is now being put on the multi-functional role of forests and there has been increased demand for the recreational opportunities and other non-wood benefits that forests provide. With the expected increase in species diversity as well as proper landscape design, forests are expected to be more attractive for recreation purposes. In this respect forests can play a very important role in attracting tourists to rural areas. They can complement agri-tourism endeavours and can help contribute to the diversification of the rural economy. This role of forests has been recognised and encouraged with the availability of grants for recreation forests. Some rural communities have already taken advantage of the multi-functional role of forests. For example, in Killenkere in Co. Cavan, 80 farmers are afforesting 200 hectares of land as a commu-

nity project. This project has now been expanded so as to exploit the tourist potential of the forests. Walks and picnic areas are being developed in the forests and a wildlife preserve is being created. In addition seven kilometres of an adjacent river is being developed with riverside walks, broadleaf landscaping and fish pools and spawning beds being provided.

Rural communities vary in their attitudes to forestry. This difference in attitude is influenced by the stage of development of forestry and accordingly by the level of employment that it generates. Kearney and O'Connor (1993) showed that, in an area where forests have been part of the landscape for many decades and where there is a considerable level of employment in forestry, there is a much more positive attitude to forestry than in an area where forestry is very much at a juvenile stage and where employment generated is quite low. Another important factor in people's attitude to forestry is that many fail to see the link between the production phase of forestry and the processing phase. One very suitable example of this is in the article by Shiel referred to above on the demise of a community in Mayo. One of the few people left in the community where "grasping afforestation" had occurred was "the carpenter". The fact that such an occupation is solely dependent on the availability of timber seemed to be missed.

Co-operative forestry

Funding for farm forestry under the Western Package Scheme was specifically targeted towards the disadvantaged farmer who was farming small areas of poor quality land. Yet very few small farmers have diversified into forestry. A recent survey of farmers

and forestry confirmed that larger farmers are more likely to get involved in forestry than small farmers. In this survey "lack of land" was the most popular reason for not getting involved in forestry (Ní Dhubháin and Gardiner, 1993). This deterrent, i.e. lack of land, to forestry development has formed part of the impetus to the development of co-operative forestry in Ireland. Co-operative forestry has grown considerably since its beginnings in 1985 with the foundation of the Western Forestry Co-operative. Initially a group of six farmers planted 26 hectares on a co-operative basis. By 1989 this figure had risen to 474 farmers planting over 2,000 hectares. Gallagher (1991) states that the aim of the forestry co-operative movement is "to use forestry as the catalyst for self-help rural community enterprise, to exploit the possibilities of afforestation for the stabilisation of declining rural communities through the provision of jobs in remote rural areas and the improvement of the viability of small farms, and to develop forestry in a way which would enhance the landscape and safeguard the natural environment". Co-operative forestry offers many advantages to those farmers who have small areas of land that they wish to afforest. It groups the suitable forestry land available on adjacent farms into viable units and effects economies of scale in planting, harvesting, etc.

Co-operative forestry has a particularly important role to play in rural development. It allows farmers to become actively involved in forestry and allows them to have a greater input into the development of forestry in their area. It facilitates better landscape planning of forests and makes it possible to design plantations with people in mind. Forestry can also form

the focal point of a far wider community development programme. This aspect of forestry is being promoted by the co-operative movement and already some rural communities have included forestry in a development programme for their locality. The development in Killenkere in Co. Cavan, referred to above, is being carried out on a co-operative basis. In Monasteraden, Co. Sligo a forestry/peat programme has been developed. Work in both aspects is seasonal so that during the summer workers prepare material for a small peat moss factory while in the winter they are deployed in forestry work. Six jobs have been generated as a result.

A recent development in the co-operative forestry movement has been the establishment of farmer forestry producer co-operatives. Twenty such co-operatives, made up of farmer members and the statutory and voluntary bodies representing farmers, have been set up. The functions of these co-operatives include encouraging farmers to plant their marginal land, ensuring that labour requirements, machinery and inputs are available locally and ensuring greater efficiency and better woodland layout. As highlighted above many of the woodlands already established are small and isolated which will make harvesting these woodlands and marketing the output very difficult. For some the value of their woodlands may never be realised. Producer co-operatives will have the potential to address the problems that face these small woodland owners. They will not only facilitate the harvesting of small woodlands but will also give farmers a collective strength

to develop, maintain and market the produce of their plantations. As one of the functions of these co-operatives is to ensure that high quality timber is produced from farm woodlands they provide an ideal mechanism for encouraging farmers to actively manage their woodlands.

Conclusion

Forestry and its related industries are significant employers in rural areas. With production from Irish forests set to rise significantly it is expected that employment opportunities in these essentially rural industries will increase. However, like all other industries, forestry is operating in an increasingly competitive market thus employment opportunities may not be as great as originally anticipated. Nevertheless forestry will offer some of those who might otherwise leave rural areas the necessary incentive, through employment and income generation, to stay. In this way forestry will play an important role in stabilising the rural population. The increase in the forest area represents a major and very obvious change in land use. This amongst other factors has increased public awareness of forestry and has in recent years generated some negative criticism of the way and rate at which the forest estate is developing. It is vital that these negative perceptions and criticisms of forestry be responded to by the forestry profession and some steps have already been taken in this direction. The need to inform and educate the public about forest sector decision making has never been more acute.

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Broadleaves – An alternative to conifers in Ireland?

Jürgen Huss

1. The role of broadleaved tree species in Central Europe

Central Europe, originally covered mainly with broadleaves, was to a large extent reforested with conifers. Only recently a renaissance of broadleaves has begun. Before going into technical details, which might be of interest to Irish foresters, it may be noteworthy to explain the background of the original and the current forests in this part of Europe.

1.1 Natural forest coverage before the influence of man

Intensive studies including pollen diagrams have been carried out, dating back to the last decades of the 18th century about the distribution of tree species in Central Europe before the influence of man became important. As illustrated in Figure 1, they led to the following results:

- Beech (*Fagus Sylvatica*) in all maritime influenced areas – i.e. the

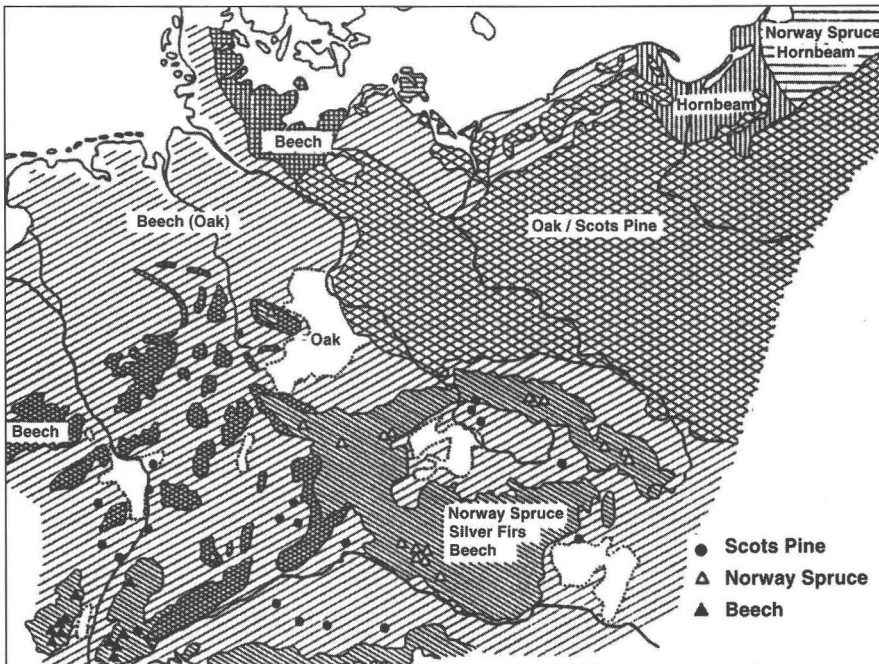


Figure 1
Natural regions of forests in Central Europe before intensive interference by man.

western parts of Central Europe – was by far the dominant species. It covered most of the lowlands, the hilly and mountainous regions up to elevations of around 1800m, in the Alps. Only in periodically flooded areas alongside rivers, on dry rocky or poor sandy soils, in the moors and in the rain shadow of some mountains did it lose its competitive capacity. The same happened in the East. In the more continentally determined climate of for instance Eastern Germany, Poland, Hungary, and Russia, beech was replaced by mixed forests of oak (*Quercus* spp.) and pine (*Pinus* spp.). Beech was only left only in “islands” in mountain regions, such as the Carpathians.

- Pedunculate oak (*Quercus robur* L.) prevailed in the riverain forests, often mixed with ash (*Fraxinus excelsior*) elm (*Ulmus* spp.), and hornbeam (*Carpinus betulus*). It was frequent also on typical pseudogleys with high watertables and in the more continental regions, as mentioned already. Sessile oak (*Quercus petraea*) evidently lived mixed with beech on dryer and warmer slopes in the low mountainous regions, sometimes in very dry areas mixed with ash, wild service tree (*Sorbus tormindlis* (L.) Crantz), field maple (*Acer campestre* (L.)), wild cherry (*Prunus avium* (L.)).
- Sycamore (*Acer pseudoplatanus* L.) and maple (*Acer* spp.) – sometimes mixed with beech – had their niches partly on rocky ground and in wet slopes in the mountains.

- Conifers such as silver fir (*Abies alba* (Mill.)) were commonly mixed with beech in the southern mountain regions such as the Vosges, Black Forest, outer borders of the Alps and Bavarian Mountains as well as in the boreal zones of Scandinavia and Russia.

Norway spruce (*Picea abies* (L.)) was generally found only in small proportions in the more continentally influenced mountainous areas but became predominant in the inner Alps and the East European Mountains as well as in the boreal zones of Scandinavia and Russia.

Pine – also of little importance in West and Central Europe – lived on extremely dry mountain slopes and rocks, as well as alongside moors. It also had only a chance occurrence in continental and boreal zones.

There is almost no dispute today, that at least two thirds of all forest coverage was with broadleaves. Conifers were only of some importance in the mountains and in the east, where they were generally mixed with broadleaves.

1.2 A short history of forest development

Since the stone age lowland forests, especially those on loess, have been gradually cleared by man, quite systematically by the Celts and Romans. There is some evidence, that oak has been particularly favoured for more than three thousand years, because of its value as construction timber and mast trees.

Today's forest distribution was established in the middle ages between 800 and 1300, when more or less all arable land was cleared, leaving a forest cover only in the mountains, bogs, and on very poor ground.

It took another 500 years until most

of the remaining forests had been heavily degraded by uncontrolled selective cuttings, by the excessive grazing of millions of cattle, sheep and goats, by litter extraction, and by the enormous need for fuel wood and charcoal. The later two were the only energy sources available to meet the high demand in households, salt and other mines and, of course, of the porcelain, glass, iron and textile industries founded by the many princely states in the 18th century.

Beech was the main casualty in this development. Oak and some other easily sprouting species such as ash, elm, hornbeam, wild service tree were being favoured where coppice forests have been built up in the hilly regions.

Little artificial regeneration was undertaken. Pine sowing, however, had taken place as early as the 14th century around some cities and industrial centres, where the forests had been heavily degraded, and oak planting was carried out to some extent in similar areas.

Nevertheless at the end of the 18th century broadleaves still prevailed.

For more than 150 years since around 1800 a remarkable reforestation and forest conversion work has taken place resulting in pure stands of Norway spruce, which are today almost 40% of European forests while Scots pine (*Pinus sylvestris* (L.)) are roughly 30%. Conifers, therefore now cover more than two thirds of today's forests.

The various reasons for this forest conversion include the following:

- The difficulty in establishing climax forests on open ground,
- soil degradation,

- expected financial return,
- need for softwood for industrial use instead of fuel wood, and
- easy handling of conifers.

Even beech forests are now mainly pure because shelterwood systems and late thinning regimes have been widely used, disadvantaging the other broadleaved species, which, without exception, demand light.

1.3 Adverse effects of coniferisation and simplification of the forest structures

At the end of the last century, many of the conifer plantations had reached the pole and small stem size stage. From then on hazards like storms, snowfalls, ice and different insect attacks started to put pressure on these plantations leading to average damage levels of 30% more than the allowed annual cut. In March 1990 hurricanes swept through southern Germany and parts of Switzerland, Belgium and France, leaving behind the sorry statistic of about 100 million m³ of windblown and broken timber.

1.4 Reasons for a renaissance of broadleaves and mixed stands

Beech, oak and mixed stands may sometimes also be affected by storms. Nevertheless, damage was always at lower levels, at approximately ten percent. There is consent today, that conifers have too often been planted on wrong sites, shallow pseudogleys being the most inappropriate soil types. Moreover, wrong provenances have been used to a remarkable extent. Low thinning, mostly carried out too late and at low intensities reduced the stability in forest ecosystems. Norway spruce stands mixed with beech proved,

however, to be especially resistant.

In order to reduce these forest risks, endeavors have increasingly been made in the last twenty years to stabilize the endangered young stands by using more adequate thinning methods. Moreover better adapted provenances are generally used. In particular, mixtures with broadleaves or total conversion from conifers to broadleaves are favoured in order to reduce the risks. Fortunately, this tendency towards more broadleaves is supported by the following developments:

(1) Heavily degraded soils now, after more than a hundred years of forest coverage, have partly recovered. This is presumably due to the fact, that the humus layers and biological activity have been restored, soil compaction has decreased resulting in better root penetration, and nitrogen input, as a result of emission of pollutants, has at least partly compensated for the tremendous nutrient export by litter extraction. Where not planted, broadleaved trees and some shrubs are reinventing, particularly the pioneer forests, such as oak into pine and beech into spruce forests.

In this regard foresters have a great friend and supporter, the jay – whereas roe and red deer tend to foil these endeavors.

On favourable sites ash, sycamore and maple are now germinating intensively as never before observed. Some people even complain about "ashification" or "sycamorisation" in some areas. Also, when not disturbed by roe deer, rowan is spreading in higher elevations and birch in the lowlands. The successional sequences thus clearly show the ecological return to forests dominated by broadleaves.

(2) Nature conservationists argue

for the conversion of pure conifer into mixed stands dominated by broadleaves, which should be structured as naturally as possible. There is now a switch from fundamentalists to "realos", who accept the compromise between natural and commercial forests realising, that people in the industrialised countries can hardly close their forests to utilisation while the tropical rain and the boreal conifer forests are being destroyed in order to supply their markets. In any case, mixed forests with a proportion of broadleaves and the structure of semi-natural production forests are now the general target at least in the public forests, which consist of state and community owned forests and total about two thirds of all forests.

Because of these arguments grants are given for the establishment of either mixed broadleaved and conifers or pure broadleaved plantations by the German government and the EU. Reforestation with pure Norway spruce on the contrary is not subsidised.

That is the reason why private forest owners have also begun to take interest in broadleaved regeneration.

(3) The demand for high quality timber from broadleaves is increasing as the tropics are less able to supply the European market sufficiently. Prices for high quality oak, beech, ash, sycamore and cherry timber have, therefore been rising for some years in comparison with coniferous timber prices. Moreover, some species such as cherry, wild service, red alder recently have become the new whizz kids. This development is illustrated in Figure 2.

(4) Most production forests in Central Europe now show an even age class distribution and thus have reached more or less a sustained yield basis.

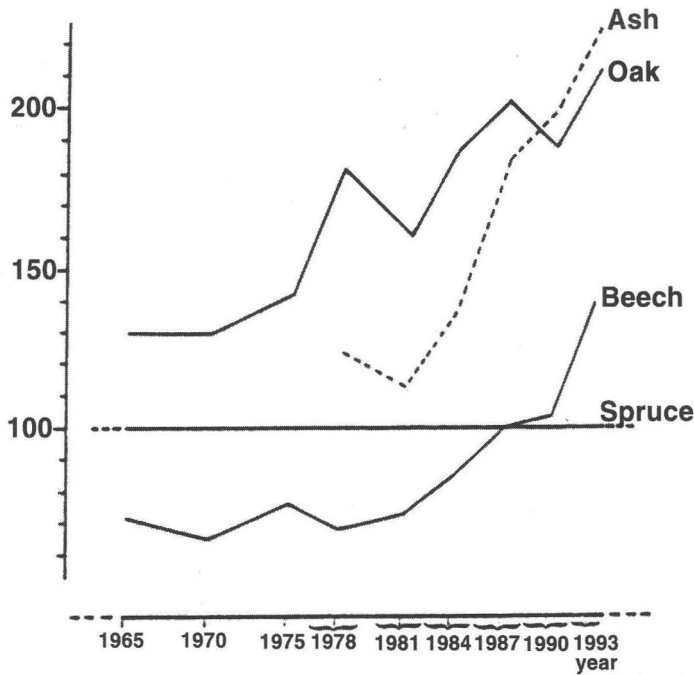


Figure 2
Development of prices of ash, oak and beech timber as compared with spruce (=100%) between 1965 and 1993 (according to data from the state forest service of Baden-Württemberg/SW-Germany).

Under these conditions the annual profit is the difference between income from timber sales and costs for planting, tending and administration. Planting etc. are therefore not regarded as investments, which must be calculated with interest.

Some calculations based on data from the forests of some German states show that oak production proves more profitable than Norway spruce, whereas pine and beech are loss making. Beech, however, is now improving (see Table 1).

2. General Silvicultural Goals and Principles for Broadleaves

Apart from details specific to the different species, there are some general principles, which should be recognised in order to make broadleaved species management successful.

2.1 Site classification

One of the main problems in increasing the proportion of hardwoods is the high site quality demand of most of these species. They prefer more or less loamy sites, well drained with a good rooting potential and sufficiently rich soil. Except for birch, rowan and aspen, broadleaves are therefore no alternative to Sitka spruce and lodgepole pine on peaty ground, on podzols, pseudogleys or on poor sandy or gravelly soils. Most of the hardwoods, moreover, are not pioneers and therefore do not grow well when heavily exposed to wind and frost.

In Germany for instance around 20 million poplars were planted in rows or small groups within or by the side of agricultural fields after the Second World War. Unfortunately, they developed poorly or failed totally as most sites were too acid, wet or cold.

Site mapping – taking into account site quality as well as exposure to climatic stress – therefore will be indispensable in order to avoid future failures.

2.2 Choice of suitable provenances

Careless collection primarily of conifer seeds from obscure sources in the late 19th and early 20th centuries and transport by railway across Europe led to poor growth and damage by fungi as well as abiotic damage. The first strict law controlling the collection of seeds, plant production and sale of plant material introduced in 1934, was one of the responses to this problem in Germany. It was later revised several times and adjusted to European regulations. As most broadleaves had been regenerated naturally not much attention was paid to them. Only recently have regions of origin been distinguished.

For several broadleaved species such as birch or aspen, no clear ideas exist about whether they show provenance differences or not and whether these should be taken into account in practice. I believe therefore that provenance trials should also be established as soon as possible in Ireland. Unfortunately, it will take a long time to gain results from them. In the meantime, however, some information may be gathered from single trees and groups, which grow by chance throughout the country.

Moreover, it will be necessary to guarantee an indisputable supply of plant material for the forest owner. Unfortunately, in spite of strict legal regulations in Germany intentional deception by nursery companies in the early eighties occurred even in recent times, which has led to the government closure of some of these nurseries.

Some examples may illustrate the problems experienced:

- It was discovered that oak seeds were collected in Rumania as pig fodder and sold as high quality material from Northern Germany.
- I found some information in the forest office of Burglengenfeld/Upper Palatine that in a pine stand, which was used for a thinning experiment, sessile oak had been sown which had been bought from a seed supplier in the early sixties. In the seventies I recognised many of the young oaks in the understorey as being Turkey oak (*Quercus cerris* (L.)) from south-east Europe.
- Some plant breeding experts from the state forest administration some fifteen years ago discovered, that all nurseries, which produced cherry transplants, had been provided with seeds by jam factories. Thus huge amounts of cherry plants have been brought into the forests, which are not suited to the specific site conditions.

Some progress had been made, however

- Seed orchards for cherry have been established — almost at the last minute — in order to save the genetical potential, and to supply the forest enterprises with adequate plant material.
- Red alder can now be supplied one hundred per cent from seed orchards.
- A great breeding program was started with birch some ten years ago, aiming at improving the often poor local strains.

- Some German state forest services have been collecting oak and beech seeds for their own use for the last twenty years. However, they are sometimes obstructed by politicians and the nursery lobby. Today's general world wide philosophy is, that private persons and companies perform better than the state organisations and therefore public activities should never compete with private ones. However, many irregularities have not been accounted for.

In any case great attention should be paid to the choice, breeding and control of the suitable provenances.

2.3 Production of high quality timber

As previously mentioned, hardwood prices have been increasing for some years as compared with conifers. The recent development of beech timber prices illustrates the changes in the market. The prices of some species like alder have also been pushed up, but this may be a short term trend.

Nevertheless, hardwoods like oak, ash, walnut, chestnut and elm have been maintaining a high price level for a long period, and as mentioned before, there is some evidence, that this may continue in the future. Lime, birch and poplar are less valuable, but when suitable for veneer, fetch reasonable prices. This trend may continue in the long run.

Hardwood production is only profitable if good quality timber production is correlated with stem dimensions, branchiness, straightness and colour. The first three criteria are strictly bound to silvicultural treatment, i.e. early choice of crop trees, favouring of crown development and pruning.

Figures 3 and 4 show an example of

the prices for beech and oak depending on quality class and dimension.

Moreover it should be kept in mind that big stems are less expensive to fell and to transport per volume unit.

2.4 Protection of broadleaf plantations

Because of the lack of seedbearers, broadleaves are generally regenerated artificially. This can be done by sowing if the soil surface is suitable. In Germany some experience has been gained from the sowing of beech, oak and birch, which are lightdemanding or intermediate species and much more sensitive to competition by ground vegetation than species like Sitka and Norway spruce.

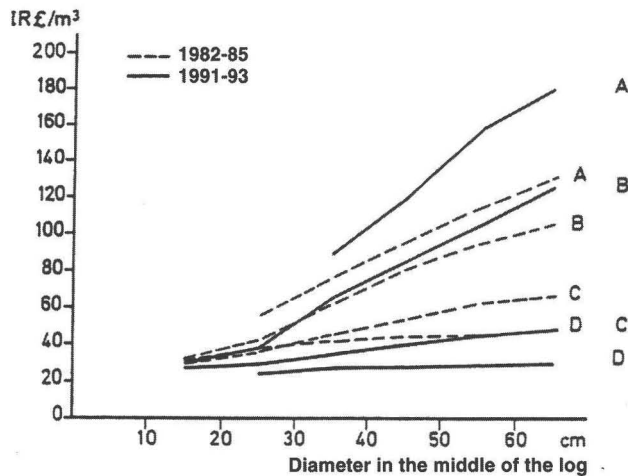
Broadleaves normally are more often attacked by mice (short tailed mice) and deer, roe deer being by far the greatest hazard to young broadleaves on the continent. That is why fencing is generally a necessity. Fencing, however, is very expensive and not always effective, as for instance wildboar open up holes in the fence, which will be used by the deer afterwards. Fences are also frequently damaged by branches or trees which have been knocked down by storms, creating openings for deer. Experiments are in progress to test the suitability of bigger sized saplings of >1.5m to overcome these problems. Planting techniques would also then need to be altered. In the presence of red deer, individual protection of each sapling by poles and meshwire would be necessary for some years.

