

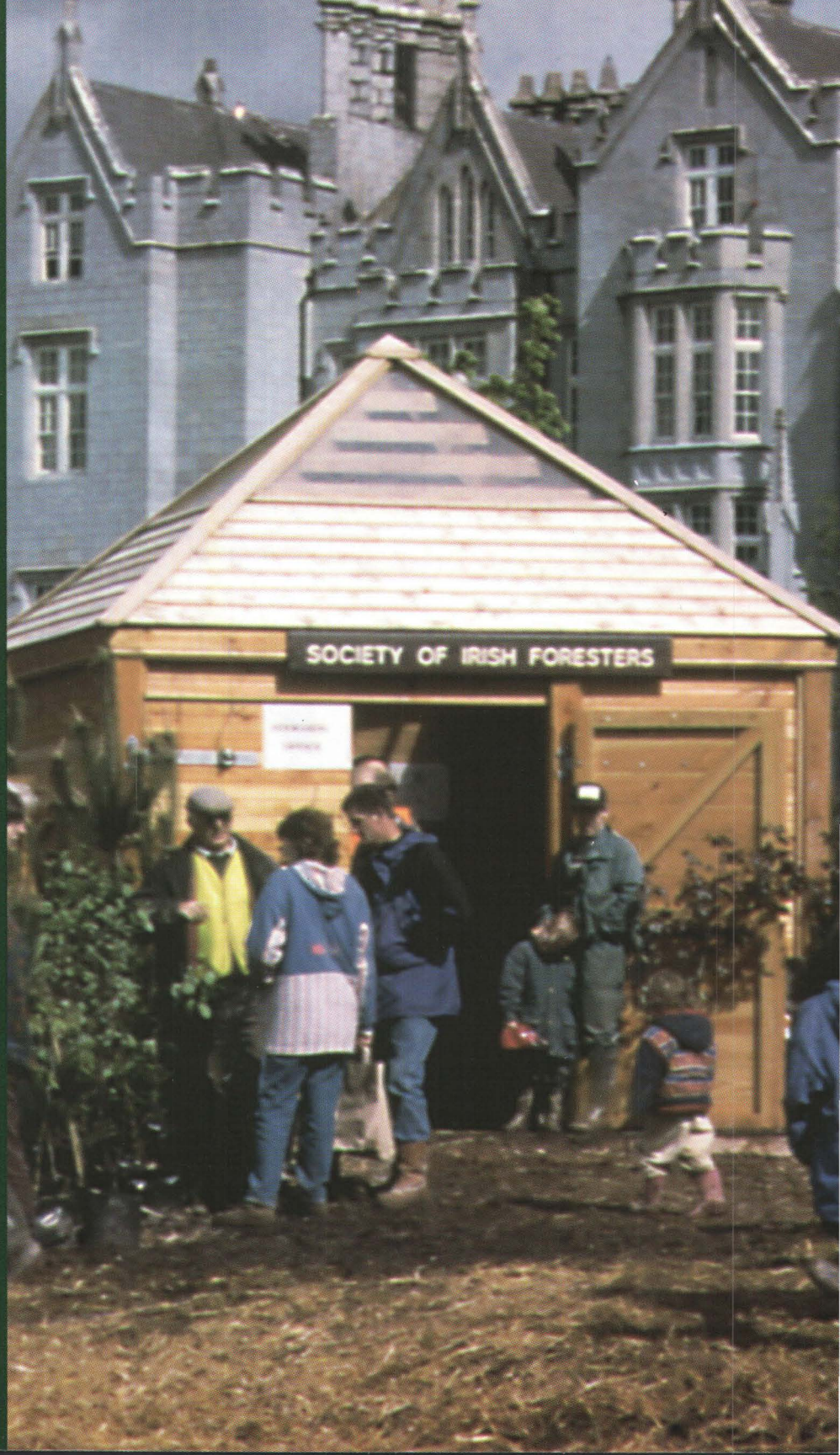
# IRISH FORESTRY

JOURNAL

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THE SOCIETY  
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FORESTERS