2.5 Mixtures

When regenerating mixed stands it has to be determined how the species involved may coexist and compete in the future. In case of expected "equiva-

Figure 3

Prices of beech timber as dependent on stem dimensions and quality classes (according to data from the state forest service of Baden-ürttemberg/SW-Germany).



lent mixtures", i.e. two or more tree species will comprise the overstorey when reaching the end of the rotation period, they should be regenerated in groups. The size of each group must be at least that of the crown of a crop tree of the species concerned. This will be about 100m² for beech and oak, – 50m² for Norway spruce for example. A number of these group sizes will lead to final groups of two or more crop trees. Within these groups the trees are spaced as in a pure stand. This procedure will improve the chances of getting those species to grow evenly which might be overgrown by those that have different growth rates. For instance, the intermediate Norway spruce had suppressed beech, initially slow growing climax species on thousands of hectares in Central Europe because of insufficient group sizes. If not properly sized at the time of establishment, the groups may be later enlarged by means of tending procedures.

In mixtures of one dominant and

one intermediate species, both species should, however, be evenly mixed over the whole area. For example: oak may form the upper storey and beech or hornbeam underneath it to suppress epicormic branching.

3. Afforestation and Regeneration of Broadleaves: Targets and Techniques

3.1 Techniques as related to ecological conditions

The establishment of broadleaved stands will greatly depend on the given site conditions, such as bare ground or the availability of shelter provided by old trees. These are discussed below.

3.1.1 Afforestation on bareground

Pioneer species like birch, aspen and pine will be able to grow in climatically heavily exposed, open areas. However, their production rate will then be reduced, and they may be of poor form. Longliving, light demanding pioneers like ash and oak will

suffer even more. Although they may generally survive, growth will be extremely poor. Climax species such as beech or silver fir are highly sensitive to late frost and drought, and on this account should never be planted in exposed areas.

I therefore would like to recommend basing afforestation of bare ground largely on successional dynamics, that means to make use of the shelter of auxiliary trees like birch, rowan, willows, aspen or pines. In case parent trees occur in the vicinity, they may regenerate freely in these surroundings. Planting crop trees may then take place after the nurse trees have reached the early thicket stage. At this point it will be necessary to open up these thickets row wise to make space for planting and to reduce shade. In the following years further thinning will be inextricably tied to the light requirements of the underplanted trees. Finally, the nurse trees will have to be completely removed, after the main crop had reached the thicket stage and made crown contact.

The nurse trees may also be sown, in order to speed up the development. Experience suggests that with birch it should be sown when the snow melts. In Ireland this will be early spring

when the soil is soaked with water.

These experiences with "snow seedings" have been successfully revived recently since the dearth of large forest areas in East Germany due to pollution, and in storm damaged areas.

We at the Freiburg Silviculture Institute started experiments on hurricane damaged areas in 1991 by planting birch and aspen in wide spacings to establish shelter for oak and beech.

Worldwide there is also a tendency to make use of the auxiliary trees as an intermediate cash crop. High breeding stock of birch, aspen, balsam and other poplars is regarded as suitable for this

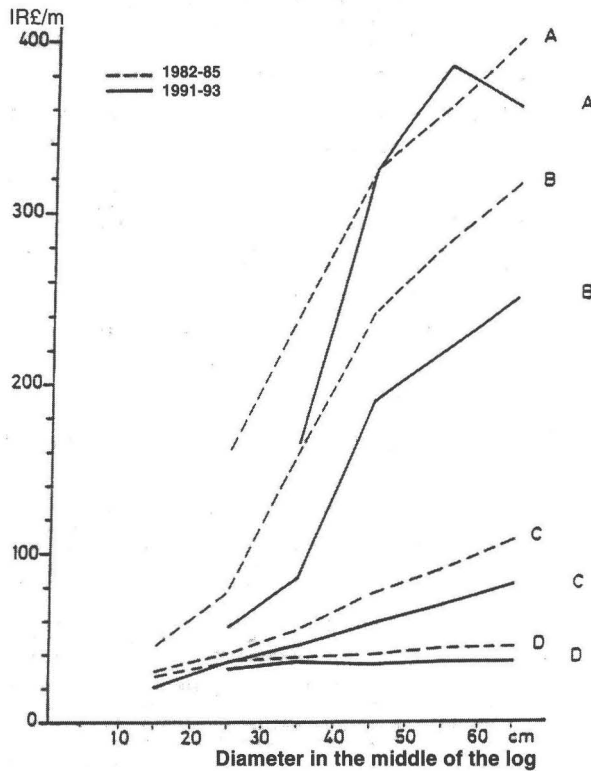


Figure 4
Prices of oak timber as related to dimensions and quality classes

purpose. The nurse trees are then reduced providing slight shelter in the thicket stage, and those overstorey trees which do not seriously compete with the main crop trees will be retained.

Models of this type should be examined much more intensively not only in the tropics and subtropics but also in temperate zones in order to develop economic systems especially for small property owners.

In Central Europe pine plantations very often acted in the same way after they had been underplanted with beech, Norway spruce, Douglas fir or silver fir or when broadleaves like oak, beech or hornbeam invaded naturally — accelerated by the jay. At the end of the pine rotation period, the old pines were carefully and successively extracted, leaving a complete young stand of mainly beech or oak, which can be managed like any other normal stand of this type.

3.12 Restitution of broadleaves in existing forests

As has been emphasized before, any shelter will be helpful for the first regeneration phase in existing forests. The more lightdemanding the commercial species like oak and ash are, the more the shelter should be opened up with the remaining shelter trees having been removed successively after ten years at the latest.

In Central Europe underplanting of beech under spruce is by far the most important example. Beech under pine is frequent, and oak under pine is going to become important.

Unfortunately, shelterwood treatments in older Norway spruce stands often result in a destabilisation of the overstorey and may lead to greater storm damage. I therefore doubt that

conversion of Sitka spruce stands into broadleaves will work in this way.

In many cases planting in gaps will be a good alternative. Gaps of not more than about half a hectare are still climatically protected by the surrounding older trees. They still provide effective protection against water stress caused by low humidity, winds and high radiation as well as against early or late frost. Gaps will be created again and again by storms accidentally. They can also be cut into existing broadleaved stands voluntarily in order to make use of the sheltering effect as well as to regenerate those parts of a stand which are of poor quality.

3.2 Techniques to establish broadleaves

A detailed description of only the more important silvicultural criteria in this field would fill a large part of a silvicultural text book. The following statements are limited therefore only to the particulars really noteworthy:

Natural regeneration may be encouraged by means of soil preparation when seedbearers exist in the vicinity. Most seeds germinate better on mineral soil than on humus layers or in ground vegetation. The use of various machinery, that opens up patches or strips on mineral soil, may therefore be favourable. Aspen normally will need prescribed burning of slash and raw humus in order to germinate and grow successfully.

- Soil preparation is also helpful for planting also, especially if raw humus layers occur. In Germany drillers are increasingly used in order to facilitate the planting process, to loosen the soil and to apply fertilisers to the planting hole.

- Poor plant quality often causes low survival rates or dieback of the tops as the seedlings or transplants have been brought up too densely in the seed or transplant beds. This shows that most nurseries either do not have experience on how to grow broadleaves, or just wish to make quick money.
 - Intensive undercutting is essential, especially for species that form a taproot like oak or a widespread root system like ash. Rootcutting after the plants have been lifted in order to ease the planting process should be strictly avoided without exception. Shootcutting will reduce water stress immediately after planting and may be carried out in the case of slim shoots with only a few branches, and where there is no competition by ground vegetation or predictable risk by deer.
 - For many years planting hoes which form inclined splits have proved suitable and are therefore common for spruce planting. However, they lead to poor root development for most broadleaves, pines and firs. Therefore increasing concern has arisen about whether or not a return to spade planting should be recommended. Planting costs will increase with this old technique. Tall transplants, in excess of one metre, cannot be planted using the traditional method because of high costs. For this reason new techniques of "excavator planting" have been tested on huge wind-blown areas since 1990. So far they look very promising.
 - There has been much discussion about spacing in combination with plant size and condition of the planting ground. Until recently most broadleaves have been planted relatively densely as natural branch pruning is essential for their later quality. Numbers range from 6,000 – 10,000 plants per ha being the standard for oak and beech, whereas 3,000 – 5,000 plants per ha is common for ash, cherry, sycamore and maple. Much wider spacing common only for poplar hybrids with about 200 – 500 plants per ha.
- Under the following conditions, however, plant density may be reduced to a greater extent:
- (1) Where tall plants or saplings are used,
 - (2) when the young trees grow under the shelter of old ones,
 - (3) if auxiliary trees or pioneers like birch, rowan or aspen fill the plantation and act as competitors favouring natural pruning,
 - (4) when artificial pruning is carried out.
- As to (1), (2) and (3) I have already explained some advantages. As to (4) artificial pruning is now generally accepted and normally practised on poplars and cherry. New experiments, however, show that it may also be applied to most other broadleaved species as long as branches are not thicker than about 3cm at the base, beech obviously being relatively the most sensitive species.
- Some scientists consequently recommend to reduce plant numbers to as

low as 500 individuals per hectare, when these preconditions are realised.

- In many enterprises autumn has become planting season for broadleaves in order to reduce work stress in spring. After a pause in August roots will thrive again in September and ensure sufficient water supply before winter. In Ireland planting after leaf fall may also be acceptable.
- In Germany fertilising plantations of demanding species such as ash or cherry will become a standard practice. Fertilisers mainly consist of mixtures of calcium, magnesium, phosphorus and potash in order to compensate for soil acidification. They are generally applied directly into the planting hole.
- The protection of the young broadleaves has already been mentioned. It often has to be carried out many times and very carefully in order to ensure the success of the plantations, and therefore will usually be very expensive.
- The release from competition of ground vegetation and of nurse trees as well as from competitors of naturally regenerated species may be necessary several times before real thinning is regarded as necessary. As pioneers like birch and aspen tend to grow very fast in the first years, tending operations will be more essential the smaller the number of young trees planted per unit of area.

4. Critical Prognosis

Forest owners are becoming increasingly interested in broadleaved

species because of improved economics, higher ecological values and physical stability and greater acceptance by the public. Their advantages as explained earlier – will however only be fully realised if the trees get the chance to grow to maturity and reach large dimensions. Rotation periods, consequently, must definitely be much higher than that of Sitka spruce. Under German conditions poplars will need a rotation period of 40 years, birch 60-80 years, cherry 80-100 years, ash 120-140 years, beech 130-150 years and oak 160-300 years until they reach their optimum. Modern regeneration and thinning regimes may somewhat accelerate the growth of crop tree dimensions, and the favourable Irish climate will also accelerate growth. Nevertheless it will take much more time to produce high quality timber even in your country than to grow small sized coniferous sawlog.

In the long run, broadleaves will be, I believe, a real economic as well as ecological alternative to Sitka spruce plantations on many sites, mainly because of the much smaller risk from abiotic as well as to biotic factors. Moreover, the higher prices per unit of timber will at least partly compensate for the lower volume production. At any rate, pure broadleaves, and mixtures with other conifers will add much to the beauty of the countryside.

All over Europe experiments have recently been started to use broadleaves such as poplars and willows for short rotation energy coppice crops – this however, is another theme for another day.

Professor Jürgen Huss, Institute of Silviculture, Forestry Faculty, University of Freiburg, Germany

Forestry and Recreation

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Environmental Studies, University College, Dublin

Introduction

In this paper, we review the existing levels and trends of forest recreation in Ireland to the extent that the data allow. We then examine its value, and conclude with a review of the policy implications. An appendix is included which outlines general issues in forest recreation valuation.

Existing Levels and Trends

In the NESC Report No. 46 (Convery, 1979), Irish Forestry Policy, the data for visits to forest Parks are given as contained in Table 1.

These data show an overall compound annual rate of growth of 12 per

cent, with considerable variation within this total. What has happened since 1976? While there are figures for charged day visits to Coillte's forest parks (Table 2) these data are not comparable with those in Table 1 since they do not capture the number of visitors who enter on days when no charge is levied. However, aggregate data are provided in Table 3 (Coillte's figures do not include patrons of the Killykeen holiday complex).

These data seem to indicate two things:

- The very high level of visitation to the State-owned forests; over 1.5

<i>Park</i>	<i>Year</i>			<i>Annual Avg.</i>
	<i>1972</i>	<i>1973</i>	<i>1976</i>	<i>Growth Rate (%)</i>
Ards	—	27,845	51,708	23
Avondale	—	18,000	36,000	26
Dœn a R'	38,460	52,475	60,742	12
Gougan Barra	71,000	56,000	58,000	-5
Lough Key	125,000	147,000	264,000	21
JFK	115,300	90,000	80,000	-9
Total	349,760	392,156	550,450	12

Table 1.
*Number of visits to
 Forest Parks,
 1972 to 1976.*

Note: Growth rate computed from the widest spread of data available, except for the total, where the rate is computed from 1973 to 1976.

Source: Convery, 1979 p. 93.

Table 2.
Day Visits to
Coillte Forest Parks
for which a
Charge¹ is Levied²

Forest Park	County	Visits ³
Ards	Donegal	15,000
Portumna	Galway	4,000
Rossmore	Monaghan	1,000
Dún an Rí	Cavan	20,000
Lough Key	Roscommon	60,000
Currahchase	Limerick	6,000
Farran	Cork	15,000
Gougan Barra	Cork	13,000
Killykeen	Cavan	4,000
Donadee	Kildare	4,000 ⁴
TOTAL		142,000

Notes:

¹A Charge is levied when it is considered economical to do so eg. weekends, high season etc.

²1993 Figures.

³to nearest thousand.

⁴Excluding caravan park.

Source: Personal Communication, Coillte (M. Brennan).

Table 3.
Forest usage,
Republic of Ireland.

Category	Numbers (000s)
All Forest Use ¹	1475
Forest and Other Parks ²	587
Specialist Groups:	
Orienteers ³	30
Walkers ⁴	230

Notes and Sources:

¹1993 Figures Including visits to Forest Parks, and all other forest visits (walking, orienteering etc.) in Coillte's forests. Source: Personal Communication Coillte (M. Brennan).

²Includes National Parks (under jurisdiction of OPW) as well as Forest Parks. Source: Tourism International, 1994.

³Source: Personal Communication IOA (F. Cunnane).

⁴"Tourist" walkers. Source: Bord Fáilte, 1992.

million visits from a resident population of less than 3.5 million is impressive.

- The negligible growth – and perhaps the drop – in visits to Forest Parks since 1976.

This lack of growth stands in contrast to the pattern of rapid growth recorded in the case of the 37 National Monuments under the control of the Office of Public Works, where visitor numbers have risen from 835,962 in 1989 to 1,481,529 in 1993, an average annual growth rate of 15 per cent; this exaggerates the growth rate slightly, because the 1993 number includes some new sites – notably Cide Fields and Hill of Tara – which have come on stream since 1989 (Scully, 1994). However, it is consistent with the steady state situation which prevails vis-a-vis visitor numbers to forests in Northern Ireland (Table 4).

Although growth is modest, the number of paying visits amounts to about one third of the NI population. The NI Forest Service is planning on putting in place mechanisms which

would facilitate the measurement of visits to other forests. There is a little more growth in the numbers caravanning and camping, and those staying at youth sites (Table 5).

It seems likely that in both jurisdictions, Forest Park recreation has matured in the sense that the local market is "saturated" and there is little participation in the rapidly growing tourist industry, whereas, presumably, the National Monuments and historic sites are benefiting from this growth. There is also a question as to the extent to which the forests as at present constituted have comparative advantage in the world tourist market as magnets. For North Americans who have savoured the profusion of colour of the Appalachians in the spring, or the majesty of the redwoods of California (or even of Sitka spruce in the Olympic peninsula...) the Irish diet of Sitka spruce and lodgepole pine may not be irresistible. In the Republic, statistics may well also reflect the fact that Coillte is not recovering even the variable costs of its recreation provision. Given the company's very explicitly commercial brief, there seems to be little incentive to promote or otherwise develop the recreational facets of the forests under its control, an issue we address later on.

However, there are domains where our forests may have a niche in the international tourism market, and this is where forests are used as "backdrop" for other activities:

Forests in Ireland are used for walk-

<i>Forest Park</i>	<i>1989</i> (000s)	<i>1992</i> (000s)
Tollymore	151	139
Castlewellan	62	60
Gortin Glen	22	28
Gosford	41	54
Glenariff	72	66
Slieve Gullion	7	6
Lough Navar	18	20
Ballypatrick	17	17
Portglenone	7	14
Parkanaur	8	9
Car Permit Holders	43	45
Total	481	484

Source: Northern Ireland Forest Service, 1994.

ing, enjoying the scenery, camping, pony trekking, horse riding, mountain biking, motorcycling and orienteering. Waymarked trail walking is a relatively new pursuit in Ireland with the first trail being opened in 1982. In Ireland all waymark trails with a couple of exceptions have some portion in woodland (Fig. 1). The Mountaineering Council has over 3500 members but sales of walking guides are well in excess of this figure (personal communication, J. Lynam, Chairman, Long Distance Walking Groups Committee). There are an increasing number of accommodation providers who are 'packaging' forest walks as a core part of their attraction (Convery et al, 1992).

The Long Distance Walking Groups Committee have made a submission to the Forest Service for the

Table 4.
*Number of
Paying Visitors to
NI Forests (000s)*

<i>Activity</i>	<i>1989</i>	<i>1992</i>
Caravanning and Camping Usage (nights)	19,571	21,526
Youth Sites (nights)	12,226	13,442

Source: Northern Ireland Forest Service 1994.

Table 5.
*Overnight Stays at
NI State Forests*

Strategic Plan for the Development of the Forestry Sector to the Year 2015 which lists that one of its aims is "to assess the potential of the various elements of the forestry sector to make a greater contribution to national economic and social well-being" and invites interested parties and the public to prepare submissions.

Orienteering was developed by the Swedish Army in 1903 and was established in Ireland in 1969. As a sport it is reliant on forests for its survival. Results are distorted when competitions takes place on open land since it allows competitors to see other runners. The sport encourages skill in map reading and is the second most important sport in army circles, second only to shooting and as such is of importance for army and Garda training. Competitors range in age from 8 to 65 years and as such is very much a family sport at a cost of about £2 per competitor. In 1993, 153 orienteering competitions were organised under the auspices of the Irish Orienteering Association with the number of runners varying from between 150 and 600. Assuming an average of only 200, this means that more than 30,000 runs were made last year. Club membership is about 2,100 with an estimated 1,000 others also involved. In 1993, an estimate was made by Coillte of the impact of Orienteering on a forest. The OPW tested the Leinster Championships at Cronybyrne, near Rathdrum and informed the Association that they found no detrimental signs and no rubbish (personal communication, F. Cunnane, National Fixtures Sec., Irish Orienteering Association).

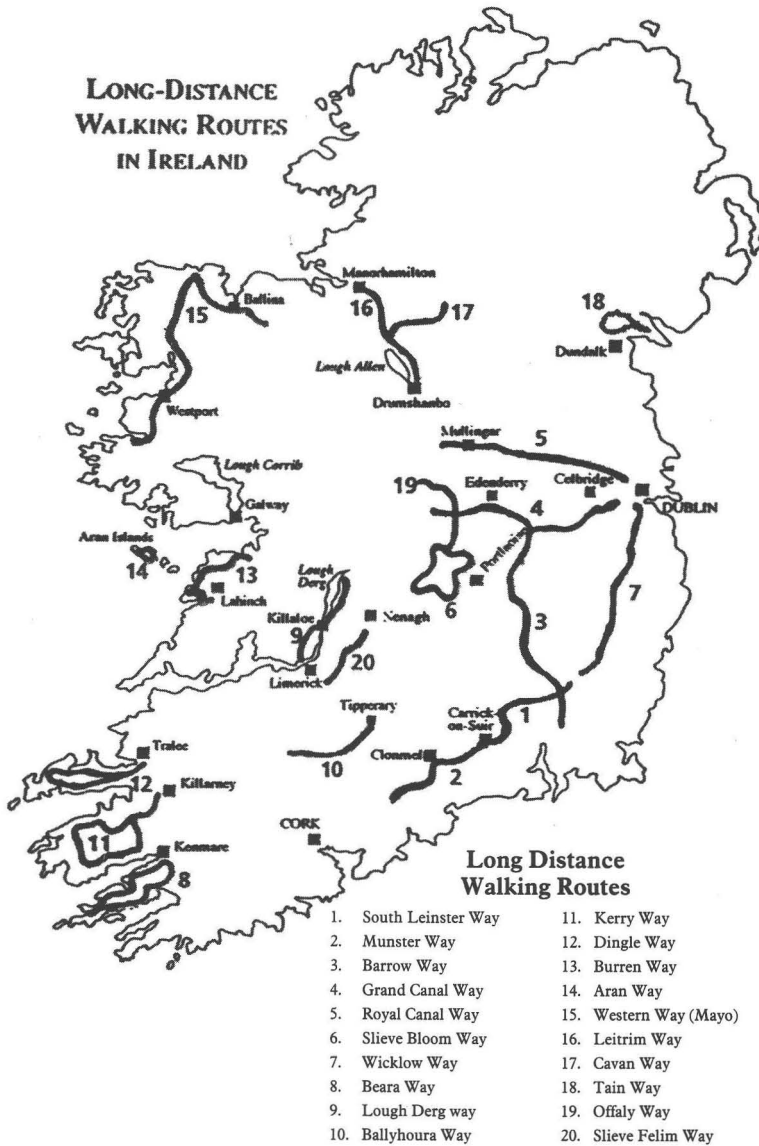
Tourism

In Developing Sustainable Tourism (1992) Walking is deemed to be the

third most important special interest product for ROI with 230,000 overseas participants in 1991 of which 40,000 had their choice of holiday destination influenced by the provision of this facility. Bord Failte's target is to raise these numbers to 350,000 and 70,000 respectively by 1997. Bord Failte proposes to establish Ireland as an internationally recognised centre for adventure sports such as Orienteering. In 1991 7,000 overseas visitors participated in adventure sports of which 3,000 were influenced in their choice of holiday destination by the facilities provided and the intention is to increase these numbers by 1,500 and 1,000 respectively by 1997. These facilities are of great importance in providing niche markets for tourism in Ireland. From these figures it is clear that forests can help to attract tourists. This is most important when you consider that foreign and domestic tourist expenditure amounted to £1,717.8m in 1991, the exchequer raised £326m from foreign tourism and £149m from domestic tourism by way of taxes and tourism revenue accounted for 7.3 % of all exports of goods and services (Bord Failte, 1993). It is worth noting that over one third of all visits to Irish tourist attractions are made by Irish residents (Tourism Development International, 1994).

What income and employment impacts might reasonably be expected? Assuming an average expenditure per visitor of £325 (Department of An Taoiseach, 1990) and a total expenditure (direct and indirect) per job generated of £25,000 (Deane and Henry, 1993), then 40,000 visitors would have the following employment impact:

$$40,000 \times 325 \div 25,000 = 520 \text{ jobs}$$



Valuing forest recreation benefits

It is typically the case that it is difficult practically and politically for the owner – and especially the public owner – to “capture” in the market place the benefits which forest recreation provides. Three methods have been developed to place a value on forest recreation. These are: Contingent Valuation (involving surveys of beneficiaries), Travel Cost (involving using travel costs to derive willingness to pay) and Hedonic Pricing (involving use of effects of forests on property values). The background and rationale of these approaches are described in some detail in Annex A, as are the results of a number of studies in the UK, Netherlands and Sweden.