Vol. 54 No. 1, 1997





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# IRISH FORESTRY

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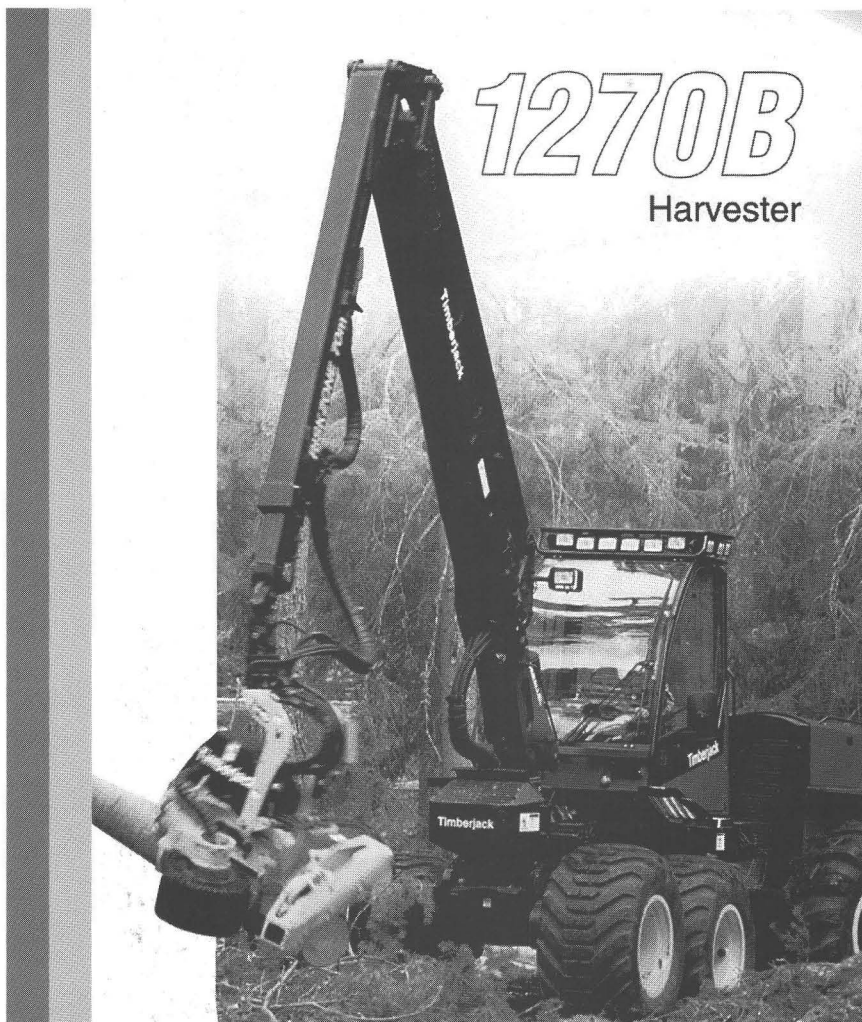
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**Cover:** Forestry Ireland, Kinnitty, Co. Offaly, May 1997.  
A full report on the show will appear in *Irish Forestry*, 54(2).





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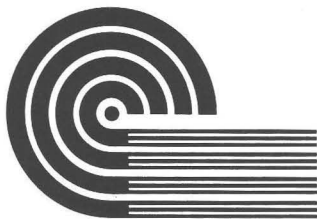
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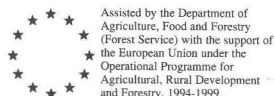
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Established to encourage the use of Irish grown Timber, in whatever form, to the benefit of the National Economy.

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Eligible entries include woodlands located in and around cities, towns and villages and managed primarily as a public amenity for the adjacent urban population.

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The main activities of the Society include the organization of symposia, field meetings and study tours on forestry topics, and the publication of *Irish Forestry*, the Society's journal. The Society also organizes forestry shows and exhibitions and has published *The Forests of Ireland* and *Forest Images - Fr. Browne's Woodland Photographs*.

There are three types of Society membership.

- Technical (MSIF): Persons who wish to promote the objectives of the Society and who, at the time of election, hold a degree or diploma in forestry from a recognised university, or who have successfully completed a full-time course at a forestry school recognised by the Society, or who hold the Foresters Certificate of the Society. In all cases, subject to the approval of the Council of the Society. Annual subscription £25.00.
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**Notification of Price Increase for Non-Membership Subscription.** The non-membership subscription rate to *Irish Forestry* has remained unchanged since 1982. Commencing with Vol. 55, 1998, the annual subscription rate will increase to IR£25 per volume world-wide (incl. P&P). This increase is necessary due to the new colour format, increased costs of production and postage and our renewed objective to consistently produce two issues per year.

The Society of Irish Foresters is supported by the Forest Service, Department of Agriculture, Food and Forestry and the EU, under the Operational Programme for Agriculture, Rural Development and Forestry, 1994-1999.

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Authors are requested to observe the following guidelines when submitting material for publication in *Irish Forestry*.

- One complete copy must be submitted in typescript. Correct spelling, grammar and punctuation are expected. Nomenclature, symbols and abbreviations to follow established conventions, with the metric system used throughout.
- A computer disc containing text must be submitted. If applicable, a second disc containing computer generated tables, graphs and illustrations is also required. In both cases, clearly indicate the editing package used.
- Authors submitting scientific papers are requested to indicate whether or not they wish their material to be subjected to peer review. Papers submitted for peer review should include an abstract (max. 150 words) and a list of up to six key words before the main body of text. For general papers, a summary (max. 250 words) is required.
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GALLAGHER, G. and GILLESPIE, J. 1984. The economics of peatland afforestation. *In: Proc. 7th Int. Peat Conf. Dublin. Vol. 3:271-285.*  
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Forestry Abstracts may be used as a guide in the abbreviation of journal titles.
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- Submission of a paper is understood to imply that the paper is original and unpublished and is not being considered for publication elsewhere.

The above guidelines are designed to facilitate the speedy processing of material submitted for publication in *Irish Forestry*. Inadequate adherence to these guidelines may result in material being returned to the author for redrafting.

# EDITORIAL

For generations, foresters busily plied their profession behind closed gates on the remote mountainsides and boglands of Ireland, well away from the direct gaze of the wider public. This situation has however changed considerably over recent years. The increased afforestation of lowlands has brought forestry into direct contact with a greater section of the rural community, leading in some cases to conflict. With the increased environmental awareness now permeating Irish society, critics of forestry are finding their way with greater frequency into local and national media. In light of the absence of any cohesive defence from the forestry profession, such criticism can sway public opinion against forestry – a trend which will invariably translate, *via* the democratic process, into tighter policy controls on the development of the sector. In addition, unlike other European countries, an inherent woodland culture is largely absent from Irish society, resulting in a general lack of understanding and appreciation of the forest cycle. Such trends are clearly at odds with the projected growth of the forestry sector within Ireland.

Foresters can no longer afford simply to react to criticism of forestry as and when it appears. Instead, we must embark on a cohesive and proactive strategy to promote the industry. We must unashamedly 'sell' forestry for what it is - a sustainable landuse capable of producing a huge range of timber and non-timber benefits for all. We must highlight the fact that we are learning from our past mistakes and are adapting accordingly to ensure compatibility, particularly in relation to landscape and the environment. We must actively promote an understanding of the forest cycle, from seed selection to the final wood product. In effect, foresters must set the agenda regarding the public perception of forestry, and not let it be set by others.

The three-day Forestry Ireland show, held in Kinnitty, Co. Offaly earlier this year, epitomised this growing realisation. The event succeeded in drawing together interests from across the entire spectrum of Ireland's forestry sector into what can only be described as a showpiece for everything forestry has to offer. Forestry Ireland has set the standard, and will undoubtedly come to be regarded as having made a huge contribution to the promotion of forestry, in all its diverse forms, among the people of Ireland - an achievement for which all those involved in the monumental task of staging the event must be congratulated.

Securing a positive perception of forestry is a long-term challenge facing us all. We are indebted to our forebears for laying the foundations which have brought forestry to the brink of a period of unprecedented expansion. Perhaps we owe it to future generations of foresters to ensure that this expansion can take place unhindered, in an atmosphere of public understanding, acceptance and support.

Submissions to *Irish Forestry* are welcome and will be considered for publication.

The attention of contributors is drawn to "Guidelines for Submissions". Submissions to be addressed to:

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## The effects of selected pre-emergence herbicides on the germination, survival, health and germinant morphology of Sitka spruce (*Picea sitchensis* (Bong.) Carr.)