The results of a well known valuation study in the UK are shown in Table 6.

Hutchinson and Chilton (1994) examine forest recreation in Ireland and Scotland using Contingent Valuation and multi-site Travel Cost (see appendix A for an explanation of these terms). Thirteen sites were chosen in ROI and fourteen in NI comprising 0.7 % and 13 % of the forested area in each jurisdiction respectively. Willingness to Pay (WTP) a site entry charge for a single day visit to a ROI forest varied

from approximately £0.80 to £2.18, with an average WTP of approximately £1.50. These figures are lower for NI with lower and upper bounds of approximately £0.60 and £1.55 with an average WTP of approximately £1.10. Some of the most frequently visited sites received a lower average WTP. Since many of these sites are urban forests WTP is reduced by frequent return visits. Aesthetic assessments of the sites were undertaken and the authors report a positive correlation between site quality and WTP. Total recreational benefit for the sites studied was £6.25 million in NI and £7million in ROI. They estimate total recreational benefit by adding declared travel and other visit related expenditures to average WTP site entry charges which are then raised by estimated visitor numbers. The study finds no relationship between site size and total recreational benefits.

The authors suggest that the generally high value of urban forestry combined with the small geographical size of their market area provides a “strong argument” for more resources to be devoted to this form of land use. The study estimates that over 50 % of recreational visits took place on sites covering 0.7 % in ROI and 0.4 % in NI. This

Table 6.

Estimates of British forestry recreation values using the Travel Cost Method (Benson and Willis, 1990).

	<i>Lowest Value Forest (1988 £)</i>	<i>Highest Value Forest (1988 £)</i>	<i>Mean Value Forest (1988 £)</i>
Individual recreation value (per visit)	1.34	3.31	2.00
Recreation value per ha	1.00	428.00	47.00

Source: Bateman, 1992.

Year	State Forests 000s ha	Private Forests 000s ha	Total 000s ha
1922	10	106	116
1938	19	101	120
1993	439	163	602

Table 7.
*Forest area, Ireland,
1922, 1938 and
1993.*

Source: Convery and Clinch; Forest Service, personal communication; NI Forest Service, 1994.

would suggest that the majority of subsidies for the provision of forest recreation should go to a small geographical area rather than to all forest owners.

If, for purposes of illustration, we apply the average willingness to pay per visit of £1.50 to the estimate of visit numbers to Coillte's forests of 1.475 million, we find a total annual WTP of just over £2.2 million. (Note that this figure does not give the total cost to the consumer of forest recreation since it does not include other costs the consumer is willing to pay to experience forest recreation such as travel cost and opportunity cost and thus is not directly comparable with Hutchinson and Chilton's estimate of total recreational benefit).

The Coolatin oak woods provide an interesting example of willingness to pay on the part of the Irish public to conserve a woodland which they regard as of some uniqueness. Approximately IR£40,000 was collected from private individuals to support the public purchase of the woods; presumably this was done in the main with altruistic intent, without any hope or expectation of pecuniary gain. The Coolatin case comprises an example of what economists call 'option value' a willingness to pay to keep options open. It is a separate question as to what such options are; what is of interest for our purposes is that there was a "willingness to pay".

The supply of forest recreation in Ireland

The extent of the forest estate in Ireland is shown in Table 7. While it is clear that the majority of the forested area is owned by Coillte or the NI Forest Service, annual planting by private investors has increased dramatically over the last ten years as a result of falling returns from farming and increasing grants for forestry (Table 8).

It must be noted that some of this forestry would not be suitable for recreational use and not all is available for such a purpose.

Forests are increasing in importance for outdoor recreation as public access to farming land becomes increasingly limited. In the UK, the government's "Forestry Review Group" has been examining the costs and benefits of selling off portions of the Forestry Commission's estate. The estate consists of over 1m ha and has a potential value of £1.7 billion. The Review Group has received submissions from some 300 organisations and 3,000 individuals and faces a strong anti-privatisation lobby led by the Ramblers Association who are concerned about the loss of public access. While woodland has been sold to private companies with an agreement to allow public access, this agreement cannot be continued to a second purchaser (Economist, February 5th-11th 1994).

Table 8.

*Total planting
(afforestation and
reforestation), Ireland,
1982-93, in hectares.*

<i>Year</i>	<i>State</i>	<i>Private</i>	<i>Total</i>
1982	8,033	687	8,720
1983	7,988	345	8,333
1984	7,988	539	8,527
1985	7,573	844	8,417
1986	8,155	2,623	10,778
1987	8,752	3,477	12,229
1988	11,153	5,584	16,737
1989	11,201	8,738	19,939
1990	11,288	10,315	21,603
1991	12,052	11,930	23,982
1992	12,420	9,654	22,065
1993	12,003	10,082	22,085

Sources: Convery and Clinch; State planting 1989-92 from Coillte Annual Reports; State planting 1993 from Coillte, personal communication (G. O'Reilly); NI planting 1992-93, NI Forest Service, 1994.

The first official way marked trail, the Wicklow Way, opened in 1982 and there are now 20 ways (Fig. 2) covering 1700 km of walking (Cospoir, 1994). The routes are established in co-operation with Bord Failte, Coillte, private landowners and local authorities. Bord Failte (1992) estimate that an extra 20 nature trails will be required by 1997 in order to accommodate the increased number of walkers.

Incentives to provide forest recreation in Ireland

Coillte

Coillte estimates that the cost of providing forest recreation in 1993 was £527,496 or £0.36 per visitor (Table 9). It is important to note that the figure for total cost is comprised of variable cost and depreciation i.e., it constitutes the cost of the upkeep of the forests (the maintenance cost) but does not

Table 9.

*Coillte Costs and
Revenues from Forest
Recreation¹*

<i>Category</i>	<i>Amount (000s 1993 IR£)</i>	<i>Per Visit (1993 IR£)²</i>
Cost ³	528	0.36
Revenue	267	0.18
Net Revenue ⁴	(261)	(0.18)

Notes:

¹1993 Figures.

²Based on number of Visits of 1.475 million.

³Not including costs of public liability claims.

⁴Brackets indicate a deficit.

Source: Personal Communication, Coillte (M. Brennan).

<i>Category</i>	<i>Commercial Recreation² (000s Sterling)</i>	<i>Non-Commercial Recreation³ (000s Sterling)</i>	<i>Total (000s Sterling)</i>
Cost	108	499	607
Admin. Cost	179	343	522
Revenue	190	229	419
Net Revenue ⁴	(97)	(613)	(710)

Table 10.
*NI Forest Service
Costs and
Revenues from
Forest Recreation¹*

Notes:

11993 Figures.

2Cost of operating camping and caravan sites at forest parks plus services involving the rearing, selling and shooting of game.

3Cost of providing amenities at forest parks for day visitors.

4Brackets indicate a deficit.

Source: Personal Communication, NI Forest Service (P. Hunter Blair)

include the fixed cost of establishing the plantation (personal communication, Martin Brennan). It also does not include any modification of timber management required to accommodate the recreation use in question. The Northern Ireland Forest Service estimate the costs of providing recreation to be £522,000 sterling (Table 10).

The Public Liability Conundrum: There is a disincentive to allow access to existing forests for recreational purposes because of fears of damage been caused. However, the largest disincentive would seem to be public liability insurance. Forest owners are liable for possible large payouts even to trespassers who injure themselves while in the woodland. Coillte (and its predecessor) has paid out over £100,000 in damages to visitors to its forests since 1986 including a single payout of £80,000 for an ankle injury. It faces a possible further £130,000 payout in unsettled cases (personal communication, Coillte, M. Brennan). The Law reform Commission is expected to produce a report in the near future which is likely to become the basis for a change in the public liability law.

Annual revenue generated by Coillte from forest recreation in 1993 is estimated to be £267,000 or £0.18 per person. Thus net revenue to Coillte is minus £260,496 (Table 9), to which must be added the cost of meeting public liability costs. This amounts to Coillte subsidising each visitor by 50 % (£0.18). NI Forest Service revenue from forest recreation is estimated to be £419,000 Sterling giving a net revenue of minus £710,000 Sterling (Table 10).

The entrance fees charged at Coillte's forest parks are shown in Table 11. The NI Forest Service levies similar charges at forest parks where it is economical to do so.

Coillte's forest parks are used by a wide variety of groups who apply on an individual basis for permits to carry out certain activities such as orienteering and pony trekking. The Orienteering Association has its own insurance policy such that Coillte are not liable for personal injury during an event. Some private forests are provided free of charge for orienteering (personal communication, F. Cunnane, Fixtures Sec., Irish Orienteering

Table 11.
*Entrance fees charged
at Coillte forest parks.*

<i>Category</i>	<i>Entrance Fee (£)</i>
Adults	1
Car/Family	3
Season Ticket	15 (access to all forest parks)
Coach	16
Minibus	8

Source: Personal communication, Coillte
(M. Brennan)

Association).

A TDI survey calculated the average admission charge to parks (forests and otherwise) in ROI to be £1.66 with 63 % of those surveyed rating value for money to be "very good" (TDI, 1994).

Grants for planned recreational forestry are payable from the Rural Development Operational Programme. However, grants contribute to establishment costs but not to Coillte's maintenance cost.

From the foregoing, we conclude that there is no incentive for Coillte to provide forest recreation under the pricing and other conditions prevailing.

Under Section 12 of the Forestry Act, 1988, the duties of the company are laid out: They emphasise the financial and commercial dimension, including:

The need to ensure that revenues are sufficient to meet all charges (including depreciation); to generate a reasonable proportion of capital needs; to remunerate capital and repay borrowings; to conduct business in a cost effective and efficient manner.

The only oblique reference to recreation is the duty: to have due regard to the environmental and amenity consequences of its operations.

Defining "due regard" given the other pressures on the company is a

challenge. Under Section 38, the Minister may issue directions in writing to the company requiring the company to, inter alia: provide or maintain specified services or facilities, to maintain or use specified land or premises in the company's possession for a particular purpose.

If the company satisfies the Minister that... it has sustained a loss in complying with a direction under the relevant subsection, it shall be entitled to recover the loss from the Minister.

There is an implicit, if rather weak, recognition here that cross subsidising may be inhibiting the achievement of commercial objectives. However, it seems to us that it would certainly be preferable if there were an explicit understanding as to the recreation facilities and services to be provided, and then if these were budgeted for separately, some perhaps allocated on a tender basis.

Private Investors

We failed to get any data, for either the Republic or Northern Ireland, as to the nature, extent and potential of recreation on private forest land.

Grant Support for Forest Recreation and Amenity Provision in ROI: Grant applications for planned recreational forestry under the 1992/93 guidelines must include plans and specifications for planting and recreational facilities together with estimated costs and detailed maps. If there is a limitation on public access the reason must be given. The proposal must include at least one planned or existing specific amenity attraction such as fishing lake, picnic sites, substantial river frontage, game development, walks or nature trails or archaeological site; or be located in an urban area. A minimum of 1700 and

1100 plants per hectare is required for conifers and broadleaves respectively. All plantations must include a minimum of 10 % broadleaves and a mixed conifer/broadleaf plantation must contain a minimum of 40 % broadleaves. As with applications under other forestry grant schemes they must comply with the various guidelines related to fisheries, archaeology and landscape. Unplanted space is limited to one third of the total area.

The grant level is set at 85 % for farmers and co-operatives and 70 % for others subject to the following maxima:

£2000	per ha for broadleaves.
£1100	per ha for conifers.
£350	per ha for construction or upgrading of access and recreational facilities including seats and signs.
£200	per ha to public agencies to encourage community involvement and for promotional and educational work.

The progress made by this scheme is shown in Table 12.

The scheme is expected to continue from 1994-99 under the new Forestry Operational Programme but EU approval (at time of writing) has not been received.

In its submission to the EU Commission concerning the Forestry Sub-Programme of the new Operational Programme for Agriculture, the Department of Agriculture, Food and Forestry is seeking to assist further private investment in recreational/amenity forestry under the 1994-99 round of structural funds. It proposes to encourage the conversion of derelict woodland in tandem with the development of recreational/amenity forestry. In such cases woodland owners would be required to provide public access for

a specified minimum number of days per annum. Charging for admission would be permitted as there would be no maintenance grant (personal communication, Forest Service, A. Murray).

Grant aid in the UK: One of the aims of the UK Woodland Grant Scheme (Forestry Commission, 1993) is to "encourage people to create new woodlands and forests to offer opportunities for recreation and sport". In addition to establishment grants and management grants there is a Community Woodland Supplement of £950 per ha which is paid to encourage people to create new woodlands near towns and cities which can be used for informal recreation. To be eligible the woodland must be within 5 miles of the edge of a village, town or city and in an area where the current opportunities for woodland recreation are limited. Charges can be made where special facilities or services are provided. Once the woodland is 11 years old it will be eligible for a Special Management Grant.

It is clear the involvement in Ireland in grant aided amenity/recreational forestry is extremely modest at present. However, it grows, and if one takes the view that there is a greater demand for recreation in broadleaf forests, then this could tip the revenue streams in favour of broadleaves and increase their paltry rate of planting. However, the long

<i>Year</i>	<i>Number of Schemes</i>	<i>Area (ha)</i>
1992	4	172
1993	10	253

Source: Forest Service, personal communication.

Table 12.
*Progress of Planned
Recreational Forestry
Scheme*

time span required for the development of a forest (particularly broadleaf) capable of providing a recreational secondary use may be seen as prohibitive. For this reason incentives to convert derelict forest (particularly broadleaf or mixed forest) seem most appropriate.

Attitudes to forest recreation

Boyle and Storey (1993) carried out a survey at six forest sites in the Greater Dublin area during the summer of 1993 to ascertain attitudes of visitors to the sites and the impact of forest recreation on the residents of Enniskerry, Co. Wicklow. Visitors used the sites mainly for passive recreation, walking, admiring scenery and nature and taking fresh air. The main areas of concern for both local residents and visitors were litter and vandalism and visitors suggested sign posting should be improved. One quarter of visitors were concerned about the security of their car while parked in forest carparks. While few visitors worried about personal safety, local residents were concerned about unsupervised campers. The majority of visitors were not willing to pay an entry fee but were not opposed to the funding of recreational forestry from taxation. Local residents believed that the forests provided an amenity value as well as improving the surrounding environment. The majority of those sampled believed that motorcycling should be banned within forests.

Annex A: General issues in forest recreation valuation

Introduction

In his famous treatise *The Wealth of Nations* Adam Smith argued that individuals acting purely out of self-interest

would help to maximise the economic welfare of a nation (Pearce, 1992). This doctrine, known as "laissez-faire", is the basis for the market economy, whereby pressures produced by the free play of market supply and demand will induce adjustment in prices such that the socially optimal (most desirable) quantity of a good is produced. But the untrammelled market does not achieve all of society's objectives: the market fails. In forestry, market failure occurs where the market does not produce a socially optimal level of a particular forest service or product. This happens in the case of inputs and outputs which are not bought and sold through markets, where costs are not borne by the perpetrator of same, and benefits are not captured by the provider thereof. These are called external costs and benefits, or externalities. External effects are commonly found in forestry (Figure A1):

It is important to note that forests can simultaneously be a generator of external costs and benefits in the same category. Thus, some forms of recreation, e.g. orienteering, will be expanded, while others, e.g. grouse shooting, may be diminished.

Externalities result in an inefficient allocation of society's scarce resources; where the forest owner is producing external costs and/or external benefits, then, by definition, he or she does not bear the consequences or capture the fruits thereof, and will "overproduce" the former, and "under produce" the latter.

Recreation as an external effect

Recreation can be considered as a positive or negative externality produced by forestry. Walking, taking nature trails, camping, picnicking, hunting, berry picking, horse riding, orienteering, mountain bike riding, motorbike scrambling, bird and wildlife watch-

ing, 'paint-balling', fishing in forest lakes, army training, scouts and girl guides expeditions etc. can all take place in forests. Thus, forests make an important contribution to the well-being of the population and make a significant contribution to revenue from tourism. However, forests can also take away open spaces and destroy the ecological and archaeological environment and thus restrict recreation, thereby imposing external costs.

'Capturing' the benefits accruing from forest recreation

Are the recreation benefits yielded by forests external, i.e. are they such as cannot be 'captured' by the forest owner? For the most part, they are: numerous small parcels of land make limiting access difficult and expensive technically, and it can also be fraught politically. How can these external benefits be 'internalised' such that Coillte or the private investor can capture the benefits? Unless such internalisation takes place, the investment (path clearing, sign posting, picnic and camp site provision etc.) needed to provide the optimum level of recreation will not be forthcoming. 'Optimum' in this context is the provision of recreation and other forest goods and services such that the gap between benefits and costs, i.e. net benefit, is maximised. But for the forest owners to give appropriate weight to recreation, they must get a 'signal' which encourages them to give it due weight.

Let us look at a highly simplified hypothetical example below: In columns (i) through (v) in Table A2, the forest is used to produce wood and recreation; the costs and outputs are shown for various levels of input. It is assumed that the inputs and outputs are all measured in the same units. In

<i>External Benefits</i>	<i>External Costs</i>
Wildlife Habitat	Destruction of
Natural Landscape	
Biodiversity	Recreation Loss
Shelter	Amenity Loss
Soil Stability	Habitat Loss
Amenity	Biodiversity Loss
Recreation	Soil Degradation
Carbon Sinks	Loss of Game
Macro-climate	Hydrological:
Regulation	water traps
Berries/Game	acidification
Ecology Value	silting
Hydrological:	Reduction of
regulation storage	Archaeological
Endowment	

Source: Bateman, 1992

Fig A1.
*External Costs and
Benefits of Forestry.*

columns (vi) and (vii), the situation in this regard is where the forest is used to produce wood alone is shown. In the case of the combined product, the forest can, up to a point, produce more recreation and wood. Up to an input level of 20, the production of wood and recreation are complementary in that both can increase. However, thereafter, recreation can only be increased if wood output is decreased - the uses are competitive. It can be seen that net output is greatest - at 10 units - at input level 30, yielding 30 units of recreation and 10 units of wood. If the forest is used to produce wood alone, then the optimum input level is 20, with a net of six.

A few points are notable:

- In practice, we know very little about the Production function for

Table A2.
*Hypothetical
Combinations of
Recreation and
Wood Output
from a Forest.*

<i>Input (Costs) (i)</i>	<i>Recreation Output (ii)</i>	<i>Wood Output (iii)</i>	<i>Total Output (iv) (ii)+(iii)</i>	<i>Net Output (v) (iv)-(i)</i>	<i>Wood Only Output Gross (vi)</i>	<i>Output Net (vii) (vi)-(i)</i>
10	0	5	5	(5)	5	(5)
20	10	15	25	5	26	6
30	30	10	40	10	33	3
40	33	9	42	2	38	(2)

forest recreation, the outputs which would be yielded by differing levels of input, and we know very little about the trade-offs, if any, involved in producing more recreation and less wood (or other outputs).

- It is clear that if the recreation output noted in the example above could not be captured by the forest owners (and if there were no other outputs the benefits of which they could capture) they will produce wood, yielding a net benefit of 6, instead of the 10 yielded by the combination.

This illustrates why it is so important to somehow 'reward' the forest owner for producing the socially correct level of recreation, defined in this case as the level, combined with other output, which maximises net benefits. It also illustrates the need to derive a value for recreation which represents somehow the value society places on the experience provided and availed of.

Measuring the value of forest recreation

Demand for recreation can be subdivided into three types of demand (Benson and Willis, 1991). Effective demand is measured by the number of

visitors to forests. Deferred demand is the result of people placing an 'option value' on forest recreation whereby they value forestry simply because they know the facility can be availed of in the future by themselves or future generations (the 'bequest motive'). Potential demand for forest recreation can result from a number of factors including technological or socio-economic change. Altruism can play a role such that people obtain some value from knowing that others enjoy this facility.

There are a number of methods available to value a non-traded good such as forest recreation. Amongst these are:

Contingent valuation

This method collects preference information by way of a survey in an attempt to measure the willingness of individuals to pay for an increased (or decreased) provision of forest recreation. The question posed to individuals in the survey might be as follows:

"It is suggested that a National Park be established. This would allow locals and visitors to take scenic walks, hunt, pick berries etc. The project will be financed by a general income tax. Would you as a citizen be willing to incur an A % increase in income tax to

finance such a scheme?" If the answer is no, the tax change is decreased until willingness to pay (WTP) is established.

Travel cost

This uses individuals' actual behaviour rather than what they say they will do. Demand for a recreation site can be measured by the costs of travel to that particular site. Assume there is a single forest that can be reached by individuals in a certain area. The area can be divided into a number of zones according to distance from the forest, say, zones A and B. The number of trips per capita and the average travel cost for these trips from zone A and zone B (which is further from the park) are calculated by surveying those attending the forest park from these areas. Sets of observations like these can be used to estimate a "distance decay curve for trips" which is negatively sloped such that the farther away from the forest a community is situated, the higher cost and the fewer the visits, all else equal. Average consumer surplus from a visit to the forest park from areas A and B is calculated from the curve and total aggregate willingness to pay for the forest is given by total consumer surplus plus actual travel cost. The assumption is implicit that the visitor who travels farthest, i.e. incurs the greatest travel cost, is at the margin; they would not have left home for this facility if they knew that they would be charged an admission.

Hedonic prices

This method involves deriving some indication of the value of a forest by comparing prices of housing identical in all respects apart from distance from a forest.

Appropriateness of measurement methodology

Both the Contingent Valuation and Hedonic Prices approaches would make it difficult to distinguish between externalities and so make it difficult to isolate WTP for recreation. There are many factors involved in the purchase of a house apart from proximity to a forest let alone recreational use. Studies have been done in Britain to estimate the value of total external effects from forestry using hedonic prices (e.g. Garrod and Willis, 1992), but it is generally felt that the Travel Cost Method is more useful since it can isolate recreation more easily. However, the assumption that utility is uniform across visitor categories is very strong and limiting.

The main problem with the Contingent Valuation Method is that there is an incentive to "free-ride". If consumers have to pay according to their stated willingness to pay, they may try to conceal their true willingness to pay in order to qualify for a lower price. However, if respondents believe that the price or the tax charge is unaffected by their response, they may have an incentive to overstate their WTP (Johansson, 1992). While the Contingent Valuation Method explicitly states the aim of valuing recreation to those completing the questionnaire there is the risk that individuals may intentionally or subconsciously take other external effects or prejudices for or against forestry into account when answering, and people may or may not take into account the opportunities forgone by using the forest for recreation. The Travel Cost Method is likely to provide a lower bound on the value of recreation since it seems fair to assume that the value of recreation to individuals must be worth a sum that

is at least equal the cost of getting to the forest. Problems arise in that unlike the Contingent Valuation Method this travel cost cannot capture option values or altruism. There are also likely to be variations in tastes, incomes, etc. across the population zone used to estimate the distance decay curve.

Practical examples of forest recreation valuation

Bateman (1992) gives a useful outline of studies which attempt to put a value on recreation in the UK. In 1972 the UK Treasury used surveys of car numbers at forest parks and applied an imputed parking fee which resulted in a figure of £1.32 million (approximately equal to £9 million in 1990 values). In 1986 the National Audit Office estimated the value of informal recreation to be £10m using the same technique. The indirect technique of using a parking fee is unlikely to capture total benefit from or willingness to pay for recreation. Benson & Willis' (1990, 1992) study using the Travel Cost Method places a value of £53 million (1988 prices) on recreation in the total Forestry Commission estate and the results are shown in Table 5 of the main text. This study was undertaken to justify the subsidisation of the Forestry Commission's losses despite government funding of £30 million.