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### Summary

The effects of five pre-emergence herbicides, diphenamid, oxyfluorfen, napropamide, isoxaben and oxadiazon, on the germination of Sitka spruce (*Picea sitchensis* (Bong.) Carr.) seeds over a 6 week period when sown under grit or soil were investigated. The main objective was to find a herbicide that could be used as an alternative to diphenamid, the principal pre-emergence herbicide used in Irish nurseries. The number of surviving seedlings was determined at the end of the test, 2 weeks later, after all germination was complete. The results under soil and grit were consistent, although as expected, seeds germinated more slowly and final germination was lower under soil. Only the results from the grits are reported. Diphenamid and oxyfluorfen had little detrimental effect on the speed of germination and final (cumulative) germination of seeds, and the survival of germinants. Final germination (approximately 80%) and survival (approximately 90%) were almost the same as in the control. Morphological development and health scores, seedling height, root length and seedling dry weights also differed little from the control. Germination and survival were a little lower in those treated with napropamide (74% and 80% respectively), and the seedlings were healthy. Shoot growth, and to a greater extent, root growth, were however adversely affected by this treatment. Germinants in this treatment also had lower dry weights than in those from the control, diphenamid and oxyfluorfen treatments. Germination and all other variables were very poor in those treated with isoxaben and oxadiazon. In all cases, the herbicides tested had no effect on mycorrhizal associations in germinants.

### Introduction

Weed competition in nursery seedbeds is a major problem, as it is in other phases of nursery production. Herbicides are widely used in their control. Post-seeding or pre-emergent treatment is generally more effective than post-germination application for full season weed control (Owston and Abrahamson, 1984). Diphenamid is the most widely used pre-emergence herbicide in Irish forest nurseries. Diphenamid can reduce hand weeding by up to 75%, with considerable savings in labour costs (McDonald *et al.*, 1974). This herbicide is highly effective, but there is concern about the over-reliance on it. Furthermore, diphenamid may be withdrawn from the market, posing a serious set-back to the nursery industry in Ireland. Alternative chemicals therefore need to be screened for use as pre-emergence herbicides, particularly for use on Sitka spruce (*Picea sitchensis* (Bong.) Carr.) seedbeds. This species accounted for approximately 80% of the afforestation and



reforestation programme of about 21,000 ha in 1993. Although several herbicides other than diphenamid have been used successfully on conifers in other countries (such as napropamide, bifenox and DCPA), there is little information on herbicide suitability for use on Sitka spruce. However, some limited information of this kind is now available for this species (Williamson *et al.*, 1993).

The success of a pre-emergence herbicide treatment largely depends on the presence of a high concentration of the herbicide in the upper 3 cm of the soil, where most of the annual weeds germinate (Klingman and Ashton, 1975). Most conifers are however sown under a covering material such as grit (1 cm used in Ireland), where the seed is likely to be in direct contact with the chemical. In one study using red pine (*Pinus resinosa* Ait.), direct contact of herbicides with seeds had no effect on germination, but newly germinating seedlings were greatly affected (Kozłowski and Saskai, 1968). As the soil absorbs herbicides (Delorit and Ahlgren, 1973), soil covering may offer more protection from the herbicide than grit.

The objective of this study was to find a suitable alternative pre-emergence herbicide for use on Sitka spruce seedbeds, particularly as a substitute for diphenamid. To this end, the effect of five herbicides (diphenamid, oxyfluorfen, napropamide, isoxaben and oxadiazon) applied to both soil and grit covered seeds on the germination, early seedling morphology and mycorrhizal associations was investigated in a controlled greenhouse environment trial. No attempt was made to test the effectiveness of the herbicide in weed control.

## Materials and methods

Soil from the Coillte Teo. Ballintemple Nursery, Co. Carlow, was placed to a depth of 5 cm in each of 72 plastic trays (35 x 22 x 7 cm). The soil was a sandy loam of pH 5.7, with an organic matter content of 0.78% and sand, silt and clay fractions of 66%, 19% and 15% respectively. The soil is considered ideal for germinating Sitka spruce.