In response to the criticism that some visitors may view their costs as petrol alone while others may take time and car running costs into account, Willis & Garrod (1991) undertook another study using the Travel Cost Method based on petrol costs alone. This produced a startling reduction in recreation value per visit from approximately £2.00 to £0.60 and a consequent reduction in the total annual recreation

value of the Forestry Commission estate from £53 million to £9 million per annum. Garrod and Willis (1992) use the Travel Cost Method to estimate consumer surplus of non-priced open-access recreation and valued it at £8.665m. They suggest that since people only visit forests for recreational purposes once or twice per year on average, recreational aspects of forestry don't enter into household's location decisions. While the estimates are seen to be widely variable, it does show that there is some justification for

Government subsidy, i.e. grant schemes, purely in relation to recreational value. McGilvray and Perman (1991) suggest that few estates can rely upon income from sporting use alone. With returns to agriculture decreasing and forestry investments not being particularly attractive the combination of agriculture and/or forestry with recreational use may be necessary to maintain viability. However, the social opportunity cost of land is rising as the derived demand for recreation on open land increases.

In May 1987, a face to face survey was carried out amongst a sample of 499 Dutch householders to estimate the social costs of damage to forests and heathlands which was assumed to take place in the future if air pollution was not reduced. The central question was what Dutch people would be willing to pay to avoid a further deterioration in the National Forests and heathlands. It was assumed that recreational and aesthetic values of the forest would be significantly reduced in the event of the deterioration taking place. On average, respondents were willing to pay 11 (1987) ECUs per month (with a median value of 5 ECU per month). This mean value amounted to 689 million ECU (1987)

for Dutch society as a whole (van der Linden and Oosterhuis, 1988).

The very high Dutch values are a reflection in part of the high population density, high levels of income, education and environmental awareness, and the relative paucity of forest. In Sweden, where forests are pervasive, and farm land is relatively scarce, there is a willingness to pay to prevent half or all of agricultural land to be converted to spruce forests (Drake, 1987).

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The Nature Of Forestry

Niall OCarroll

Aims and objectives

In choosing a title for this contribution I have deliberately echoed the title of a lecture: "The Name and Nature of Poetry" given by the poet A. E. Housman at Cambridge in 1933. He relates how he was asked by an American source to provide a definition of poetry. In reply he said: "I can no more define poetry than a terrier can define a rat, but we both recognise the object by the emotions that it arouses in us." (Housman, 1933) Like most such analogies the comparison is inexact, particularly as I argue from the premise that forestry is a science, and not an art. I propose to discuss certain aspects of forestry in the hope of clarifying, at least to myself, something of its nature.

I start from the assumption that the primary purpose of forests is to improve the life-quality of humankind through the control and management of trees and their associated ecosystems. I would offer that as a useful criterion to which proposed actions might be referred.

However, at the more specific level the primary purpose of a forester is, of necessity, to secure an income. This can usually be achieved only by satisfying an employer, either as an employee or as a consultant. But among the conditions of employment of a forester, as with most professionals, there is also a requirement, either explicit or implicit, to provide advice

to the employer or client and thereby to guide the employer in the formulation of his objectives and how they may best be achieved. The nature of forestry as it has evolved is such that well-defined and ethically valid objectives will rarely if ever be found to be in conflict with the basic principle as it has been formulated above.

Forestry and the public

It is clear that public attitudes to forestry are changing. In the less developed countries the principal concern is with the use of a native or national resource, and the extent to which the benefits arising from that use can be assessed as improving the lot of the local population as a whole. Indeed that is a concern which might have arisen in various parts of the world over many centuries (Westoby, 1989) and not least in Ireland, particularly during the seventeenth and eighteenth centuries (McCracken, 1971). That the concern has developed so widely and intensely now is probably due to a recent combination of universal education, comprehensive and rapid communications, and local political awareness and self-confidence.

In the more prosperous countries a relatively extended period of peace and comfort over the past half century has enabled opinion leaders to develop their thinking on the longer term implications of current policies and actions, and to disseminate these

conclusions. Extended leisure has allowed more people to become aware of the value of forests as amenities and sources of recreation. All of these developments are correct and valid. They are rational developments of logical arguments based on common experience. The difficulty is that in many cases the arguments have been extended irrationally. Developments which are unexceptionable on any rational basis are likely to be attacked by fanatical devotees of some extreme school of thought, who may perhaps find in their enthusiasm a substitute for other, more internal forms of spirituality.

Forestry as science

I have said that forestry is a scientific discipline, but it is better described as a combination of different disciplines. Forest management planning is mathematical; forest protection is based on biology and physics; forest harvesting is largely engineering; forest policy relates to the sciences of sociology and psychology. The basic science is silviculture. Silviculture is less easy to characterise. It must be clear that by the standards of laboratory sciences such as physics, chemistry or physiology, silviculture is a very primitive science. The laboratory sciences develop by hypothesis and observation¹ in which the basic experimental unit, as in a physical measurement or a chemical reaction, is instantaneous or nearly so (Medawar, 1967 and 1969). In silviculture the unit of observation, to be totally valid, must be a whole rotation, anything from about 50 to 200 years.

There is of course, an acute scarcity of documented observations covering whole rotations, and in that situation we must try to find other avenues to

progress. There are at least two approaches. One is to assemble many observations over fractions of rotations and to try to assemble these, much in the way that dendrochronologists assemble overlapping sequences of tree-ring data. The other approach is to treat silviculture as a science similar to geology or cosmology, in which the close observation and analysis of current phenomena can then lead to the hypotheses which seem to us to best explain the development of those phenomena. This approach was described in a recent paper as "identifying the kinds of forests we want and trying to work backwards to see how they reached the desired condition (Smith, 1992)

Research

This leads to a consideration of the place of research in silviculture. A character in a novel by Henry James defines science as "the absence of prejudice backed by the presence of money" (James, 1905). That is a fair definition, but modern research seems to lay far more emphasis on the second element, the presence of money, rather than the first, and sometimes even seems to favour a "prejudice" which will lead to further funding. It must be said that the present approach to the appointment of researchers, on limited-term contracts, may be sound in relation to other sciences, but in silviculture it is not conducive to the carefully thought out, long-term forest experiments which we require in order to place silvicultural management on a sound scientific basis.

Services and controls

The various services provided by forestry to society have been discussed by previous speakers. There can be little doubt that for the foreseeable future

the main service that will be required is a supply of wood for industry, or in some countries for fuel. In any enterprise it is a pre-condition of efficient management that there be a commercial motivation on the part of the owner and the management. Forests can be managed so as to produce wood very efficiently indeed, but the more intense is the management concentration on efficient wood production, then to that extent also the provision of other socially desirable services is likely to be diluted. It is here that the State, acting on behalf of its citizens, becomes involved. Local attitudes and traditions will largely determine the nature of the State involvement, whether it will intervene by means of the carrot or the stick. Stick-based intervention has the disadvantage that ownership may decide that its freedom is so prescribed that it no longer wishes to continue the enterprise, and thus the social functions may themselves be put at risk. Usually there is a judicious combination of stick in the form of statutory controls in respect of functions which are socially vital, such as wood supply, erosion control, or water quality, and carrot in the form of subsidies in respect of modifications which are socially desirable such as landscape, recreation and some aspects of conservation.

In circumstances where the State uses tax revenues to subsidise the purely commercial aspects of forestry, such as the initial creation of the forest, then it is quite reasonable that the State should require in return that the constitution and management of that forest should reflect the sectoral requirements of the society which has provided the subsidy. It will often happen that modifications induced by incentives will in themselves be of

direct commercial advantage to management. For example, I believe that an increased proportion of conifers such as Norway spruce and Douglas fir, and of some broadleaves, as a result of the new EU based forestry programme, will result in a significantly advantageous improvement in the quality and value of forest produce.

Wood as a fuel is a major service provided by the forest. It has been estimated that half of the wood harvested worldwide is used as fuel (e.g. FAO, 1993). But the provision of fuelwood, or biomass, is not now seen as a major objective of forest management in temperate or in boreal forests. Considerable research has been completed and the results are in the published literature or stored in files. But a crisis in respect of the environmental or other implications of the continued use of fossil fuel and nuclear energy must arise sooner or later. Wood must then figure as a major acceptable alternative, with advantages over other sources, such as wind power or wave power.

Forest ownership

The ownership of forests is a matter which arouses strong public opinion. This became clear when a proposal was made by a non-political source in 1986 that Irish State forests should be sold. It is also clear from the current debate on a similar proposal in Britain. The apparent emphasis in the British public debate on the question of public access sidesteps the major issue, that of public control, particularly of exploitation and regeneration. At different times and in different social systems, forest ownership has ranged from royal or State ownership, though ownership by large integrated timber-using industries to small woodlands in

private ownership. All in their own way can contribute to the needs of society. The key is adequate and appropriate control by society, mainly in order to modify extreme short-term reaction to market forces. State control of private forestry activity is now a universally accepted concept and is applied with varying degrees of rigour in different countries throughout the world. Even in the USA, "the land of the free" (Key, 1814) the Supreme Court found in 1946 that State control of forestry on private land was fully in accordance with constitutional rights and provisions (Cubbage and Siegal, 1985).

The future

Looking into the future is always an uncertain matter. In the 1960s there was speculation that the hungry nations of the world could be fed with artificial protein, an idea that ended with remarks such as that reported from a leader of one such nation: "My people want steaks like everybody else". There might well be a similar response to the undoubted progress in genetic engineering, and the promise of trees with artificially predetermined characteristics. I may be permitted to express a measure of personal biased satisfaction that it will not happen in my time.

On the other hand we might ask should we concentrate now, for instance, on planting Norway spruce and Douglas fir and managing them with a firm intention to match and compete with the best Baltic white-wood or Oregon pine? Should we be growing oak with the intention of producing top quality timber in perhaps 150 years? My answer to these questions would be yes.

Valuation

But ultimately the question arises of the commercial value of forestry, or to be more precise the commercial value of forests. The most logical approach to this, and one that has been universally accepted, is the net present worth, or the value now of all future income and costs discounted to the present at a rate which represents the real long-term earning capacity of investments, and ignoring all previous cash flow. In the case of man-made forests it is natural to compare this value with the net historical cost, if only to see whether the costs of the investment have been justified, and, more importantly, to see whether further investment can be justified. Such a comparison was carried out by the Review Group on Forestry in 1985. It found that the Irish State investment in forestry, in spite of severe restrictions on the quality of land made available, in spite of the trials and errors inevitable in such a pioneering enterprise, in spite of the constraints on operational freedom associated with Civil Service procedures, that investment had earned a real compound interest return, on top of inflation, of around 2% (Review Group on Forestry, 1985).

The net present worth (NPW) or net discount revenue (NDR) approach to forest valuation has long been adopted in Ireland, and in Britain where State-owned forests are also largely of human creation. But recently we have seen the Forestry Commission of Great Britain change to an open market valuation, based on a hypothetical assumed sale of the forest estate between a willing seller and a willing buyer and assuming its existing use. The adoption of this new approach has reduced the 1992 valuation from £2,788 million under the old system to £1,700 million under the

new, a reduction of 39% (Forestry Commission, 1994).

In this context it must be borne in mind that the market value of forests is heavily influenced by artificial and temporal factors, not least of which are the State incentives and subsidies available in support of forest establishment and management. But while these factors may distort the apparent or commercial market value of forests, their real value to the State and to society remains unaffected.

Thus the position is that State investment in forestry is commercially justified in itself, even before we begin to consider all the social values which have been the subject of today's discussion.

Public control

Seen in this light forests have always been a vital concern of governments, and to be preserved and maintained as such. All organised States have laws, of varying degrees of stringency, designed to ensure the sustainment of forests and all of the benefits which derive from them. But just as in life the price of liberty is eternal vigilance, so also in forestry we must never lose sight of the danger consequent on an excessive emphasis on a commercial return, or profit, particularly in relation to the primary output, wood, which is equally both the factory and the product.

What conclusion does all this lead to? It leads me to conclude that forestry is an indispensable public service, with an essential commercial motivation on which it depends for its

sustainment, but that that commercial motivation in itself constitutes a potential threat to sustainment, requiring that the whole activity be closely monitored and controlled at government level.

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'The Joys and the Riches O' Kathay'

Augustine Henry and the Trees of China

E. Charles Nelson

Introduction

Professor Augustine Henry is acknowledged as the 'father' of Irish commercial forestry, as the 'prophet of forestry in Ireland and the forests are to keep his memory green'¹. His promotion of the planting of wind-tolerant, vigorous, northwestern American conifers has had obvious effects on the Irish landscape. When we are honest, the wisdom of this aspect of Augustine Henry's work must be questioned, because a dense, dismal monoculture of conifers is not always an ornament, no matter how profitable. Such criticism is, of course, one-sided and fails to take into account Henry's philosophical views about forests, woods and trees and fails also to acknowledge his work as a botanical explorer and collector, his roles as a dendrophile and teacher and his contributions and accomplishments as a scientist who recognised, for example, that hybrid vigour could be exploited to the betterment of planted forests.

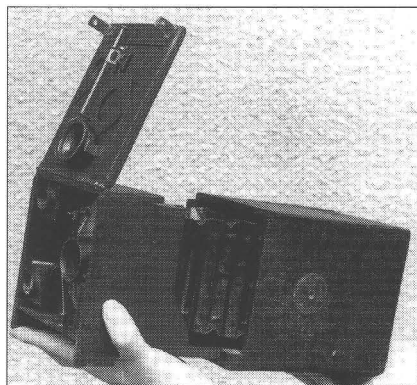
In *Forests woods and trees in relation to hygiene*, Henry quoted Alexander von Humboldt: How foolish is man in destroying the mountain forests, as thereby he deprives himself of the wood and water at the same time.²

Henry saw forests, woods and trees not merely as economic resources to be exploited, but as vital, renewable resources to be cherished for the well-being of the entire human race, not just

in his own time but in times to come. Augustine Henry was a conservationist long before conservation became a fashionable pursuit. He held a broad view, and certainly did not view a forest or piece of natural woodland simply in terms of the amount of cash that could be earned per hectare, although as a professional arboriculturist he was not unaware of the economic value of well managed timber-lands.

Ninety years ago, Dr Henry gave an illustrated lecture on forests to the Royal Dublin Society. He expounded some of his views about the wild woods and planted forests that he had seen in France, Ireland and China. Echoing Humboldt, he began with these forthright statements:

Man, since he emerged from the purely hunting stage, has been at work destroying the natural forest. The primitive modes of this



Augustine Henry had this camera with him in China,³² and from his diaries of 1898 and 1899 we know he was a careful photographer. No single album of his Chinese photographs has survived and those used here are attributed to him in the absence of evidence to the contrary. (Camera by courtesy of Catherine Gorman; photograph by David Davison).

destruction may still be observed in countries like China, . . . In our own country the destruction of the forests is well-nigh complete. Nearly every bog is the site of an ancient forest.

He added a melancholy opinion:

It appears to be an almost constant rule that, once forests are cut down by man, it is with great difficulty they are naturally reproduced.³

A few years later, when asked by Professor John Campbell, during the enquiry into Irish forestry held during November 1907, "Have you any views on the application of the principles of natural regeneration to Ireland?", Henry replied with this pointed question, "Where have you the woods to regenerate?"⁴

Augustine Henry:

Origins of a forest prophet

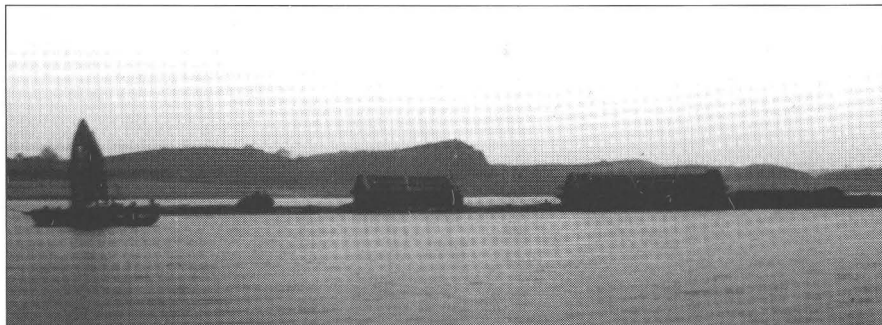
Who was this man who abhorred the destruction of wild woods, and who was to promote the cultivation of man-made forests? What has China got to do with his dendrological career? How did the 'joys and riches' – botanically speaking – of Kathay, the Celestial Empire, influence his attitudes to forests and trees? He was not a forester nor a woodsman by trade, so where did he gain so deep and thoughtful an appreciation of woodlands, trees and forests?

Augustine Henry was born in Dundee, Scotland, in 1857, the son of an Irish father and a Scottish mother.⁵ He was brought up at Tyane, a townland on the banks of the River Bann, in County Londonderry, a few miles from the village of Portglenone.⁶ That part of Ireland is not by any means a wooded land, although today there are conifer plantations nearby. Augustine went to school in Cookstown and when

he completed his schooling, gained a place at Queen's College, Galway, where he studied arts. In 1877, he graduated and then moved to Queen's College, Belfast, competing for a scholarship that enabled him to continue his studies but obliged him to spend a year in The London Hospital. Henry obtained his Master of Arts in 1878 and went to London for a year. He returned to Belfast, and while the available evidence suggests that he had little real ambition to pursue a career in medicine, Henry was recruited by Sir Robert Hart into the Imperial Maritime Customs Service where a vacancy existed for an assistant medical officer. Henry rapidly acquired a licentiate from the Royal College of Physicians in Edinburgh – to allow him to practice medicine, including surgery – and he sailed for China in 1881. Dr Henry spent most of the succeeding two decades in China, leaving that country for the last time on 31st December 1900, the last day of the last month of the nineteenth century.⁷

Henry in China

In March 1882, Henry was transferred to his first lengthy posting at Yichang on the Ch'ang Ch'iang (Yangtze River), over 1,500 km inland. Henry's non-medical colleagues were involved in keeping inventories of exports and imports and gathered taxes on behalf of the Chinese authorities. His duties within the Imperial Maritime Customs Service were those of an assistant medical officer, so Augustine Henry was not in China as a forester, let alone as a botanist, nor even as an explorer. For two and a half years he led an indolent life whiling away time by playing whist, learning tennis, and venturing out on occasional hunting forays after pheasant, deer and wild antelope.



Boats on the Ch'ang Ch'iang (Yangtze River); an original print of this is inscribed on the back – 'Timber raft'. Augustine Henry probably took this photograph himself.

We know from Henry's diaries that he was not interested much in matters botanical, let alone dendrological, until 1884. That mid-summer he noted in his diary that he had ordered botanical books.⁸ November 25 1884 was an epochal day – 'Crossed river – botanised about Shil-liu-lung'.

What brought about these two events, the purchasing of botanical books and the botanising? Yichang was a desolate place – Henry actually used that phrase in the one surviving letter from his first decade in China. He wrote to his long-time friend, Miss Evelyn Gleeson, on March 26 1885, thanking her for her 'intoxicating ... charming letter' and Christmas card, adding that

You can have no idea how exhilarating is the reading of such a letter to one like me – a lonely man in a desolate place... Life here is very monotonous. I am sorry to say there is not even a tiger. I have got various armaments, but I am a wretched shot, which is curious, as I play tennis (I learnt to do so here) very well and have not a crooked eye – & my hands are steady, but perhaps I am a "butter fingers".

Then Henry contradicts himself – or seemingly contradicts himself – by

relating that "The country is charming, but I cannot get much away. I am now studying botany a little..."⁹ There is, in my interpretation of Henry's letter, no contradiction. By 'country' he meant, in a veritable Irish sense, the vast territory beyond the city and the city's minuscule European community, the wide-open spaces of the river and its gorges, the mountains and adjacent valleys. That countryside was 'charming' because by the spring of 1885 Henry had learned that the wild flora was enticing and interesting.

One week before he wrote to Evelyn Gleeson about the desolate city, Henry had sent his first letter and first botanical specimens to the Royal Botanic Gardens, Kew. The seeds were from the Chinese varnish tree, *Rhus verniciflua*.

A good number of medicines are grown about here and there seems to be a fair number of interesting plants; and as this part of China is not very well known to botanists (at any rate, as compared with the south and also the northern and maritime provinces) interesting specimens might be found.¹⁰

Thus, the open spaces, the extraordinary medicinal herbs unknown in European pharmacopoeia and his

innate, insatiable curiosity combined to lead Augustine Henry into botany.

Henry as botanist

There are now few people alive who can accurately recall Professor Augustine Henry and none who knew him in China. A few decades ago, he was still remembered vividly as an ebullient person and in some circles, as an eccentric, even comical man. Henry was also a scholar with wide interests who very frequently was tempted off the beaten track into arcana; for example, he strove to identify the fabulous golden fleece of classical antiquity. He was an avid collector of marginalia and ephemera,¹¹ but he was also single-minded when pursuing some immediate problem. He was humorous yet obsessive about minutiae. This latter characteristic, recalled by the late Miss Elsie Miller¹² who had to photograph larch cone scales for him, is perhaps the most pertinent when we consider his diversion from a career in the mundane routine of general medicine into botany and dendrology.

Henry was especially curious about Chinese medicinal herbs and their names, both in Chinese and in scientific Latin, making the complexities of nomenclature and taxonomy the explicit reason for making contact with the Royal Botanic Gardens, Kew:

I was induced at the beginning of the year to commence to take an interest in Chinese botany, in the hope of being able to give proper equivalents to Chinese names of plants, as it is my intention to make a translation some day of the more interesting parts of the Chinese work on *Materia Medica* (the Pen Ts'ao)...¹³

While no manuscript that might represent Henry's translation of the

Pen Ts'ao is traceable among his papers, during the mid-1880s he made careful notes, in his own copies of the customs inventories, about Chinese medicinal herbs. His book, *Notes on economic botany of China*¹⁴, published one century ago, also includes many references to medicines and cures. He certainly did manage to identify and thereby to provide modern scientific names for numerous plants used in Chinese traditional medicines, and may well have tried the medicines too.

We have therefore followed Augustine Henry into botany – he entered out of curiosity and boredom. During the next fifteen years, as he continued routinely to work in the Imperial Customs Service, Henry collected plants and employed several native collectors to cover territory he was unable to investigate thoroughly. His personal collection and his collectors' gatherings were transported regularly to Kew for study and while we cannot compute accurate figures for the entire collection, it is generally accepted that during his time in Yichang, Henry brought to European attention at least one new plant family,¹⁵ not fewer than 25 new genera and approximately 500 new species. In Taiwan (Formosa) he collected over 750 separate accessions and by his own accounts, his gatherings of sub-tropical south-western China were very extensive.

In all, Henry and his collectors were responsible for sending to Kew over 15,800 different specimens, representing perhaps 5,000 species

As for trees, Henry's first discoveries – or, more correctly, the specimens which he and his collectors collected – included a series of astonishing plants. As these were from temperate, central China, many from areas underlain by limestone, the plants have proved

amenable to cultivation in western Europe, including Ireland. However, it is important to stress that at the time he was collecting specimens for naming and was not directly concerned with the task of gathered seeds so that these plants could be grown in European gardens. To confine my examples to trees, Henry's first collections included *Acer henryi*, *Carpinus turczaninowii*, *Emmenopterys henryi*, *Eucommia ulmoides*, *Pinus armandii*, *Tilia henryana* and *Davidia involucrata*.¹⁶

Davidia was undoubtedly his most significant find – but he was not the first European collector to gather specimens. He did obtain fruits, and sent these to Kew where they were pickled. Henry recalled his impressions of this tree as he first encountered it – ‘a solitary tree... in a mountain wood in central China, south of the famous Yangtze Gorges...’ on May 17 1888: ‘one of the strangest sights I saw in China, riding up a river valley, was *Davidia* in full blow on the other side, waving its innumerable ghost handkerchiefs.’¹⁷

Why was the ghostly handkerchief tree so influential? In a letter to William Thistleton-Dyer at Kew, dated June 3 1897, replying to a request for seeds of the Chinese redbud (*Cercis racemosa*), Henry suggested that the authorities at Kew

ought to make a strong effort to get the consul [in Yichang] to send one of the coolies who accompanied me on my trip to the locality, & procure not only seeds of the *Cercis*, but also of *Davidia*... Why *Davidia* is worth any amount of money... *Davidia* is wonderful.¹⁸

Thus began the campaign by Augustine Henry to encourage Kew to send a collector to China. He succeeded. On September 28 1899 Ernest

Wilson reached Simao, ‘clasped the worthy doctor’s hand’ and thereafter obtained instructions from Dr Henry about the locality where the ghost handkerchief tree grew. *Davidia*, more than any other plant, was the prize that stimulated the extraordinary series of expeditions to central China and the valleys and mountains of Burma and Tibet which began in 1899 and which have continued ever since. The roll-call begins with Augustine Henry and proceeds with Ernest Wilson, George Forrest, Frank Kingdon Ward, Reginald Farrer, Joseph Rock and William Purdom. The Chinese also participated – Tse-Tsun Yu being the most memorable and important.

Ernest Wilson noted that Henry’s ‘hobby devoured him and fortuitously enmeshed me.’ John Besant wrote that

If [Henry] had done no more than make known the marvellous riches of China he would have achieved more than most men... Happily so many plants bear his name that while trees and shrubs are cultivated his memory remains in every garden and arboretum for long years to come.¹⁹

Thus the ‘joys and riches o’ Kathay’ were, in part, unearthed by Augustine Henry.

Henry as forester

Few of Henry’s letters covering his first decade in China survive and so there is a lacuna about his thoughts about forests while he lived and worked about Yichang. In fact, by his own accounts, there was little natural forest in the hinterland of Yichang because trees and shrubs had been felled indiscriminately:

... firewood was ... sold to the river-boats & carried to the large cities down the river. The result of

A charcoal oven in China – another way in which vast quantities of wood were exploited. Augustine Henry probably took this photograph himself.



this collection of firewood which had gone on for centuries was that hardly any trees existed within five or ten miles of the great river. Forests were only to be met with in the interior mountains at three days journey.²⁰

In 1889 Henry took leave and returned to Ireland where he married for the first time. Caroline accompanied her husband on his second tour of duty when Dr Henry returned to China as an 'ordinary' official in the Customs Service, not as a medical officer. Caroline Henry did not enjoy good health and died in Denver (Colorado) during September 1894. After his wife's death and a further period of leave in Europe, Henry ventured to China for the third time in 1895 and in May 1896 journeyed into the south-western provinces, to Mengsi. He had been promoted, and was Acting Chief Commissioner of Customs with the official status of a mandarin. The letters that Henry wrote during his third tour, when he lived in

some of the most remote parts of China, are the most revealing - at times very introspective - letters, indicating his 'conversion' into a dedicated plant-hunter (when time permitted) and a convinced dendrophile.

The wild forests of south-western China greatly impressed Dr Henry, but he was also depressed by the fate of some of these superb natural tracts of virgin woodland. Writing from Mengsi in January 1897 to Professor Charles Sargent at Harvard University, Henry began to enunciate the disquiet he had about the forests' survival.

I haven't been to any tremendous forest yet, though I was in one which must have been 15 miles long: but I had awful weather on that trip. My native has just come back from a forest situated between here and Laokay, which he described as full of immense trees and lots of big game:- bear, wild pig, red-

deer, musk-deer, and panthers. It is very curious to note how persistent the Chinese have been in deforesting their country. On the Red River in Tonking we saw much forest: but the moment we entered the Yunnan part of the River, only grass, hills and little shrubberies ...²¹

More telling is his diary, written while travelling in this region. On 14 February 1899 he set off at 11am from the custom house at Simao 'with chair & 4 chair coolies'. Towards the end of the arduous trip, on 26 February, Henry wrote (his phrases are often staccato):

Sing Ya appears in valley below ... it is a valley of 10 houses. This is really the proper place to turn off to Szemao [Simao], we hear afterwards. We now come on thro a Pine wood which is very beautiful. Most of the leaves here turned a golden yellow to the sun shines through the wood delightful. There are no trees so beautiful as Pines... The beauty of the Pine woods & seeming health of them ...²²

And later that day:

Importance of early investigation of flora of China before all the forest is cut away. Also mineralogist to be sent to investigate the mines.

In this territory he also saw such plants as *Paulownia fortunei* – 'amongst trees ... the most beautiful I have ever seen ... which in Yunnan ravished the eye with its myriads of violet foxglove flowers ...'²³

The richness of the forests made the greatest impact on Henry, not the quantity or quality of the timber. He was equally impressed by the *lack* of forest; on that same march of fourteen days during the spring of 1899 he trav-

elled into country that was

... dreadfully barren – totally deforested: and all this done by a few wretched settlers, as the population was scarcely 5 to a square mile. I really appeal to you and others to get up some expedition to western China, to explore botanically and to collect seeds, bulbs etc. The work of destruction of the forests is going on rapidly, as the Chinese are displacing the aborigines & wherever the Chinese go, forests disappear. In 50 years, many plants will be extinct I am sure. Such an expedition need not be costly as travelling in China is cheap. I could of course give advice and hints if such an expedition is thought of. The results to arboriculture & horticulture would be very great, as western China is the richest floral district in the world.²⁴

These thoughts continued to exercise Augustine Henry throughout the time he lived at Mengsi and Simao, and in July 1899, he wrote this passionate paean for the forest in a letter to Evelyn Gleeson.

Yesterday I was in a forest near here. A band of Lolos were out hunting the big deer: and we saw many fresh tracks. At one time we were somewhat excited, as the jungle was much beaten down & the tracks seemed very large: we thought first it might have been an elephant, but careful examination showed it to be deer. It seems monstrous that the deer & elephants get no rest, as the hunters are always after them for their horns & ivory and before a hundred years I suppose they will be extinct. What a wretched earth it will be with only rats & smaller fry of sorts.

The birds here are untouched but I daresay their gay plumage will one day entail their destruction. The calm way in which man extirpates animals & ruins forests annoys me. Man is an uncanny brute; he wants the earth.

The necessity which will always exist for timber, will however necessitate in the future great forest reservations in all countries & these forests can thrive. So there is hope. A forest is the finest thing in the world: it is the expression of nature in the highest form: it is so full of beauty and of variety. Here every form of vegetation is to be met with. The tall trees, the small trees that grow in the shade, the

climbers that too weak themselves depend on the trees for support to reach the sky. In the gullies & ravines grow the tall ferns and graceful palms, with here & there great grasses twenty or more feet high. On the trees the orchids get a foot hold, & besides them the smaller & pretty ferns - the pretty herbs & other ferns also grow in the shade of the cliffs²⁵

Yet not all forests pleased him: '... I don't care for Red River vegetation: it is tropical, often very gay, much magenta colouring - but there is not the chaste beauty of the temperate mountain vegetation.'²⁶

As a botanist, Henry gained great pleasure from discovering the riches of

Henry's personal guard in southern China - note the hills beyond are denuded of trees. Henry evidently took this photograph himself.



the flora of China, but his joy was tempered by the vision he had of the forest's future. He lived and worked among the people, often in the most out-of-the-way towns where Europeans were not regular visitors – indeed where even the missionaries did not dare enter. In such regions, he was able to observe that the great Chinese forests were diverse, wild, uncultivated.

Henry and Irish forestry

Those wild, sub-tropical Chinese forests were not a monotonous monoculture, planted and maintained by man. Ireland was unforested. That difference is crucial in understanding Henry's transformation from a dendrophile and botanist, into a promoter of planted forests. Perhaps there are some who cannot see any difference between those vocations, but I think there is. It is the difference that is encapsulated in the enigmatic phrase 'the wood and the tree' – 'one can't see the wood for the trees'.

Dr Henry's reputation as the 'father of commercial forestry' springs from the evidence he gave on 28 November 1907 to the Committee Enquiry, established by the Department of Agriculture and Technical Instruction for Ireland, that investigated Irish forestry.

Between his departure from China and that day, Henry had been feted as an intrepid explorer, and had undertaken to study forestry. He had persuaded the Irish authorities to secure him a place at the school of forestry in Nancy, France. By November 1907 he was Reader in Forestry at the University of Cambridge and at the same time, was working with Henry Elwes on their monumental *Trees of Great Britain and Ireland*, which is not just an authoritative, six volume text-

book but a most handsome tome. Henry gained through these endeavours an unrivalled knowledge of trees, as individual specimens, as species with all the variation and peculiarities that species can display in their various habitats and as the essential denizens of forests and woodlands in China, France, North America and these islands. He knew where the tallest specimens were growing. He was also to explain how rapidly such-and-such a species would grow when planted in western Scotland or Kent. There was no-one else with such a comprehensive knowledge of trees and arboriculture.

When he appeared before the Committee, Henry made several points of importance. 'No forestry ought to be attempted unless it will pay' and plots of less than 500 acres, in Henry's opinion, were not viable. When asked to comment on trees that will give the quickest return he responded: 'Yes, they will be the best, and, furthermore they will encourage further planting.' Henry also made the following, extraordinary statement:

Many people look upon forestry as a branch of aesthetics; they look upon the establishment of forests in the same way as they look upon the establishment of an art gallery, as being very beautiful. I agree with that to a certain extent, but forestry ought to be made to pay.²⁷

Noting that the French and German governments saw forests as strategic reserves,²⁸ Henry added that 'we are not contemplating [a strategic reserve] in the afforestation of Ireland, what we contemplate is a commercial scheme.'²⁹

Taking that stance, Henry then dismissed native and widely naturalized

(beech, sycamore, for example) tree species as of no commercial use and urged that Irish foresters should consider foreign species – but not all foreign trees:

Many exotic trees are useless. The useful ones have distinctive definite requirements as to soil and climate. We are now in a position to separate the wheat from the chaff. ... some of these [exotic trees] grow so well that in them you have a collection of conifers that would enable you to cover the surface of Ireland with trees if you like.

Henry was carefully selective. He reiterated that he was not recommending all non-native trees and offered his own carefully considered and ultimately influential judgement.

The fact that a species is exotic or foreign has nothing to do with the question as to whether it should be planted. ... I [have gathered] facts as to exotic trees in Ireland [and after that] I formed my theory, and my theory is this, that owing to the insular position, extreme mildness and rainy nature of the winter, the Gulf Stream, and the excessive rainfall, the climate of Ireland differs in every respect from the climate of Europe and of the greater part of France. Where we have an analogous climate the same species do very well. ... In British Columbia, Washington, Oregon, and California, the forests are the greatest forests in the world in many respects, and ... all the trees without exception that grow on the Pacific Coast have done extremely well in Ireland. ... The non-trial of the fast-growing trees on a large scale is simply due to the innate conservatism of these

islands, backed up by imperfect knowledge of the remarkable and peculiar features of the climate of Ireland.³⁰

Thus is revealed Augustine Henry as the father of Irish commercial forestry – the metamorphosis was complete. But that is not the end of the matter, for the assistant medical officer of the Imperial Maritime Customs Services, the lad from Tyane, was to take one more step and to become the foundation professor of forestry in the Royal College of Science, otherwise University College, Dublin. Professor Augustine Henry was the first person to hold a chair in forestry in an Irish university.

Conclusion

I set some questions at the beginning of this lecture – who was this man who abhorred the destruction of woodlands and who was to promote the cultivation of man-made forests?

Augustine Henry was a man of great learning, little of it learned in the classroom. He admitted that he had seen most of the northern temperate hemisphere and had learned thereabouts that woodlands and forests were valuable for the well-being of mankind. His recommendations to the Committee on Irish Forestry were very precise, being concerned only with commercial planting – he was not dismissing the innate value of natural woodlands, nor the great diversity that could be enjoyed in arboreta containing hundreds of exotic species. He was proffering the explicit advice that was required by that particular committee. Had he been giving advice to a committee on the establishment of nature reserves, I think we would have heard him arguing, with equal authority and vigour, that they are essential for the well-being of mankind and that



Like so many of the surviving photographs (mostly preserved as lantern slides) among Dr Henry's papers, this is not captioned, but it shows the bole of a tree, with prayers on wooden plaques. The well-developed aerial roots are also seen clearly.

remnants of natural forest deserve to be preserved and managed for the enjoyment of everyone. Like an art gallery, a wild wood is beautiful.

The Celestial Empire, joyful, rich, fabled Kathay, taught an Irishman to love trees, to see the wood *and* the trees.

I have just returned from a day in the forest. It was very lovely and enjoyable – but how can one depict its essence, the charm of the woods. There is something primevally congenial in the very breath of a forest and I ask for nothing but to enjoy it.³¹

E. Charles Nelson, National Botanic Gardens, Glasnevin, Dublin 9

Notes And References

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2. A. Henry. 1919. *Forests woods and trees in relation to hygiene*. London: Constable.
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4. Report of the Departmental Commission on Irish forestry. Dublin: His Majesty's Stationery Office. Pp 164- 168.
5. Pim (1984: especially p. 23, fn 1). see also E. C. Nelson. 1982. Augustine Henry and the exploration of the Chinese flora. *Arnoldia* 43: 21-28.
E. C. Nelson. 1986. Introduction, in A. Henry, Notes on economic botany of China (facsimile issue introduced by E. C. Nelson). Kilkenny: Boethius Press. (see note 14 below).
6. Much of the biographical material in this essay is derived from Sheila Pim's unequalled biography of Augustine Henry, especially the second edition (1984: see note 1 above). I am grateful to Miss Pim for her help over many years, and applaud her continuing interest in the work of her 'anti-hero', Augustine Henry. More than anyone else she has championed Henry and enlightened us about his work and contribution to science and society.
7. B. Morley. 1979. Augustine Henry: his botanical activities in China. *Glasra* 3: 21-81.
8. Morley (1979: 41).
9. A. Henry to E. Gleeson, 26 March 1885 (original ms in National Library of Ireland, Dublin).
10. Morley (1979: 42-43).
11. This trait is demonstrated by the innumerable annotations, newspaper cuttings, letters and notes in Henry's own books, now in the National Botanic Gardens, Glasnevin. These include his notebooks with notes on, for example, the Golden Fleece.
12. Morley (1979: 24-25).
13. A. Henry to W. Thistleton-Dyer, 7 September 1885, quoted in Morley (1979: 46)
14. A. Henry. 1893. Notes on economic botany of China. Shanghai: [the author] (Printed by The Presbyterian Mission Press).
This very rare booklet was

- issued to encourage missionaries to collect plants. Only 100 copies were printed, and until recently only one copy of the original Shanghai issue was known to be extant. Recently, however, the present author acquired a copy, inscribed and presented to the Japanese botanist Jinzô Matsumura by Augustine Henry; this is the second copy of the original issue known to survive. The booklet was republished in facsimile in 1903; a copy of this early facsimile is among the books in Augustine Henry's library, now in the National Botanic Gardens, Glasnevin. A second facsimile, with a modern introduction and index, was published in 1986 by Boethius Press, Kilkenny; this third issue is still in print (copies may be obtained from the present author).
15. The family generally credited to Henry is Trapellaceae, of which *Trapella* was the type genus. *Trapella* is now placed in Pedaliaceae. However, Henry also discovered *Eucommia*, a genus that is now placed by itself in its own family, Eucommiaceae.
 16. Details of some of Henry's botanical discoveries can be found in E. C. Nelson. 1984. The garden history of Augustine Henry's plants. Appendix 2 in Pim (1984), pp. 217-236. See also Pim (1966), Morley (1979), Nelson (1982).
 17. See Nelson (1982).
 18. See Nelson (1982).
 19. J. W. Besant. 1930. The late Professor Henry, V. M. H. Gardeners' Chronicle 87 (ser. 3): 274-275.
 20. Alice Henry ms notebook f. 29 (original ms in possession of Dr Barbara Philips, to whom I am also very grateful for her unstinting help and interest in my research on Dr Augustine Henry).
 21. A. Henry to C. Sargent, 13 January 1897 (original ms in The Library of The Arnold Arboretum, Jamaica Plain, Massachusetts).
 22. A. Henry, unpublished ms diary (National Botanic Gardens, Glasnevin).
 23. A. Henry. 1903. Some new trees and shrubs of western China. Flora and sylva 1: 217-218.
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 25. A. Henry to E. Gleeson, 31 July 1899 (original ms in National Library of Ireland, Dublin).
 26. A. Henry to E. Gleeson, 20 February 1897 (original ms in National Library of Ireland, Dublin).
 27. Report of the Departmental Commission on Irish forestry. [hereinafter RDCIF. Dublin: His Majesty's Stationery Office. Pp 164, para 4024.
 28. RDCIF: 166, para 4025. ('The forests of Germany are worth as they stand one thousand millions sterling....')
 29. RDCIF: 165, para 4025.
 30. RDCIF: 165, para 4029.
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 32. D. Davison & E. C. Nelson. 1986. *Buxus camera* 'Augustine Henry' Moorea 5:11-16.

Competition Control for Establishment of Ash (*Fraxinus Excelsior L*) on Lowland Soil in Ireland

N. Culleton, W. E. Murphy and R. R. Hicks, Jr.

Summary

The herbicide glyphosate was used to control competing vegetation in an ash plantation on a fertile agricultural site in Co. Wexford. Treatments consisted of complete weed control, and strip treatments of 0.5 and 1.0 m width and no treatment. The strip treatments were coupled with mowing or not mowing the untreated grass strips. The best result after three growing seasons was for the 1.0 m strip without mowing, with a cumulative height growth of approximately 134 cm. The poorest performance was for the untreated replicates which had a cumulative height growth of about 45 cm. We speculated that competition for water and/or nutrients was the cause for poor growth in the untreated plots. The reason for the beneficial effect of leaving an unmowed grass strip between the tree is unclear, but it would appear to be related to a combination of nutrient availability and protection, from wind of the young plants.

Introduction

Ireland has the lowest proportion of trees in the European Union (EU) with forests covering almost eight percent of the landscape. Forestry provides a means of diversifying the landscape

and helps facilitate sustainable agriculture (Culleton and Lee 1993). Forest products can be a viable component of farm production (Richards et al. 1988) and forests can be useful in schemes designed to protect eroded land (Whitley 1991).

In Ireland, as in much of the EU, the majority of forest planting since the turn of the century has been with conifer species (Gillmor 1993). Recent interest in deciduous trees has sparked a number of studies on deciduous species and their suitability in Ireland (Fitzsimons 1987). Deciduous trees are being promoted because they can supply products that are in demand (Fitzsimons and Luddy 1986) and furthermore, they were components of the 'natural' landscape of Ireland before land clearing took place (Hickie 1990). Grants are available through the EU that cover the initial cost of establishment of trees and maintenance grants extend for 20 years beyond establishment. A premium is awarded for planting of broadleaves to encourage their use.

Farmers have been reluctant to plant deciduous tree, mostly because they were uninformed as to the potential of such species. The longer

rotation of many deciduous species has been a major disincentive to their culture, but species like ash (*Fraxinus excelsior*) and sycamore (*Acer pseudoplatanus*) are relatively fast growing and can produce a merchantable forest crop in a rotation length not unlike Sitka spruce (Culleton 1993). Ash is useful for a variety of products such as for furniture and hurleys (Culleton *et al.* 1993). Ash is also a fast growing species which requires a fertile growing site (Bulfin 1992) and it is particularly well suited to the productive lowland mineral soils (Culleton and Bulfin 1991). New EU granting scheme and CAP reforms provide incentive for converting such sites to forestry (Daly 1990).

Ash responds to high pH and to high levels of N and P (Gordon 1964), but on the fertile lowland soils, weed and grass competition is severe (Culleton *et al.* 1993). On such sites, weed control is necessary in order to ensure establishment and rapid early growth of planted saplings (Culleton *et al.* 1993; Culleton and Bulfin 1991, 1992). Herbicidal control of competing vegetation is well suited to plantation forestry, and the herbicide Glyphosate appears especially well suited since it is a broad spectrum chemical that is rapidly deactivated in the soil (Thomas and Burke 1972).

Thus, to provide information to Irish farmers who are considering tree planting on their agricultural sites, this study was designed to investigate the effect of herbicidal control of competing vegetation in ash plantations.

Methods

The competition control study was designed with six treatments, listed below:

1. Complete kill – All vegetation was sprayed 2-3 times per year with glyphosate which controlled virtually all competing vegetation.
2. Untreated – The competing vegetation was permitted to grow unaltered.
3. Narrow strip, mowed – a band 0.5 m wide, centred across the tree rows was sprayed with glyphosate and the remaining grass strips were kept mowed.
4. Narrow strip, unmowed – This treatment is similar to no. 3, above except the grass strips were left to grow.
5. Wide strip, mowed – This treatment is similar to no. 3, above except the sprayed band was increased to 1.0 m width.
6. Wide strip, unmowed – This treatment is similar to no. 5, above except the grass strips were left unmowed.

The planting site was a fertile lowland agricultural soil of the Crosstown Complex. The soil is a well-to moderately-drained brown earth with stratified loam over clay loam. The study site is part of a larger experimental block that had been fenced to exclude hares.

The statistical layout of the trial was a randomized complete-block design (Fig. 1) with 6 blocks, each containing all 6 treatments. Treatment plots consisted of 6 rows of 11 trees each, giving a total of 66 trees per plot. Thus, the 6 replications each contained 396 saplings and the entire study contained 2,376 saplings.

Bare-root nursery stock was obtained from Coillte, averaging 60 cm

Figure 1:
*Layout for weed
control trial.*

1.0m Cut	Kill	0.5m No Cut	1.0m No Cut	0.5m Cut	No Kill
0.5m Cut	0.5m No Cut	No Kill	0.5m Cut	Kill	0.5m No Cut
Kill	1.0m No Cut	0.5m No Cut	No Kill	1.0m No Cut	0.5m Cut
1.0m Cut	Kill	0.5m Cut	No Kill	1.0m No Cut	0.5m No Cut
Kill	No Kill	1.0m No Cut	0.5m Cut	1.0m Cut	0.5m No Cut
1.0m Cut	0.5m No Cut	0.5m Cut	1.0m No Cut	No Kill	No Kill

in height. Saplings were planting in the spring of 1991 by digging a hole in the soil of adequate size to accommodate the root mass, inserting the roots, backfilling and compacting the soil.

Height growth, total height and grade (good, medium and poor), using a subjective scale were 3 = good and 1 = poor, were measured in December 1991 and again after 1992 and 1993 growing seasons. In 1992 and 1993, sapling diameters at 1.3 m were measured. The data were analysed using analysis of variance to determine if

treatments significantly affected height growth and grade.

Duncan's Multiple Range test was utilized to determine which means were significantly different.