Stratified Sitka spruce seeds (registration code 94R91) of Washington origin were sown in May, 1993, in five rows containing 10 seeds per row in each tray (50 seeds/tray), giving a density of 800 seeds/m<sup>2</sup>. After sowing, 36 trays were covered with 1 cm grit (the same grit as that used operationally at Ballintemple), while the remaining trays were covered with a similar amount of soil. The trays were then placed in an experimental greenhouse unit at University College Dublin. After covering, all trays were well watered. After 24 hours, each herbicide was applied to six trays of each covering material (12 trays), using a hand-held bottle sprayer at recommended concentrations (Table 1). Twelve untreated trays served as controls. The trays were then randomly arranged within each of six blocks, each herbicide by covering material combination replicated once within each block. The trays were raised off the floor of the greenhouse using polystyrene laths, to avoid the possibility of cross contamination through runoff water.

As high temperatures (35°C) and low humidity (40% or lower) are common in greenhouses at the time of year during which the trial took place, three small polythene tunnels, each spanning two blocks, were erected for the duration of germination. A shade cloth was placed over the tunnels to lower the temperature. Temperatures were monitored daily using a maximum-minimum thermometer, while humidity was checked periodically with a digital hygrometer (Delta Ohm HD8501H, Padova, Italy). Temperatures were less than

**Table 1.** Rates used for the application of herbicides to Sitka spruce seeds before germination. Herbicide abbreviations are given parenthetically.

<i>Herbicide</i>	<i>Rate of application (g ai/ha)</i>
Diphenamid (DIPH)	4,000
Oxyfluorfen (OXYF)	72
Napropamide (NAPR)	3,150
Isoxaben (ISOX)	125
Oxadiazon (OXAD)	2,000

30°C and relative humidity was between 75-95% at all times during the trial.

All weeds were removed as they emerged, and no attempt was made to assess the effectiveness of the herbicides in weed control. No fertilisers were applied to the trays.

### *Data collection*

Beginning 7 days after sowing, the trays were monitored daily until germination began. At this point, and thereafter at 2-day intervals, the number of new germinants were recorded until germination ceased 42 days later. After another 14 days, the health (severe, slight or no damage) and stage of development (seed cap present, cotyledons emerged, primary needles present, shoot elongation) of each germinant was subjectively scored.

Total germination alone is perhaps not the most meaningful way to quantify germination. The speed of germination is also important as it takes into account the vigour of the seeds. To account for differences in both speed of germination and total germination, Czabator's formula was used to calculate the germinative value (Czabator, 1962). This value is a product of mean daily germination over the whole test period and the mean daily germination over the most vigorous component of the test period (beginning at zero).

Seedling morphology, dry weight measurements and the number of surviving seedlings were recorded at the end of the experiment, 56 days later. Every fifth seedling was removed until a total of 10 seedlings was obtained from each tray for morphological assessments. As there were usually fewer than 50 seedlings per tray, each tray was scanned more than once. In a few cases, there were fewer than 10 germinants per tray. Shoot and root lengths were measured. The seedlings were then placed in an oven at 65°C for 24 hours, after which, dry weight determinations were made.

### *Data analyses and presentation*

As the data were consistent across covering material, only the effects of herbicides on grit-covered seed trays were evaluated. For most variables, the data (mean value per tray) were subjected to an analysis of variance following a randomised block design using the SAS software package to test the effects of treatments and blocks (SAS Institute Inc., 1982). This test was followed by the least significant difference test to determine which herbicides were significantly different. In the case of the morphology data, two treatments were excluded as they contained too few seedlings in some replications. Nevertheless, mean values for all treatments are presented for comparison. Data on health and stage of

development are presented for descriptive purposes only. These data were not subjected to statistical analysis as they were derived from observations of all surviving germinants, with sample sizes varying accordingly.

### *Mycorrhizae*

In December, 1993, a further five seedlings were removed from each tray and stored in plastic bags at 4°C. Over the following few weeks, seedling roots were examined for the presence of mycorrhizae. The roots were washed in running tap water and rinsed in deionised water. Following washing, the seedlings were placed in petri dishes containing deionised water and examined under a stereo microscope (20x) to determine the presence of mycorrhizae. Notes were made of the colour and size of the hyphae. The number of infected root tips was recorded for each germinant as a percentage of the total number of root tips.

To identify the species of mycorrhizae, the root tip was mounted on a slide in cotton blue stain (10-15 seconds), and then squashed firmly under a cover glass. The squash was observed under a compound microscope (400x), and the mycorrhizae identified, using mantle and hyphal characteristics (Ingleby, 1990). In an attempt to speed up this procedure, a staining technique using 0.1% Ponceau S (acid red 112) diluted in 10% acetic acid was tested, following the procedure outlined by Daughtridge *et al.* (1986). Although used successfully to detect ectomycorrhizal fungi in *Quercus rubra* L., this technique was not effective in detecting ectomycorrhizal fungi of Sitka spruce in this study.