Results

Analyses of variance were performed on plot-mean data to determine if the treatments were significantly different for incremental and total height and diameter. Table 1 indicates that annual height growth and total height growth at year three

Table 1:
*Annual height
increments and
cumulative total
height of trees, by
treatments.*

Treatment	Height increment (mm)			Total height (mm)
	1991	1992	1993	1993
1.0 m, not cut	17.4 (1)*	6.53 (1)	56.6 (1) A**	192.6 (1) A
1.0 m, cut	5.6 (4)	47.2 (3)	52.3 (2) A	160.0 (3) C
Weed free	6.9 (3)	21.0 (5)	51.3 (3) A	156.9 (4) C
0.5 m, not cut	11.9 (2)	54.7 (2)	47.5 (4) B	173.3 (2) B
0.5 m, cut	4.5 (5)	40.2 (4)	46.8 (5) B	155.9 (5) C
Untreated	3.3 (6)	13.9 (6)	27.6 (6) C	100.0 (6) D

* Rank in descending order

** Duncan's Test - means with the same letter are not significantly different (Alpha = 0.05)

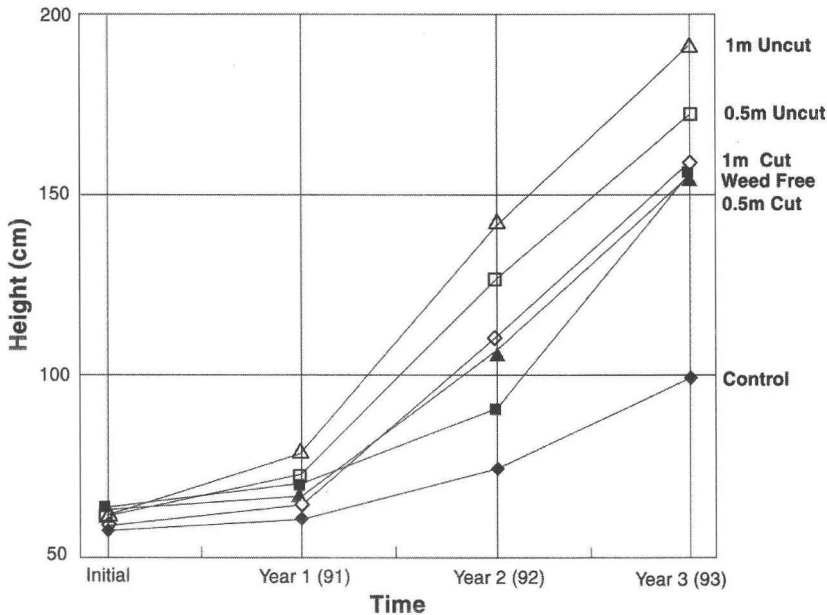


Figure 2:
Average height growth
and time of treatments.

(1993) were significantly different by treatments. Diameters at 30 cm showed a similar trend (Table 2). The greatest height growth occurred for treatment 6 (1 m strip, unmowed) and the poorest for treatment 2, the untreated control. Duncan's Multiple Range test indicated which means

were significantly different. In general, the control was always significantly poorer than any of the treatments for both height and diameter and the 1 m, not cut treatment usually was the best, often significantly so.

In 1991, the first season after planting, height growth of the untreated

Treatment	Diameter Increment (mm)	Total Diameter (mm)
	1993	1993
1.0 m, cut	9.3 (1)* A**	23.3 (3) C
Weed free	8.2 (2) B	21.9 (5) D
1 m, not cut	8.0 (3) B	26.5 (1) A
0.5 m, cut	8.0 (4) B	22.3 (4) D
0.5 m, not cut	7.8 (5) B	24.4 (2) B
Untreated	4.5 (6) C	12.4 (6) E

* Rank in descending order
 ** Duncan's Test - means with the same letter are not significantly different (Alpha = 0.05)

Table 2:
Diameter
increment and
cumulative total
diameter
(at 30 cm),
by treatment
for 1993.

plots averaged only 3.3 cm while the best treatment (1 m, not cut) averaged 17.4 cm, a difference of 14.1 cm. In 1992, the corresponding figures were 13.9 and 63.5 cm with a difference of 49.6 cm. In 1993, the difference between the 1 m, uncut treatment and the control was 25 cm with treatment 2 averaging 27.6 cm and treatment 6 averaging 52.6 cm. Plotting the apparent growth curves of the various treatments over the three years of the study (Fig. 2) revealed that the best treatment (1.0 m, not cut) appears to be sustaining a rapid rate of growth while the control is still struggling to get started. Although all treatments started with seedlings of the same height, the 1 m, uncut treatment is currently almost twice as tall as the control.

Diameter at 30 cm height in 1993 gave results that were similar to those obtained for height growth (Table 2). The 1 m, not cut treatment had the largest average diameter in 1993 (26.5 mm) and the control was the smallest at 12.4 mm. Duncan's test indicated that the 1 m, uncut treatment was significantly larger in total diameter than any of the others while the control was significantly smaller. There was a significant Pearson's correlation between sapling height and diameter ($r = 0.98$).

For sapling grade, there seemed to be little effect of treatment, although the average grade for the untreated plots was generally lower than the herbicide treatments.

Conclusions

A number of researchers have recommended planting of deciduous trees in Ireland (Fitzsimon 1987, Richards

et al. 1988). Ash seems to be well suited to such plantings, especially on the more fertile agricultural sites (Daly 1990). Early results on such sites indicated that weed competition might be a problem in ash culture (Culleton and Bulfin 1992), and our results after three growing seasons seem to verify this.

Rapid early growth of planted saplings is desirable from several standpoints. First, saplings that get off to a good start generally maintain good growth, which accelerates the rate of maturity and shortens the rotation length. This has dramatic economic benefits, since the initial investment in planting becomes more difficult to justify as rotation length increases. Growing trees on a long rotation has not proven to be attractive to farmers, who are accustomed to a short interval between planting and harvest. In point of fact, ash has a rate of maturity that is comparable to that of Sitka spruce, but up until recently planting trees on high quality agricultural sites was not an attractive alternative (Culleton, 1993), and species like Sitka spruce were better suited to lower quality sites. There is also an increased awareness of the need to diversify Ireland's forests, particularly with deciduous trees. Ash seems to offer several advantages. It is fast growing and there is good market potential for ash as hurleys and for furniture (Culleton *et al.* 1993, Fitzsimons and Luddy 1986). But on the high quality sites that are required for ash, competition can be a problem for establishment and rapid early growth.

It is evident from the results of this study that controlling competition is essential to the early establishment of

ash on lowland agricultural sites. Height growth of ash with competition control in a 1.0 m wide band exceeded that of untreated plots by almost twofold after three growing seasons and the quality of stems seemed as good, or slightly better with competition control.

The surprising finding in this study was that leaving an unmowed strip of grass between the rows of saplings actually provided a significant benefit to height growth of the ash.

The exact reason for these results are not very clear. We speculate that one possible explanation is a two tiered argument:

- a) The weed free zone in the immediate environs of the tree gave the trees unrestricted access to available soil nutrients without competition from grasses and weeds. There is little doubt the weed free zones do increase growth rates (Culleton and Bulfin, 1992).
- b) There was a beneficial effect of leaving an unmowed grass strip between the ash rows in that this strip protected the young plants from the constant, often high winds normally experienced in Southeastern Ireland. The grasses and weeds which often reach a height of 50-60 cm probably act to deflect the wind over the ash saplings. The effect of wind may also be related to moisture stress since wind enhances the rate of evapotranspiration.

Another explanation maybe that competition control is making more water available to the tree saplings. Allelopathy and/or possible soil temperature effects cannot be ruled out

completely.

We believe that herbicidal control of competition in 1 m wide bands is a means to help ensure establishment and rapid early growth of ash plantations on agricultural sites.

Now that the need for vegetation control has been established, we need to definitively establish how many years for which weed control is necessary and how many treatments per year are necessary to get the optimum results. Preliminary results in unpublished trials suggest that when trees reach 2.0 - 2.5 m tall, there is very little need for further weed control. Finally, we need to decide which herbicide is best to obtain the desired results. The ideal herbicide should be inexpensive, require only one application per year, selective for the target species and environmentally safe. We used glyphosate in our study, and certainly it meets many of these criteria, but other materials may be as good, or better. There may also be combinations of herbicides that will produce a better effect and these should also be investigated.

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Annual Study Tour

Lakes Forest District and North York Moors Forest District

(Monday 9th – Saturday 14th May, 1994)

Introduction

The 1994 Study Tour was based in the forests in the north of England commencing in the Lakes Forest District in the west and concluding in the North York Moors Forest District in the east.

On Monday, 9th May, the group assembled at the ferry port in Dun Laoghaire and arrived in Holyhead just after midday. Our coach took us across North Wales and on to the M6. Travelling north we arrived at the Burnside Hotel in Bowness-on-Windermere in the late afternoon.

After dinner in the hotel, we were met by our host for the next few days, Mr Brian Mahony, Forest District Manager of the Lakes Forest District, Forest Enterprise. He welcomed the group to the Lakes and gave an introductory talk on the region. He explained the organisational changes in the Forestry Commission and the establishment of the Forest Enterprise which now manages the publicly owned woodland estate. District headquarters are at Grizedale with responsibility for the management of forests throughout Lancashire and Cumbria, north to Carlisle.

The landholding in the Forest District amounts to approximately 16,000

ha. Of this, about 13,500 ha of forest and other land lies within the Lakes District National Park boundary. This represents about 5% of the total area of the National Park.

The Lakes District National Park is the largest of the national parks in England and Wales with 880 miles² (2,279 km²). The first organised pressure for the establishment of national

Multi-purpose forest management in the Lakes District had its origins in Grizedale where far-sighted policies for the management of wildlife and for public use were established in the early 1960s.

parks with greater access to mountains and other areas of outstanding natural beauty came in the 1920s and '30s

when walking and mountaineering became popular pastimes. At this time, access to open country in many parts of Britain was very restricted. The outbreak of war postponed progress and following the Hothouse Committee's recommendation, The National Parks

Education is an integral part of forest management in the Lakes and it is considered highly important to convey an understanding of the countryside to young people. Each year over one thousand educational groups visit the forests.

and Access to the Countryside Act was passed in 1949. A British national park is a defined area of unspoilt countryside usually with some wild, if not wilderness country, which is specially protected from unsuitable development. Public access for enjoyment is secured with due regard for local community needs. There is no true wilderness left in Britain, unlike many of the national park areas in other countries.

Multi-purpose forestry

Forestry in the region must be of a multi-purpose nature and management is committed to this principle. This approach now forms the basis of national forest policy and nowhere is its practice better demonstrated than

in the Lakes Forest District. The forest can be an economic and productive source of timber while fulfilling a wide range of other objectives including access for public recreation, the conservation of wildlife, the preservation of the historic environment and application of good landscape design. Multi-purpose forest management in the Lakes District had its origins in Grizedale where far-sighted policies for the management of wildlife and for public use were established in the early 1960s.

Production and employment

The annual production of timber in the District is over 75,000 tonnes while an estimated one million people visit the area each year. Direct and indirect employment amounts to over 120 people working in the areas of establishment, maintenance, harvesting, wildlife management and the provision of services for visitors.

Wildlife management is an integral part of forest management and the forests are home for significant populations of a wide range of species. A detailed conservation plan is maintained and certain woodlands are managed as Forest Nature Reserves.

Recreation and access

The central feature of the forest recreation provision is the principle of open access on foot to woodlands and other lands. The only limitations are on agricultural holdings, a small proportion of leasehold land and a number of sites where conservation is paramount.

Apart from the above restrictions the public enjoys the "freedom to roam" in the forest which is uniquely able to absorb visitors without crowding. Each area of forest has an

appropriate level of recreation provision which may vary from an informal parking area giving access to walks and trails, to the more elaborate visitor centre, car parks and interpretative exhibits, as found at the Forest Parks at Whinlatter and Grizedale. Here the emphasis is on high quality facilities which are in harmony with the forest environment.

Education is an integral part of forest management in the Lakes and it is considered highly important to convey an understanding of the countryside to young people. Each year over one thousand educational groups visit the forests. A recently established "Forest Classroom" and specialist ranger at Whinlatter demonstrates the strength of commitment to this work.

Landscape and forest design in the 1990s

As the first rotation crops reach maturity an opportunity to examine forest design and forest landscape presents itself. This is achieved through the production of forest design plans for each of the areas of woodland managed. These plans set out detailed management proposals to meet the diverse set of objectives. Included are a phased felling and restocking plan which show how the fabric of the forest will develop in a way that is sympathetic to the landscape. These plans also address issues of recreation, access and conservation.

A high level of co-operation with the National Parks and other bodies is a cornerstone in this form of multi-purpose management.

Achieving the right balance

The Forest Enterprise forests in the Lakes Forest District clearly have a multi-purpose function. There is a

strong economic production base which underpins all other activities. Work in the field of access, recreation, landscape and conservation is complementary to that of the many statutory and non-statutory bodies working in the National Park and other areas. The estate illustrates the firm belief that a balance of activity, which integrates timber production with the environmental, non-market benefits, is established and maintained for each forest area. The commitment to the production of forest design plans will move this process forward very significantly in partnership and consultation with the other public bodies.

John Fennessy

Cumbria And North York Moors

Tuesday 10th May 1994:

Forest Enterprise, Grizedale Forest Park. Multi-purpose management towards timber production, recreation, conservation and landscape objectives in a sensitive national park setting. Traditional coppice management in semi-natural oak woods.

Leaving our hotel base in Bowness-on-Windermere we set off south bound following the eastern shores of Lake Windermere, much of which is lined with oak woodland. We reached the upper limits of Morecambe Bay, and swung north at Penny Bridge. By following narrow, winding country roads our journey to Grizedale took us through Satterthwaile village. The district offices of Lakes Forest District are located a mile or so north of here, adjacent to the park visitor centre. Joining us was Brian Mahony, District Manager (whom we met the previous night) and Peter Bret, Silviculture and

Recreation Officer. On an historical point, the car park and office area formed part of a former estate house used as a prisoner of war camp during World War II.

From the confines of the district offices, we drove up through the forest to Carron Crag, which at 1,000 ft., is the highest point within the forest park boundary. From the breezy rocky summit one gets an extensive view of the landscape and forest structure in the park.

In the valley floor below are two farms, both leased from Forest Enterprise and worked in an environmentally acceptable manner. Coming up the slopes the general composition of woodlands is oak on the lower slopes, larch and Douglas fir on the middle slopes, with a capping of Sitka spruce at the higher elevations.

Prior to 1960, afforestation formed the bulk of the annual planting programme. However, since then the move has been towards reforestation. It was also around this time that the idea of "multi-purpose forestry" was established in Grizedale Forest as a way of optimising economic production while fulfilling a wide range of other objectives, principally access and public recreation, the conservation of wildlife and the historic environment, and good landscape design. Felling coupes are carefully planned so as to create a more uneven aged crop and be visually attractive. A felling plan has been drawn up taking into account factors such as soils, aspect, water courses, view points and waymarked walking trails. The plan comprises of shaped coupes, each one ranging in size from 4 ha to 30 ha, with no less than 5 years felling period between adjoining areas. It must be somewhat flexible to take account of unforeseen factors such as

fire or windblow.

Officers specially trained in forest landscape design draw up these plans. They make use of photographs from important view points and computer programmes to assist them in their task. A master plan is drawn up for reforestation, with inputs from harvesting, recreation and wildlife staff. Once approved at District Forest level this plan goes off to the National Park office for their comments and observations. Staff may change throughout the duration of this plan, but the actual workings are drawn in black and white which leaves incoming managers a precise working tool.

Below us, on Carron Crag, an area was felled and subsequently reforested in 1989. A practice at Grizedale is to leave spruce lop and top for 18-24 months before planting while the lighter larch reforestation takes place almost immediately after felling. Ground preparation involved the use of a scarifier at a cost of £80-£90/ha. The project forester marks on site the planting pattern as set out in the plans. In many areas fencing against deer is essential and quite costly, at £400-£700 per ha. On this site planting was done under contract. Plants, supplied from Forest Enterprise nurseries, are delivered to the forest and are treated against weevil attack. Planting began early in January, as with most cases, and subsequent treatment is minimal. There may be the occasional use of *Round-up* or *Asulox*, but otherwise the crop is on its own after three years. A problem on some sites is natural regeneration. It has to be respaced at 5-7 years of age.

From the fresh and healthy conditions of Carron Crag we travelled to the more sheltered harvesting site at the Heald. An outline of the operation

here and harvesting in general within the region was given by Peter Humphries, Region Harvesting Forester, and David Gregory, District Harvesting Forester. In the Lakes Forest District about 70,000m³ of timber is produced annually. It can be broken down to 40,000m³ direct harvesting and 30,000m³ of standing sales. Income from these is in the region of £1.1 million for direct sales and around £250,000 for standing sales. Similar to the planting plan, an extensive harvesting plan is drawn up prior to any work being carried out. Initial permission to clearfell has to be given by the Forest Authority. Inputs are then made to the plan from various sections such as recreation and wildlife staff. Consultation with local groups and authorities is essential to acquaint them with what is going on. A costing is also made of the operation. This particular site had a crop of Sitka spruce (p.1952) and was being felled using an Akerman harvesting head. Felled timber falls into two qualities, 'green' and 'red' being for the top grade and second grade respectively. On roadside the sawlog fetches £41 per m³ while the "pallet bars" reach £33 per m³.

A welcome stop for lunch was made at Wood Moss Tarn. There we were introduced to John Cubby, the Forest Officer with responsibility for wildlife management in the district. He gave us an introduction on the subject.

Wood Moss Tarn is one of twenty such lakes scattered around the Forest Park. Initially the area had been planted with Norway spruce in 1989, but never performed well. It was decided to clear the crop and create a lake. There had been the idea of introducing beaver here, but this never came to anything – maybe just as well! Currently the lake is home to a variety

of waterfowl.

Throughout the forest, populations of red and roe deer are high and require culling (carried out by trained personnel) to reduce numbers by around 25%. Valuable income is made from organised stalking. Venison reached 80p per lb. for red and £1.00 per lb. for roe.

Urgent action is required to stem the rapidly expanding grey squirrel population. This species does a lot of damage to hardwoods and displaces the native and less harmful red squirrel. Experiments are currently in progress using a variety of traps and trapping methods specifically designed to catch the grey and not the red squirrel.

There are also calls from the public to be dealt with. John Cubby has high praise of the multi purpose forest policy which he sees has helped increase populations of lesser known mammal and bird species.

As we moved to our next stop, in the semi-natural oak woodlands the only "wildlife" we saw was a series of modern wood sculptures. There are 70 of these in total throughout Grizedale Forest Park, which draw quite an amount of people to view them. Within the park boundaries there are around 300 ha. of semi-natural oak woods. In former times they were extensively worked as coppice, but then stems were singled and let develop to the condition they are in today.

A programme of regeneration has recently begun. Small areas were felled and planted, using stock from local seed material, as management want to hold on to the local strain of oak. For protection against deer, various types of individual tree shelters have been experimented with.

In recent times income from hardwoods has been minimal, consisting of low value firewood. It is hoped that future management, combined with a marketing drive, can produce top quality end products of higher value.

Our final stop at Grizedale was at the visitor centre and providing us with a "whistle-stop tour" was Recreation Head Manager, Paul Burke. His enthusiasm for his role of "people management", as he called it, was very evident.

The bulk of the 300,000-350,000 visitors to the park each year come from within a two hour travelling time catchment area. With so many visitors, facilities at the visitor centre and throughout the forest must be of top quality and maintained to a high standard. The layout of facilities has been well planned from the beginning. The large car parks are designed for easy flow at peak times.

Naturally, after a long journey to the park most folk will head first to the toilet. The importance of having these in a spotless and well maintained condition is vital. As Paul Burke outlined, people can have a "high quality experience" which puts them in the right frame of mind to enjoy their visit to the park. A playground is provided so that children can "let off steam and frustration" after the long journey. It is vital that fixtures and fittings are regularly checked.

A sizeable proportion of people do not leave the visitor centre area. Heavy use is made of the tea room and shop while the information counter provides everything the visitor wants to know about the forest. For the energetic, there are ten walking trails ranging in length from half a mile to nine and a half miles. Good use of these is made during periods of

inclement weather, when the hill walkers come down from the high country. Also provided are mountain bicycle trails and orienteering courses.

Unfortunately our visit to Grizedale had to come to an end. The President, Eugene Hendrick expressed the thanks of the Society to all concerned, in particular, Brian Mahon, in making our visit both enjoyable and interesting. Our day was not over yet. On the way back to the hotel we stopped off at Black Beck Woods to see traditional coppice management in semi-natural oakwoods which proved very popular to all of us. We met Richard Pow, Cumbria Broadleaves Project Co-ordinator, and Bill Hogarth, coppice merchant.

The Cumbria Broadleaves Project, established in 1991, aimed at maintaining and enhancing the area's broadleaved woodlands. It's a joint venture between several bodies involved with offering advice to woodland owners and private consultants in all aspects of establishing, managing and marketing native broadleaved woodland. Increasing public awareness in broadleaves is also seen as being very important. Since its establishment the project has brought 600 ha of previously undermanaged broadleaved woodlands into production and new markets have been found for end products.

From his appearances on television, Bill Hogarth was familiar to some in our group. He has been coppicing for almost 40 years, carrying on the craft from his father. It was a real joy to listen to and see Bill at his work in which he takes so much pride. To provide the raw material he coppices 15 acres a year, with the cutting cycle varying according to species. Hazel can be cut again in six years, birch 10 years, and oak 20

years. In all, Bill produces 68 end products. Nothing goes to waste, there is a use for everything including oak bark for tanning, birch tops for brushes and hazel rods for garden fencing, the list is endless. It was a delight to watch the expert peel the bark off small oak branches – it looked so easy! Out in the woods Bill brought us to a site where charcoal is made. Along the way he pointed out a woodsman's hut. In those days, the men would live in the hut during the week while making charcoal. Such huts were small simple constructions of stone walls covered with branches. Entrances at both ends allowed smoke to escape the central fire.

Time again had caught up on us and we had to move on. Eugene Hendrick thanked Bill for such a fascinating insight to the art of coppicing.

With that it was back to our base in Bowness.

R. D. Jack

Wednesday 11th May 1994:

Morning

Day two of our Study Tour took us from the Burnside Hotel in Bowness-on-Windermere, north on the A591, through the picturesque villages of Ambleside and Grasmere and the town of Keswick, to our first stop of the morning at Dodd Wood, Winlatter. Here, at a small car park and picnic site, we were met by our host, Mr Brian Mahony, Forest District Manager, Peter Humphries, Marketing and Harvesting Forester, and Gareth Browning, Crop Establishment Forester.

Mr Browning led the group to our first stop, beyond the shop, across a footbridge and up a steep path to the forest road.

Stop 1. An old Douglas fir stand

This stand was established in 1930 on a brown earth. The total stand area is 9.5 ha with a yield class of 16. The area is managed on a shelterwood system, encouraging natural regeneration as a way of providing continuous forest cover. Past treatments have included a gradual selective thinning which opened up the stand, allowed light to reach the forest floor, and resulted in prolific natural regeneration.

In the recent past a heavy seed fall has taken place over the entire area, resulting in extensive natural regeneration of between 5,000 and 6,000 seedlings per ha, with up to 10,000 in some places. All felling work in this stand was carried out by local labour on a contract basis.

Harvesting Statistics

Total stand area: 9.6 ha

542m³ produced as "green" logs and sold @ £44/m³

728m³ produced as "red" logs and sold @ £33/m³

23 tonnes of chipwood produced and sold to local merchants @ £22.50/tonne

Average tree size: 2.63m³.

Total vol. harvested:

1445m³, categorised as follows;

37% "green" log capacity

50% "red" log capacity

13% chipwood.

A discussion followed on the price obtained for this type of Douglas fir log in Ireland. As a transmission pole with the ESB, the price would probably be six or seven times greater for this size of log (2.63m³ average tree size). The attitude of visitors to the

establishment of Douglas fir, an exotic species in the National Park area of the Lake District, was also highlighted.

The future management options were listed and these included the following.

- Leaving the stand for 1-3 years, to allow it to recover from recent thinings and then to re-examine the area, with particular attention to areas needing respacing.
- Carrying out a further respacing in 1995/96 at an estimated cost of £300-£400/ha. This is likely to further reduce re-establishment costs due to more extensive natural regeneration.
- Considering a further selective "seed felling" in a few years time, concentrating on areas with poor natural regeneration.
- Continuing constant monitoring of natural regeneration as a cheap and viable option for crop replacement.

Leaving the Douglas fir stand, we climbed a forest road and passed several viewpoints over Bassenthwaite lake and arrived at our last stop for the morning.

Stop 2. Longside harvesting site

Here, a clearfell of a stand of P/1929 Sitka spruce was nearing completion. Timber was extracted by cable, using a skyline system, producing log poles for supply to BSW sawmills at Carlisle.

Material was extracted "full pole" with an average tree volume 0.4m^3 and topped at 16cm. On some of the more difficult parts of the site, trees were cut to waste as part of the overall management plan and tops were left on the

ground. In northern English and southern Scottish forests, the concept of "log pole" harvesting is now an important harvesting method and BSW Timber plc. are one of the foremost mills using this whole tree method.

Skyline operation works on a piece-rate payment with an average extraction of 100m^3 per set-up. Annual average production from skyline systems is $5,000\text{m}^3$.

Costs

Felling:	£6.65/ m^3
Extraction:	£8.55/ m^3
Handling:	£1.00/ m^3
Total:	£16.20/ m^3
Income:	£28.00/ m^3
Surplus:	£11.80/ m^3 (excluding overheads)

After a pleasant lunch at this site, the President thanked Peter Humphries and Gareth Browning for a most interesting and rewarding morning in Dodd Wood. The group then moved off to our afternoon rendezvous at the BSW sawmill in Carlisle.

John Fennessy

Afternoon

Stop 3. BSW Carlisle Sawmills

The group was met at the mill by Mr. A. J. "Sandy" Brownlie, Chairman of BSW Timber plc., who welcomed The Society of Irish Foresters to the mill and gave an introductory talk on the Carlisle mill and other BSW Timber operations in the UK. The Carlisle mill is staffed by 60 workers, including yard staff, mill staff and office management. The mill's working hours are 7.15 a.m. – 5.00 p.m.

BSW Timber plc. operates five of Britain's top sawmills, providing a current annual output of sawn timber in excess of 400,000m³. This represents a 20% share of the British market output. The BSW mill at Newbridge-on-Wye in central Wales was Britain's first successful fully automated facility. It was followed in 1991 by a major investment at Carlisle incorporating state of the art technology and built to meet the growing market demand for British softwood. Other plants in the group include sawmills at Sehenydd in south Wales, at Boat of Garten and BSW sawmills at Kilmallie, both in central Scotland.

Output per year:

115,000m³ of sawn timber

Recovery rate:

55%-60%

Round timber intake:

180,000m³

Intake/week:

4,000m³ round timber

Yard stock:

8,000m³ round timber,

2 weeks supply in summer

12,000m³ round timber,

3 weeks supply in winter.

Fifteen loads of round timber per day on average are delivered to the yard. The mill only uses long pole harvested material for the following reasons:

- a) Better utilisation of upland Sitka spruce material.
- b) The mill is better able to respond to market demand on specification and length required by their customers.

The mill has a team of contractors, cross-cutting logs in the yard. This gang consists of two men cross marking and cutting and one operator on a Valmet 840 extraction unit for stacking material into various category lengths (minimum length – 5.1m, maximum length – 15m). The majority of the material is extracted from the forest by clam bunk and skyline extraction units.

The equipment at the mill included a butt reducer, a chipper canter and triple band saw. The mill quality control personnel are very conscious of improvements in sawing technology and every one per cent improvement is worth a saving of £200,000 p.a.

Sawn material was not being kiln dried, due to weak market conditions at that time. The group was surprised at this and expected that this material would be difficult to sell as it would fail quality specifications.

Gerry Murphy

North York Moors Forest District

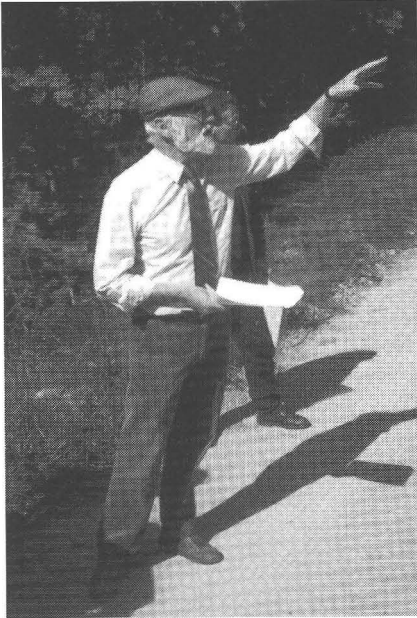
Thursday 12th May 1994:

Wykeham Nursery; Leader – Graham Menzies (Nursery Manager)

The nursery was first established in the 1930's. It is now one of the largest conifer nurseries in the UK and covers an area of 64 ha in blocks of varying sizes. The soils are generally sandy loams, and are free of stones. Once the naturally occurring pans are broken, these soils are free draining.

The nursery is situated about 700 ft. above sea level, with an annual rainfall of approximately 30 in. Each year, the nursery produces 9-12 million plants, mainly Sitka spruce with the balance

*Mr. John Mackenzie,
Forest District Manager*



made up of larches, Douglas fir and Scots pine. The nursery uses precision sowing throughout, with 8 rows to a bed. Undercutting and wrenching during the second season are used to produce 1ul forest seedlings. This approach produces a fibrous root ball and eliminates the need to lift and line out seedlings, resulting in major savings in cost and time.

Because of the low rainfall, the nursery requires regular and frequent irrigation during the growing season, with an on-site reservoir to supply the water needs. Plants are mechanically lifted from November to May and are subsequently hand graded and packed into co-extruded bags.

A very significant proportion of the plants supplied by the nursery will be used on reforestation sites, and accordingly need to be protected against weevil attack. The nursery dips plants to order, with permethrin, at a cost of

£18 per thousand. Both humid and dry store facilities are available.

During the visit to the nursery, many of the operations were described rather than demonstrated, as the time of our visit was a relatively quiet one for nursery work. Many areas of interest were discussed and much new information was gained in all areas of nursery production. New approaches to weeding were necessary, because the traditionally used chemicals were no longer available.

A claim was made that it was not possible to produce a three year old plant profitably. The costs of handling and dealing with waste chemicals was outlined and indicated to be significant, and was identified as a factor which Irish landusers would soon have to consider.

Wykeham Forest:
Leader – John Mackenzie
(Forest District Manager)

Stop 1. Warren Top:

Introduction to the District:

From a particularly impressive view point, Mr Mackenzie gave an outline description of his District.

Pine and larch were predominant, with average yield class 8. Most of the plantations were over 40 years old, and where replacement was taking place, the policy was to favour Sitka spruce where it would grow satisfactorily.

Elevation was 120-250m and soil types included ironpans, gleys, surface water gleys and about 5% peat soils.

Normal harvesting output for the district was 90,000m³ per annum.

Stop 2. Deepdale, Dalyb Forest

Conservation and Nature Reserve:

The group visited an area that had been designated a Forest Nature Reserve in 1989. There is an extremely high usage of the forest for recreation and conservation purposes by the public, and management strategies adopted have to take cognisance of these important factors. For example, clearance of the Norway spruce (p/1959) began in 1986/7 with the aim of rehabilitating a meadow area.

Stop 3. Crosscliffe:

Introduction to District's restocking programme:

Peter Green, District Forester FM, assisted Mr. Mackenzie at this stop.

The planting at this stop was carried out in 1989, after the previous crop had been clearfelled. It helped to demonstrate the results of implementing current Forest Enterprise policies to achieve appropriate balance between forest operations and environmental considerations.

The District restocks about 300 ha each year, and where possible the policy is to favour "hot planting", especially after windblow. Special cultivation for restocking does not normally take place, except on gleys, otherwise the original ploughing is deemed to be adequate. Site preparation is carried out with a "brush rake" and Delta scarifier.

Plants are manually planted, with 70-80% being contracted out. The main species used are; Sitka spruce 50%, Larch 30%, Douglas fir 15% and some broadleaves and other conifers. An unplanted edge of approximately 15m. is left for conservation and amenity purposes also helps to create

greater visual interest. It has not yet been decided whether the edge should be planted with broadleaves, maintained clear of tree growth, or be left to its own devices.

Stop 4. Housedale:

Restocking of Sitka spruce (P/1988) and hybrid larch

The soil type at this stop was a Rendzina, which has been scarified at a cost of £200 per ha. The larch was planted to act as a nurse for the spruce.

In the past, the pattern of felling and replanting was determined by forecasts and stability. Now, however, amenity considerations are the more important determinants.

The crop was established and growing extremely well, leading to an expectation that it was of a higher yield class than that indicated by the leaders for the day. It was pointed out that that initial fast growth would not be maintained, especially when the crop reached thicket stage.

Stop 5. Woodyard:

Over mature retentions – and possible management options:

For the last stop of the day, the tour visited a fine old mixed stand of Sitka spruce planted in 1926, yield class 18, and Douglas fir planted in 1924, yield class 20.

The Forest Enterprise was developing a policy of retaining 5% of over mature stands for amenity, conservation and recreation purposes. There would be an attempt to maintain continuous cover in these areas by using group shelterwood or similar systems.

Paddy O'Kelly

Friday 13th May 1994:

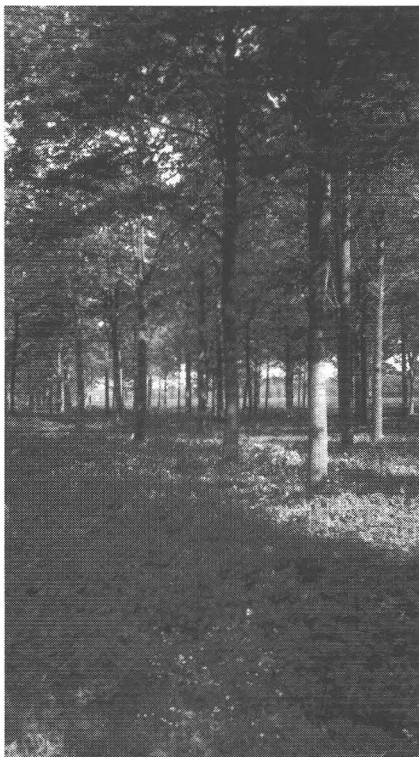
The first stop of the day was at Sutton Bank Top, where we were met by Mr. John Mackenzie, District Forester, and Mr. Andrew Greening, Harvesting Forester. On the Bank Top we were shown to a viewing point at 300m OD, from where the view was reputed to be one of the finest in England. It was certainly very spectacular on this fine sunny morning. There was a long distance walk marked out along this Bank Top.

Mr. Mackenzie displayed maps of the Kilburn block to Hamleton Forest and pointed to the various areas on the ground from our elevated viewing point. He explained that the Kilburn block was acquired on a 999 year lease-

hold basis back in 1952 and had a high recreational value which naturally led to constraints on forest management. There was an above average proportion of broadleaves in this forest block and the species were mainly planted over a 10 year period from the mid 1950's to the mid 1960's. The species composition was detailed by Mr. Mackenzie as follows: 28% larch, 28% broadleaves (mainly oak and sycamore), 14% pine, 8% spruce, 6% other conifers and 16% was classified as non-productive area. The soil types were mainly brown earths and surface water gleys with a limestone parent material.

The second stop was at a broadleaved area retained for amenity purposes. This stand was an ash/oak mixture with a hazel understory and was classified as a nature reserve conservation area, managed to conserve the existing species.

Below this was a 30 year old European larch/sycamore mixture, with some Norway spruce, recently first thinned. Though this thinning was very late, there were some good larch and sycamore stems through the stand. The harvesting forester, Mr. Greening, said that cost effective management of these mixtures was very difficult, as there was a problem in getting people to harvest and extract this size of material. A contractor was employed to thin this area and the sycamore thinnings were sold by the Forest Enterprise mainly as firewood. There was a high population of grey squirrels here and they were causing damage to the sycamore. Trapping of the squirrels was ongoing using special selective traps which trapped only the grey squirrels and not red squirrels. The yield class of the various species was given as sycamore yield class 6, European larch yield class to 16 and



Quality sycamore, aged 32 years at Bolton Hall

Norway spruce yield class 12 to 14.

A discussion ensued on the production of quality broadleaves. Mr. Robert Tottenham expressed his opinion that the production of quality broadleaves should be the ultimate objective here with early thinnings and a short thinning cycle being practised. Mr. Mackenzie felt that hardwood markets should be planned for and the planting of specific broadleaves should then be actively promoted. He also stated that sycamore was not favoured in nature reserves such as this by conservationists, as it is a non native tree to this area. Mr Mackenzie also stated that in this particular stand they were working towards up to 100 sycamore stems per ha final crop with thinning every five to six years.

The next stop was a recently cleared windblown area where restocking options were discussed. These areas must be developed in a sensitive way. One possible option was to plant

broadleaves. Another was to leave the area as it is for wildlife and ash may naturally regenerate with birch to give a mixed woodland. The lop and top in this area would probably be burned at the right time next year.

On the upper side of the road at this stop there was a band mixture of 40 year old Japanese larch and oak planted on the contour. The treatment options for this area were discussed. The contour mixture made harvesting very difficult. The current management objective for this area was to reduce the width of the larch band by removing the larch in thinnings. The end objective was to have a final mixture of 85% oak and 15% larch.

The next stop was a visit to a 45 year old Japanese larch/sycamore, 3 rows: 3 rows band mixture. This stand was last thinned seven years ago with two rows of the larch being removed. It is anticipated that a 10 year thinning cycle will be employed here due to the delay



Mr. George Stephenson passes on his knowledge to the group at Bolton Hall

of the initial thinning.

The next stop was to view a 45 year old stand of Norway spruce/oak (3:2) band mixture. This stand was also thinned seven years ago with two rows of the Norway spruce being removed. The future management plan is to remove the last complete row of Norway spruce in about two years time and to thin the oak lightly. The end objective is to have a stocking of 80 oak stems per ha. The previous thinnings were harvested and extracted on contract by skidder.

The Society President, Mr. Eugene Hendrick, thanked Mr. John Mackenzie and Mr. Andrew Greening for their time and efforts in organising the two days of the Study Tour and they were presented with a token of the Society's appreciation. The group then stopped for a packed lunch in a forest setting. After lunch we travelled to Bolton Hall, Wensley. There we were met by Lord and Lady Bolton, Mr. George Stevenson, the retired Head Forester, Mr. Paul Stevenson, the current Head Forester and Mr. Robert Freun, the Estate Agent. Mr. George Stevenson outlined that there were 1,000ac. of woodland under management at Bolton Estate. A five year Management Plan had just been completed for this woodland area.

The first stop was to Hell Gill tip at a sycamore stand planted in 1939. This stand was planted at an initial spacing of 5ft. by 5ft. (i.e. 1,720 plants per ac.) with four lines of European larch to one line of sycamore and one line of beech outside this. The site was 500ft. OD and the soil was of limestone parent material. The natural vegetation was dogs mercury, wild garlic, buckler fern and brambles, ideal indicators for a sycamore site. The first thinning was undertaken in 1953 when the stand

was 15 years old. Subsequently thinnings were undertaken in 1956, '59, '62, '66, and '72. Some larch have been selectively thinned out since 1972. At one stage honey fungus was responsible for killing a proportion of the larch. The sycamore in this stand has been pruned to 18ft.

Grey squirrels are currently causing damage to the sycamore and a control programme has been implemented in the woodlands by selective trapping as mentioned earlier.

George Stevenson stressed the importance of the provenance of the sycamore in producing quality timber. Bolton Estate has a number of sycamore seed trees which it uses as its own seed source.

The most valuable sycamore timber is veneer and wavy grained sycamore which is currently exported to Japan for the making of fiddle backs. George Stevenson said that a neighbouring Estate received £1,000 for one wavy grain sycamore butt recently. The figure sycamore stems also have a very high value.

The second stop was at a younger recently thinned stand of sycamore and Japanese larch in mixture. Squirrel damage was evident here and was a cause of concern to the Head Forester.

The third stop was at Hell Gill Bottom. This stand was planted in 1916 and the initial mixture included sycamore, Norway spruce, Douglas fir, European and Japanese larch. Most of the conifers have been thinned out and much of the European larch was sold for boat building. The sycamore was high pruned in the early 1950's and the excellent quality of the stems reflects the intensive past management of this stand. The prices expected for the sycamore timber from this stand varied from £140/m³ standing for most of

the commercial timber which could make furniture grade to £550/m³ standing for the veneer quality butts. George Stevenson stressed that in thinning the sycamore, the crown requires a lot of light, indeed sycamore is even more light demanding than ash. The ideal is to thin to achieve 27 to 30ft. between final trees.

We had an enjoyable walk passing the large estate house to the final stop at Bolton Estate. This was a sycamore/larch stand planted in 1962. George Stevenson said that they would possibly achieve final crop spacing of the sycamore in this stand at the target age of 35 years. This stand was planted in groups with 16 larch in one group to 16 sycamore in the next. The sycamore in the stand now requires high pruning to produce top quality hardwood. Most of the stems in the stand were very straight and of excellent quality and with good strong crowns.

George Stevenson pointed out that the sycamore seed tree growing in open parkland had produced all the seed for the sycamore in this stand and many other stands in the woodlands. He also stated that all the larch in this stand was also grown from the seed from one tree.

After returning to the coach, the President thanked the hosts of the afternoon tour, Lord and Lady Bolton, Mr. George Stevenson, Mr. Paul Stevenson, and Mr. Robert Freun.

Donal P. Whelan

List Of Participants

Eugene Hendrick (President)

John Fennessey (Convenor)

Participants:

Tony Crehan

Lily Furlong

Tim O'Regan

Richard Jack

Tom Luddy

Charles Farmer

Brian Monaghan

George Hipwell

Brendan O'Neill

Ari van der Wel

Paddy O'Kelly

Trevor Wilson

Michael O'Brien

Brigid Flynn

Andrew Duffy

John Rycroft

Gerry Fleming

Jim Crowley

William Murphy

Denis O'Sullivan

Robert Tottenham

Gerry Murphy

Donal Whelan

Edgar Lee

Pat O'Sullivan

Tony Clarke

Joe Doyle

Gerhardt Gallagher

Social Forestry in Lesotho

Damian Clarke, John Casey

Introduction

Lesotho is situated in the southern end of the African continent. It is 11,720 sq. miles, about the size of Belgium, and has a population of about 1.6 million. The country is completely encircled by the Republic of South Africa and is virtually all above 6000 ft. Formally a British High Commission Territory, it gained independence in 1966. The annual rainfall of 28 inches occurs in the hot season October to March. English is the principal language. The project on which we worked is aided by the German agency for technical co-operation, GTZ.

Social Forestry in Lesotho

Lesotho has largely been treeless throughout its recorded history i.e. since 1833, when the first permanent missions were established. When the missionaries arrived they exhausted the few remaining trees in the construction of permanent stations.

A shortage of trees for firewood and as a source of heating means the people of Lesotho have to rely on shrubs and dung as a fuel. The intensive collection of dung and shrubs has resulted in a reduction of soil fertility and water holding capacity. Fertilisation has never been practised by Basotho farmers to any extent.

Due to the breakdown of soil structure, erosion occurs extensively during the rain season. Massive gullies

(locally known as dongas) are created and this results in a lowering of the water table, restricts ploughing and reduces further the limited cultivable area of the country.

Tree planting schemes are not new to the country and various attempts to afforest Lesotho have been undertaken over the past 150 years with little success. The new initiative being undertaken by the Ministry of Agriculture to increase the forested area of the country is a Social Forestry Project aided by GTZ.

Social Forestry Project

This Social Forestry Project was started in February 1993 and has a pilot phase of three years, after which the German agency will assess its success and decide whether or not to continue with the second planned phase for a further nine years.

Social Forestry in Lesotho is taken to mean all forestry activities planned or being undertaken with the direct involvement of local people, specifically for their direct or indirect benefit - whether the activities are carried out individually, by group or by Government authorities.

The two objectives of the Social Forestry Project are;

1. Production – fuelwood, poles, fodder, fruits, honey etc.

“
During the summer of 1994, John Casey and Damian Clarke, then 3rd year forestry students at UCD were afforded the opportunity to visit Lesotho for the purpose of working on a development aid programme. The opportunity arose through APSO who kindly assisted towards the travel costs.
”

2. Protection – erosion control, donga stabilisation and rehabilitation of catchment area.

The manner in which the social forestry project differs from other projects is that it aims to educate the local people and promote a desire to plant and raise trees.

Most previous projects failed because the indigenous population do not want to plant trees. The ownership of cattle and goats in Lesotho is seen as a status symbol and this need to own cattle is reflected in the tradition where a man must give twenty three cattle to a woman's father in order that he may marry her. Therefore, the basic ideas that the people have about agriculture must be changed or modified. The Social Forestry Project which aims to do this has three main projects strategies:

1. Extension services and farmer issues;

2. Tree management packages;

3. Management of the Forestry Division.

The Social Forestry Project is more concerned with people than the production of commercial timber. To deal with the people they operate as part of a "unified extension scheme". The unified extension scheme is under the control of a District Agricultural Officer. The Social Forestry Project is an element of a unified extension scheme in two areas of Lesotho, namely Maseru, the capital and Mafeteng.

The unified extension scheme personnel organise meetings with villagers which are called village headman workshops (VHW). At the VHW, representatives from various aspects of agriculture tell the villagers about the various areas with which they deal. When the villagers have heard from all the representatives they form into Common Interest Groups (CIG) to discuss further topics or detail of the



Typical Lesotho countryside

*Attempting to
rehabilitate a donga
using cuttings of
grey poplar*



specific interest area. The CIGs are headed by Subject Matter Specialists who hold degree or diploma qualifications in one of the four topics, namely forestry, livestock, range and conservation.

When villages have shown interest in a certain topic and have decided to implement some of the ideas suggested, they are aided by an extension agent. These hold agriculture certificates and live out in the countryside and thus are close at hand for advice as required.

The second project area concerns the development of tree packages which are made available to the people. The packages include the recommendation of forestry advisors concerning species selection for planting. Under this project, trees are made available to people free or at reduced cost depending on the circumstances. For the purpose of the tree packages, six categories are recognised: individuals;

communities; public institutions; schools; donga owners; and groups. Each of these categories must satisfy certain criteria to obtain their trees.

The Social Forestry Project recommends certain species. Individuals, public institutions, groups and donga owners will be advised towards the planting of multipurpose trees, shrubs and the planting of mixed stands.