## **Results**

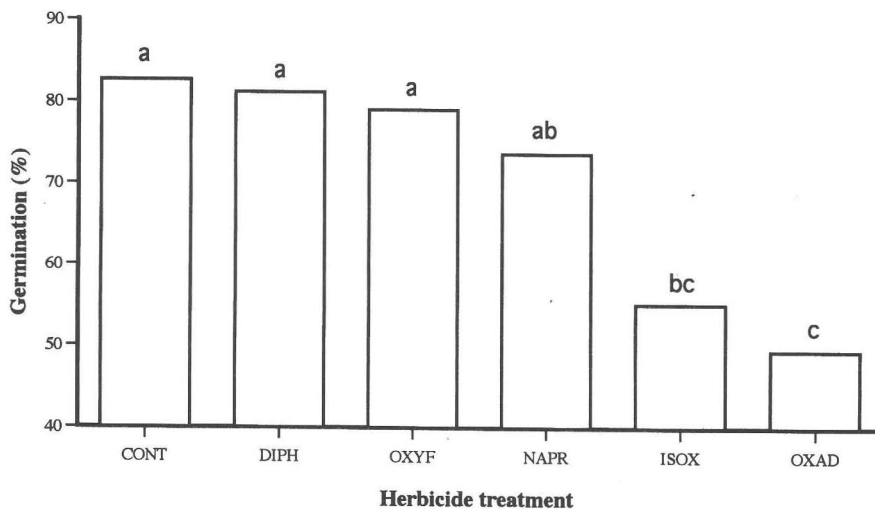
The effects of replication were significant for a number of variables, but this was largely attributable to the slightly smaller values recorded for two blocks closest to one edge of the experiment. These blocks may have received some additional 'drift' watering, due to their position adjacent to a separate trial. The effect of replication will not be addressed further in this paper.

### *Germination and survival*

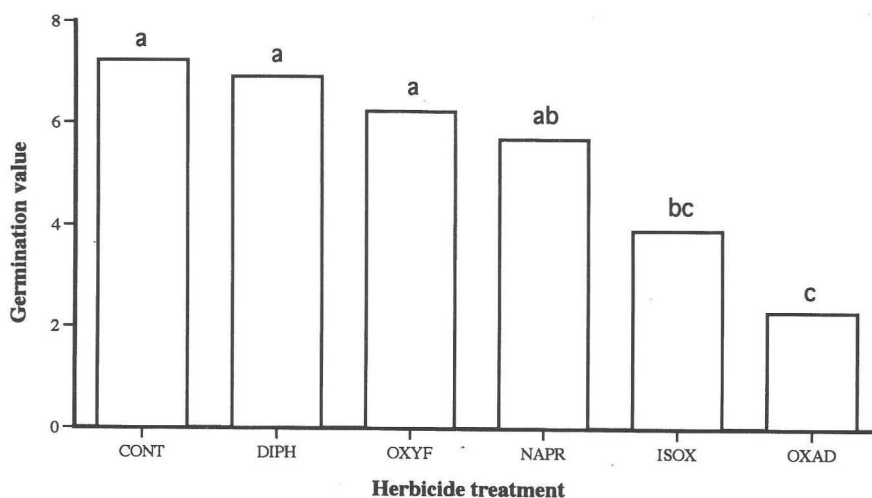
Herbicides had a highly significant effect on final or cumulative germination ( $p=0.023$ ) and germination value ( $p=0.013$ ). Seeds from the control had the highest final germination, but not significantly higher than in those from DIPH, OXYF and NAPR (Figure 1). Final germination was over 80% in the control, DIPH and OXYF, but was a little lower in NAPR (74%). Seeds from ISOX and OXAD treatments had the lowest final germination ( $\leq 55\%$ ). The pattern for germination values, which takes the speed of germination into consideration, showed an almost identical pattern to that of final germination (Figure 2).