Within communities, the emphasis is on growing trees for timber production whilst in the schools, the emphasis is on the educational value. All the packages are supported by training courses and technical advice. If tools are required they will be supplied on loan under the scheme.

The third area within which the Social Forestry Project is actively working is improving the Forestry Division. Social forestry training is carried out where a lack of training in an area is a hindrance to the fulfilment of project goals.

Nurseries

The main nurseries of the Social Forestry Project are based in two regions. The Maseru region has seven nurseries whilst the Mafeteng region contains five. The main species grown in these nurseries are pine and eucalyptus. A wide variety of multipurpose trees are also propagated.

A large proportion of the trees produced in the nurseries are grown from cuttings and are normally grown in shade sheds to prevent them drying out. Average summertime temperatures are 85° F. The shade sheds are necessary to give seedlings and cuttings a chance to harden off before being placed out in the sun.

A system of small local nurseries – micronurseries – has been established for the purpose of providing seedlings. This approach ensures that knowledge is imparted to the local farming community on nursery management and demonstrates that income can be earned from this source as seedlings are sold on.

A farmer who wants to establish a micronursery is supplied with all the initial inputs from the Social Forestry Project. These inputs consist of a shade net, plastic sleeves and seed. Training is also provided in the pre-treatment of seed and the raising of seedlings. When the seedlings have been raised to the desired stage they are sold to people in the village and neighbouring areas. They are priced at 20 cents which is 4p each in Irish money.

Micronurseries are not intended to be the main source of income for anyone. They are intended to be run as a sideline and whilst they produce a local supply of seedlings to an area they also increase and encourage an interest in trees.

Certain problems exist with the micronurseries. The main one being that there is a conflict with state nurseries which provide seedlings free in certain circumstances.

Donga rehabilitation

A major area of the Social Forestry Project is that of donga (gully) rehabilitation. Dongas are a common sight around the country and they have a severe adverse effect on agriculture. Dongas account for 60,000 ha of the land in Lesotho, a sizeable area compared with 12,000 ha of land covered by forestry.

Landowners whose land contains dongas receive free trees under the Social Forestry Project if they request them for donga rehabilitation. Advice on species selection is also provided.

There are three main categories of trees selected for this purpose. These are as follows;

1. Grey poplar (*Populus canescens*) which tend to throw up suckers and form new trees when roots become exposed. This is a very useful characteristic when dealing with erosion. Similar species used are black locust (*Robinia pseudoacacia*) and honey locust (*Gleditsia tricanthos*).

2. Weeping willow (*Salix babylonica*) which owes its usefulness in donga rehabilitation to the fibrous nature of its root system which acts effectively in the binding of soil particles.

3. Mexican red pine (*Pinas patula*) and similar species retard surface run-off by covering the soil with a thick mat of fallen branches and leaves. Other methods of donga rehabilitation practised includes planting of grasses and the building of small dams which are created from stones or sandbags filled with soil and grass seed. The grass grows out through the bag and

helps stabilise the dam.

All these methods of donga rehabilitation are cheap and effective. They also demonstrate the usefulness of trees in conjunction with other agricultural practises in minimising erosion during the rainy season which lasts from November to February.

Research division

The Lesotho Forestry Department has a small research division, staffed by three people. The activities of the research division consists of;

- (i) Silvicultural research – species and provenance trials,
- (ii) Forest inventory, permanent sample plots,
- (iii) Seed supply, improvement of local seed, mainly eucalyptus and the increased collection of seed of indigenous species.
- (iv) Protection – the monitoring of pests and diseases in nurseries and plantations.

The research division receives 20% of its funding from the forestry division. Funding also comes from the Canadian Government and the EU. It is aided in its goal of seed improvement by being a member of the Southern African Development Councils Tree Seed Centre Network Project. Arising from this they have a specialist in forest genetics working on a part time basis with them.

The Southern African Development Council includes nine other countries with Lesotho. These are Angola, Botswana, Malawi, Mozambique, Namibia, Swaziland, Tanzania, Zambia and Zimbabwe.

The research division is compiling

information on the selection of species for the different site types in the country. This information gathering is ongoing but the process is hampered due to lack of manpower and vehicles.

Pest problems

At present there are only three major pests affecting the forests of Lesotho.

1. The Pine wooly aphid (*Pineus pini*). This pest is rather common and attacks pines causing a yellowing of the needles and dieback of the growing tip. Death is uncommon but it does slow growth and causes deformity in the trees.

2. The Pine needle aphid (*Eulachus rileyi*). All pines are susceptible to this species but *Pinus greggi* is the most susceptible. This pest causes premature needle cast although death is rare.

3. The Eucalyptus snout beetle (*Goniapterus scutellatus*). This beetle is the major pest on eucalyptus in Lesotho. It has a preference for *Eucalyptus viminalis* and in areas where this is grown in mixture the beetle will transfer to other species of Eucalyptus. For this reason, *Eucalyptus viminalis* is not being planted on a large scale anymore. Where it occurs in mixture it may be cut out.

Pest control is not generally practised due to high cost. Biological control is practised in South Africa however, and this benefits Lesotho due to its proximity.

Existing Projects

Two forestry projects were already in existence in Lesotho prior to the introduction of the Social Forestry Project. These projects are titled the "Woodlot Project" which was introduced by the old Forestry Division and the "Plenty Project" which is

organised and funded by a Canadian Agency.

The woodlot project was organised on the basis of the Forestry Division being allocated land by a local community. They then hired local labour to plant and fence the land. The trees produced on the land belong to the Forestry Division but the community receives 20% of the revenue which the Forestry Division receives for the timber.

The plenty project is a food for work scheme. People are given food and rations to plant and fence an area of land. The planted land is then given to the people and they own everything that accrues from it. This method succeeds in production forestry but it would appear that once the timber is felled there is no incentive for the people to replant the land.

Of the three projects currently operating in Lesotho, the Social Forestry Project is probably the most expensive to operate and the slowest to get land planted. The expense is incurred as the majority of seedlings are provided free and it takes a considerable amount of manpower on the ground to instruct and educate partici-

pants in the planting and care of seedlings.

Of the three projects, the Social Forestry Project is the only project that addresses the real needs of the people. It would appear that only the Social Forestry Project stands a real chance of successfully meeting the timber/fuel needs of Lesotho. With an average 60% survival rate of trees planted under the scheme the goal of self sufficiency in fuel needs is a long way off.

Conclusion

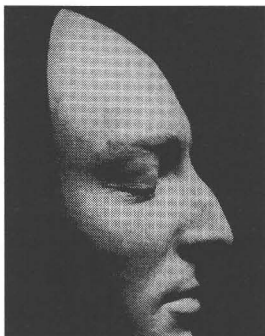
The scale of the problem facing the Forestry Division and Development Aid Programmes can be highlighted by the following points;

- it is estimated that the agricultural land in Lesotho will support one more generation.
- An estimated 9000 ha of forestry need to be planted each year for Lesotho to achieve its fuelwood needs by the year 2010. At the moment, approximately 300 ha of forestry are being planted per year.

Book Review

A Man who can Speak of Plants

Death mask of
Dr. Thomas Coulter.



A Man Who Can Speak of Plants
(Dr. Thomas Coulter 1793-1843)
E. Charles Nelson & Alan Probert
Soft back. Pp192. 52 black and white
illustrations, 8pp colour plates.
Price IR & UK £15. ISBN 0 9524847 0 6

John Anderson

This book offers a detailed account of one of Ireland's great unsung heroes of his generation. I have only briefly encountered Dr. Thomas Coulter through his horticultural merits, of which there are many. Although he was a doctor of medicine – he graduated from Trinity College Dublin in 1820 – he was by all accounts a botanist at heart. This pursuit in the plant world brought him into contact with some of the most eminent people of his generation.

This is more than a book on the life of Coulter. It delves into life around Coulter and the people who most influenced him like Dr. Romney Robinson

and Professor A. de Condolle. Coulter will live on for ever in Irish gardens with the wonderful perennial plant of *Romneya coulteri* a Californian poppy which adorns the summer months, with large white flowers appropriately named the “fried egg plant”. In forestry terms Coulter may not have shared the same fame as David Douglas the renowned Scot, who discovered so many of the forest trees we cultivate today. Coulter is commemorated with discovering the “big cone pine” *Pinus coulteri* around the time Douglas was collecting in California. Specimen trees of *P. coulteri* are well represented in Irish gardens. The two men were good friends and spoke highly of each other. In a letter to Dr. William Hooker, Professor of Botany in the University of Glasgow, Douglas praised Coulter “as a man full of zeal and a pleasure to find me a good man who can speak of plants”.

In his final years, Coulter had moved to Trinity College and became curator of the herbarium and was to take over the chair in botany, but after a prolonged period of poor health Dr. Thomas Coulter died on 28th November 1843.

The book is excellently written and researched, giving detailed references on the life of Coulter. I hope this is only the beginning of a much needed library of extraordinary Irish botanical scholars who should be brought to the fore. This book is printed privately by E. Charles Nelson.

Obituary

Thomas Clear, Emeritus Professor of Forestry

Tom Clear, Emeritus Professor of Forestry at UCD died on the 12 December, 1994, just ten days short of his 83rd birthday. His passing brings to an end a life of service to forestry and forestry education unparalleled in the history of the State, spanning almost half a century from the 1930s to the 1980s.

Tom was born in Portlaoise on 22 December, 1911. He attended the local secondary school and secured a county council scholarship to study agriculture at UCD in 1930. During his first year he was influenced by a forestry student, Sean M. O'Sullivan to change career, a move he was never to regret. Tom, together with Sean O'Sullivan, O. V. Mooney, Martin Feehan and Douglas Walsh formed a forestry cadre which has contributed much to what constitutes Coillte today. They were greatly encouraged by the policies and programmes of the government of the time, which had made afforestation an election issue, and they were to benefit educationally from these policies by a four month study period in Sweden during their final year, to acquire experience in forest engineering, surveying and forest inventory.

Having graduated in 1935 with first class honours, Tom was awarded a travelling scholarship to undertake postgraduate study. On the recommendation of Dr. Otto Reinhard, the Director of the Irish Forest Service on secondment from Germany, Tom opted for study at the world renowned Prussian *Forstliche Hochschule* at Eberswalde, some 100km east of Berlin. It was a move which, not alone influenced Tom's attitude to forestry theory and practice but through him, had a profound effect on forestry in this country.

At Eberswalde Tom's mentor was Professor Dr. W. Wittich, one of the most highly regarded forest scientists of the period. Here Tom was imbued with principles of silvicultural practice which were to remain his forte for the rest of his life. During vacations he travelled widely to study forest management practices in the States of Bavaria, Baden, Hessen, Saxony and Thuringia as well as Prussia. It was characteristic of the man that he threw himself into student activities with his usual fervour. He mastered the language, an accomplishment which was to stand him in good stead in later years, and students were to benefit from his translation of excerpts from Dengler's *Waidbau*, the standard silvicultural text in German Universities. He engaged in sporting activities but, on his own admission, was not a great success. Later he would laughingly recall his attempts to achieve proficiency in woodcraft and rifle marksmanship, a prerequisite for the post of forest officer in Germany. It would seem that Tom's aim was so wide of the target that the score enumerator on the rifle range feared for his life and suggested to Tom that he might like to give up target practice as it was unlikely that he would ever become a Jäger.

On his return to Ireland in 1937, Tom was appointed an Assistant District Officer in the Forest Service based at Gort, Co. Galway. However, his stay there was short. In 1938 Professor Drew, Dean of the Faculty of Agriculture, invited him to take the post of acting Lecturer in Forestry at University College Dublin. From then until his retirement in 1981, he was the foremost forestry academic in the country. He adapted Central European forestry theory and practice to Irish conditions with a refreshing pragmatism and due regard for the national requirements. In the North American conifer, Sitka spruce, he saw the answer to Ireland's constructional timber needs and it

is worth recording that his views on this subject were vindicated during his lifetime. To quote his own words, 'Sitka spruce is God's gift to the Irish nation'. He would argue that, but for a quirk of ice-age glaciation, Sitka spruce would have been an indigenous species.

In his role as lecturer and professor, Tom was a strong advocate of the final year forestry student tour, arguing that forestry was essentially a land use enterprise which needed to be taught in a field environment. During the 1939-45 war the tour was, of necessity, confined to Ireland and forestry students of that period have occasion to remember some marathon hikes. Niall Morris, one of the class of '45 recalls a cycle stage from Cashel to Portlaoise, after a day on the Galtees, with Tom leading the *peloton*. After the war Professor Clear focused on mainland Europe for the student tour with a view to broadening the forestry students' education. The Nordic countries provided frequent venues but Germany remained a favourite destination. Unfortunately, however, he never had the opportunity to revisit Eberswalde. By the time the Berlin Wall was dismantled his failing health curtailed travel outside Ireland.

Like many foresters of his generation he leaves a living memorial of woodlands which he helped establish. From Wicklow to Clare many private forestry estates have had the benefit of his expert advice and are ecologically and financially richer on that account. He made no excuses for his choice of conifers over broadleaves knowing that few estates could afford the long rotations and dubious financial returns associated with the latter in an era of meagre forestry grants and no premiums. In his view, the promotion and establishment of broadleaves was the responsibility of the public rather than the private forestry sector: only the State could afford to grow them.

Professor Clear was the very antithesis of the 'ivory tower' academic. He was most at home in the forest environment, holding forth to his students or discussing a silvicultural point at a Society of Irish Foresters field outing. He was a founder member of this organisation and its Secretary and Treasurer for almost two decades. Later in life he was to become its President. His immense contribution to forestry was recognised by the Society in recent years when he was made him an honorary life member.

Promoted to Statutory Lecturer in Forestry in 1944, Tom was appointed to the Chair of Forestry in 1959. His analytical approach to problems and sound judgement lead to his election as Dean of the Faculty of Agriculture and in this capacity he served two terms in the late 1960s and early 1970s. Throughout this period he was actively engaged in negotiations and arrangements for the new faculty building at Belfield. His broad vision and insistence on maintaining core values ensured the world-wide recognition of the UCD degree.

Apart from a great interest in reading, current affairs and travel, his almost total immersion in forestry left little time for other activities. Following retirement he became an enthusiastic gardener and maintained a keen interest in forestry.

He married Kathleen Mitten from Wexford in 1938 and they were blessed with a large family. Although Kathleen was not directly involved in forestry, her invaluable contribution to Tom's work and career was widely recognised as wife, mother, private secretary, organiser and confidant. To Kathleen and to their family, Michael, Judith, Mary, Aidan, Declan, Colman, Eoghan, Simon and Richard we offer our deepest sympathy.

Padraic Joyce

Minutes of 52nd Annual General Meeting

21st April 1994

Venue: G-08, Agriculture Building, UCD

1. Minutes of 51st A.G.M.

The minutes were taken as read. There being no amendments, the minutes were signed by the President.

2. Matters Arising

An assessment of the quality and content of the numerous forestry courses currently on offer in Ireland should be undertaken by the Society.

3. Council Report for 1993/1994

The Council report was approved. It was proposed by Fergal Mulloy and seconded by Gerhardt Gallagher.

4. Abstract of Accounts

The audited Statement of Accounts for year ended 31st December 1993 was adopted by the meeting. It was proposed by Brendan Fitzsimons and seconded by Trevor Wilson. The President thanked the Hon. Auditor Mr. William Jack, who is retiring this year, for his services to the Society of Irish Foresters over the years.

4. Results of 1993 Council Elections

President: Eugene Hendrick
Vice President: Gerhardt Gallagher
Secretary: Pat O'Sullivan
Treasurer: Richard Jack
Editor: Donal Magner
Public Relations Officer:
John McLoughlin
Business Editor: Jim O'Dowd

Hon. Auditor: William Jack

N.I. Group Representative:

Trevor Wilson

Belfield Group Representative:

Joe O'Carroll

Technical Councillors (3):

Pacelli Breathnach

John Fennessy

Gerard Murphy

Associate Councillor: Lily Furlong

The results, proposed by E. P. Farrell and seconded by Pat Doolan, were ratified.

6. Linkage with the Institute of Chartered Foresters (ICF)

The President, Eugene Hendrick, outlined progress on the development of linkages with the Institute of Chartered Foresters of the UK as follows:

The Institute of Chartered Foresters, founded in 1925 as the Society of Foresters of Great Britain, was incorporated by Royal Charter in 1982. It is the representative body of the forestry profession in the UK and safeguards the public interest in forestry matters, maintains the standards regulating entry to the profession and advises the UK Government on matters of policy.

The outcome of our discussions to date with the ICF is the Councils of both organisations have formally agreed that some form of linkage is

desirable. The proposed linkage will be effected by the Society incorporating a branch of the ICF in Ireland.

Members of the branch would be Technical members of the Society who have also opted to join the ICF Membership of the branch would be open to Technical members of the Society only, however there would be no obligation on Technical members to join.

Existing Technical members of the Society (from the date of the Annual General Meeting) would be eligible to apply to become Chartered Foresters. This would most likely entail the submission of a CV and a committee of Council would be responsible for recommending applicants for membership of the ICF in Ireland.

All new members of the Society and existing Associate and Student members who wish to become Chartered Foresters would have to sit the ICF examinations in the normal manner. It is envisaged that these examinations would have separate Irish papers relating to forestry practice, regulations and other relevant areas. If the proposed link is effected it will entail an increase in subscription rates for members who opt for joint SIF/ICF membership.

The President recommended linkage with ICF for the following reasons:

1. It offers an opportunity for the forestry profession in Ireland to strengthen its membership through linkage with a widely recognised qualification.
2. It offers the opportunity for a united forestry profession in Ireland and Britain that can speak with one voice on issues of common concern such as environmental matters, silviculture, and recognition for the profession.

ture, and recognition for the profession.

3. It would allow the Society access to the I.C.F. examination system and would allow through this means and through the accreditation of various forestry courses that are organised here, the orderly development of the profession in Ireland.
4. It could permit the organisation of joint field days, study tours, conferences and other events.
5. If successful it could and should lead to the development of similar linkages with the forestry profession in other EU countries.

The President pointed out that there are risks associated with the development. For example, there could, in time, be increased competition here in Ireland from UK consultants who are ICF members – however the much larger UK market would also be open to Irish consultants. There is also a danger that the Society of Irish Foresters would lose its identity and be subsumed into the ICF.

However, he was confident that the profession in Ireland is sufficiently well developed to ensure its separate identity and role. Finally, it was emphasised that these developments would not lead to any lessening of the role or status of our Associate members.

The President strongly recommended to members that they support the proposed linkage with the ICF and give a mandate to the incoming Council to continue the discussions and

bring them to a successful conclusion.

During the ensuing discussion it was confirmed that membership fees would increase only for those Technical members who become joint members of SIF and ICF. In addition, the ICF requires that all members on its list of approved forestry consultants should have professional indemnity insurance cover. It is envisaged that the proposed linkage with ICF would necessitate a number of amendments to our constitution. The meeting agreed that the proposed linkage should be pursued.

7. Any Other Business

“Strategy for the Development of the Forestry Sector to the Year 2015”

The Society’s submission, which focused on the issue of professionalism in forestry in Ireland, will be published in the next issue of Irish Forestry.

Meeting with Minister of State for Forestry and Rural Development, Mr. Liam Hyland, TD

The President and Vice-President

met with Minister Hyland in April, the following topics were discussed:-

- the need for the employment of professional foresters on all grant assisted projects of 10 ha or greater;
- list of forestry consultants (MSIF) to be included by the Forest Service in promotional literature in relation to grants;
- dangers associated with a differential shift in grant aid towards broadleaves without adequate knowledge of their silviculture;
- that a professional forester should be appointed to the Board of Coillte.

Professional Indemnity Insurance:

The incoming Council will consider the proposal that SIF would organise a Group Scheme of Professional Indemnity Insurance.

Pat O’Sullivan
August 1994

Attendance:

Richard D. Jack
Joseph O’Carroll
Pat O’Sullivan
M. O’Mallon
Lily Furlong
T. Wilson
Donal Magner
M. Mac Siurtain
Jim O’Dowd
B. Fitzsimons
Tim O’Regan
Brendan Lacey
Brigid Flynn

Gerhardt Gallagher
Conor O’Reilly
Ted Farrell
Pat Doolan
Tom McDonald
Maureen Cosgrave
Daithi de Forge
Myles Cosgrave
Suzanne Jones
Declan Lawless
Bill Dallas
Gerard Cahalane
Aine Powell
Eugene Hendrick
D. Mangan

Paul Gordan
Adam Brennan
Donal O’Hare
Gavin O’Mahoney
Gerard Dunne
Fergal Mulloy

Apologies:

P. Breathnach
N. O’Carroll
G. Murphy
K. Byrne
Bill Wright
J. Fennessy

Society of Irish Foresters Statement of Account for years ended 31 December 1993

1992	Receipts	1993
15,859.79	To Balance from last account	20,969.43
	Subscriptions received	
	Technical 1993	7,747.35
	1992	1,408.00
	Associate 1993	1,657.00
	1992	210.00
	Student 1993	210.36
	1992	30.00
	Other arrears	571.00
	Advance Payments	1,090.11
12,750.74		12,923.82
	Interest on Investments	
	Savings at Ulster Bank	557.97
1,016.96	Educational Bldg. Society	4.26
1,835.70	Journal	562.23
5,000.00	Grant for Book	885.38
600.00	Book sales	8,363.86
1,151.00	Tie sales	106.00
17.50	Gains/(Losses) on sterling	-6.35
13.50	Donation	10.00
	Wood Ireland	

38,245.19

43,814.37

I have examined the above accounts, have compared with vouchers, and certify same to be correct, the balance to credit being IR£17,138.44 which is held in current accounts at the Ulster Bank (IR£1860.00 less IR£872.21 uncashed cheques), Ulster Bank Savings Account 08778241 and the Educational Building Society Account 11304413. There is a holding of Prize Bond Numbers R855061.080.*

W. H. Jack, Hon. Auditor
12 March 1994

Society of Irish Foresters Educational Award Fund

Statement of accounts for the year ended 31 December 1993

1992	Receipts	1993
1,492.61	To Balance from last account	1,613.76
121.15	To Interest	102.45
<u>1,613.76</u>		<u>1,716.21</u>

I have examined the above accounts, have compared with vouchers, and certify same to be correct, the balance to credit being IR£1416.21 which is held in the Trustee Savings Bank Investment Bank Account 30013591.

W. H. Jack, Hon. Auditor
12 March 1994

1992	Payments	1993
1,125.31	By stationary and printing	1,361.03
2,991.00	Printing of Journals	
1,959.95	Postage	1,721.52
656.15	Expenses re Meetings	1,080.06
121.23	Bank charges	88.35
1,484.10	Secretarial expenses	1,116.62
607.03	VAT	106.89
—	Examination expenses	508.30
208.52	Miscellaneous	143.05
900.00	Insurance premium	901.00
147.36	Affiliations	92.50
	Honoraria	
	Secretary £50	
	Treasurer £50	
	Editor £50	
200.00	Business Editor £50	200.00
1,100.88	Father Browne book	16,567.00
1,375.78	Purchase of Society ties	—
1,998.45	Society display stand	1,389.61
2,400.00	Study tour	1,400.00
	By Balance	
	Current Accounts 987.79	
	Savings Accounts 15948.35	
	Educational Bldg 202.30	
20,969.43		17,138.44
<u>38,245.19</u>		<u>43,814.37</u>

1992	Payments	1993
0.00	By Awards	300.00
1,613.76	By balance	1,416.21
<u>1,613.76</u>		<u>1,716.21</u>

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