The survival of the germinants showed a similar pattern among treatments. However, these data were not statistically analysed due to the low sample sizes available in some treatments. DIPH and the control had survival rates of over 90%, while survival was a little lower at 86% in OXYF. Approximately 73% of the germinants of ISOX survived, but only 21% of the OXAD germinants lived.





**Figure 1.** Effect of pre-emergence herbicides on final germination of Sitka spruce seeds after 42 days in the greenhouse. The treatments are control (CONT), Diphenamid (DIPH), Oxyfluorfen (OXYF), Napropamide (NAPR), Isoxaben (ISOX) and Oxadiazon (OXAD). Bars having the same letter are not significantly different using the least significant means test.



**Figure 2.** Effect of pre-emergence herbicides on germination value of Sitka spruce seeds after 42 days in the greenhouse. Germination value is a composite index of both the speed and final germination values. The treatments are control (CONT), Diphenamid (DIPH), Oxyfluorfen (OXYF), Napropamide (NAPR), Isoxaben (ISOX) and Oxadiazon (OXAD). Bars having the same letter are not significantly different using the least significant means test.

### *Seedling condition and morphology*

Seedling morphology differed among treatments (Figures 3 and 4). Due to the small sample sizes available in ISOX and OXAD, however, these treatments were excluded from the statistical analyses. Values for all morphological variables in germinants from NAPR were significantly different from other treatments in the analysis (CONT, DIPH, OXYF) ( $p=0.003$ ).

Shoot length differed little among the control, DIPH and OXYF (32-34 mm) (Figure 3). Shoots from germinants in the NAPR and ISOX treatments were a little shorter (25 mm and 27 mm respectively), while those from the OXAD treatment were shortest (21 mm). Roots of germinants from the control treatments (27 mm) were longer than those from other treatments. Root length (20-22 mm) was similar in germinants from DIPH, OXYF and ISOX. Root length was shortest in those from NAPR (14 mm).

Reflecting the combined differences in shoot and root morphology, there were differences among treatments in germinant dry weights (Figure 4). Mean dry weights were similar in the control, DIPH and OXYF (8.8-9.1 mg). Germinants from the NAPR and ISOX treatments were lighter (6.0 mg and 7.0 mg respectively), while those from the OXAD treatment were close to half these weights (3.5 mg).

With the exception of the OXAD treatment, few of the surviving germinants showed evidence of treatment damage after 2 months of growth in the greenhouse. Undamaged germinants accounted for 98% (control), 97% (DIPH and OXYF), 95% (NAPR) and 94% (ISOX) of the total, compared with 49% in the OXAD treatment.

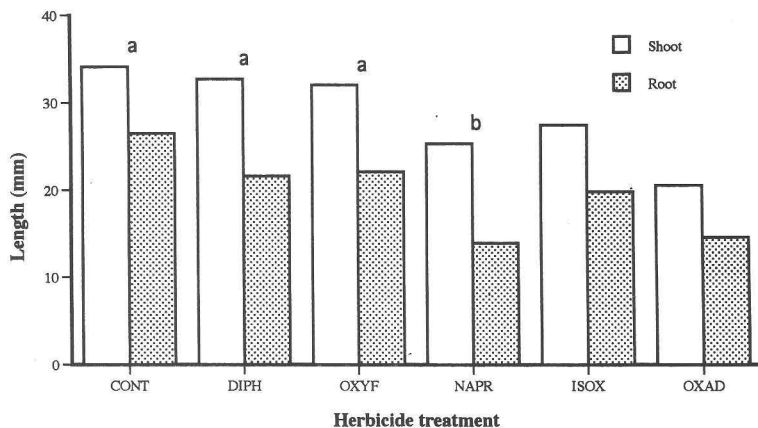
In contrast, the stage of development of the germinants varied among treatments. While a large proportion of the germinants from the control and the OXYF treatment underwent primary shoot elongation (88% approximately), very few of those from the NAPR (30%) and OXAD (27%) produced primary needles. Germinants from the DIPH (71%) and ISOX (79%) treatments were slightly less advanced in stage of development than those from the control and OXYF.

### *Mycorrhizae*

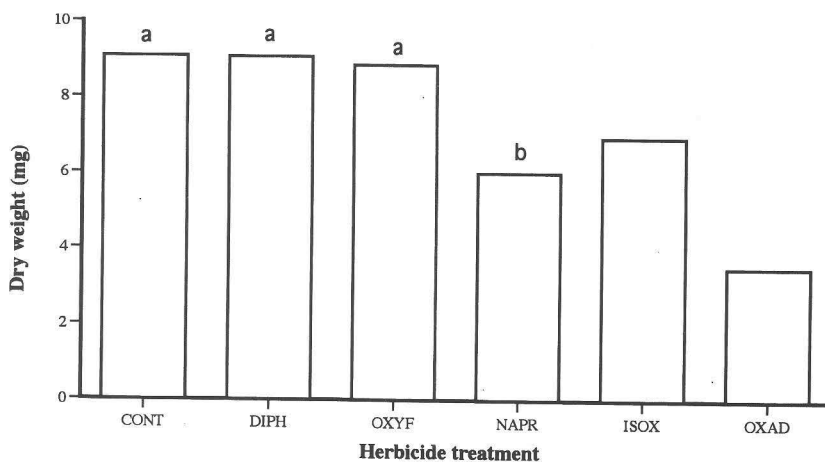
More than 90% of the root tips of germinants from all treatments had mycorrhizae, although only 10 germinants from each treatment were examined. No significant difference among treatments was detected. Three species of mycorrhizae were identified – *Humaria hemisphaerica*, *Thelephora terrestris* and *Helbeloma mesophaeum*.

### **Discussion**

The final germination percentage and germination value (composite index reflecting rate and final germination) after 42 days, and survival after 56 days in the greenhouse were little affected by the use of DIPH and OXYF herbicides. Final germination was nearly 80% and survival was between 86-94% – levels not greatly different from those in the control. Furthermore, these herbicides had little effect on seedling dry weight, morphology or health. OXYF appears to be a very promising alternative herbicide to DIPH on Sitka spruce seedbeds. DIPH is the most widely used pre-emergence herbicide in Irish nurseries, and there is concern about the over-reliance on this herbicide. Repeated applications of the same or similar herbicide formulations may lead to weed resistant populations (Sandquist



**Figure 3.** Effect of pre-emergence herbicides on shoot and root length of Sitka spruce germinants after 56 days in the greenhouse. The treatments are control (CONT), Diphenamid (DIPH), Oxyfluorfen (OXYF), Napropamide (NAPR), Isoxaben (ISOX) and Oxadiazon (OXAD). Bars having the same letter are not significantly different using the least significant means test. Because of the low number of germinants in some replications in ISOX and OXAD, these treatments were excluded from the analysis.



**Figure 4.** Effect of pre-emergence herbicides on the dry weight of Sitka spruce germinants after 56 days in the greenhouse. The treatments are control (CONT), Diphenamid (DIPH), Oxyfluorfen (OXYF), Napropamide (NAPR), Isoxaben (ISOX) and Oxadiazon (OXAD). Bars having the same letter are not significantly different using the least significant means test. Due to the low number of germinants in some replications in ISOX and OXAD, these treatments were excluded from the analysis.



*et al.*, 1981). OXYF is very widely used as a pre- and post-emergence herbicide in North American nurseries to control a wide variety of broadleaved weeds and grasses (Owston and Abrahamson, 1984).

Although germination (74%) and survival (80%) were good with the use of NAPR, seedling growth was very poor, underlining the need for assessing variables in addition to germination percentage. In contrast, Sumaryono and Crabtree (1989) found that NAPR had little negative effect on the germination and growth of several coniferous species, including Douglas fir (*Pseudotsuga menziesii* (Mirb.) Franco), ponderosa pine (*Pinus ponderosa* Dougl. ex Laws) and Japanese black pine (*P. thunbergii* Parl) when applied at higher concentrations (4 kg ai/ha) than used here (3.2 kg ai/ha). The application rates used in this trial were in line with those recommended for use in US nurseries for Douglas fir, lodgepole pine (*P. contorta* Dougl.) and western hemlock (*Tsuga heterophylla* (Raf.) Sarg.) (Owston and Abrahamson, 1984). However, the application rate used in this study was nearly 3.5 times that recommended by the British Forestry Commission guidelines (Mason and Williamson, 1988; Williamson *et al.*, 1993). As root growth is perhaps more sensitive than shoot growth to herbicide toxicity (Kozłowski and Saskai, 1968), the very poor root development (14 mm vs. >20 mm; Figure 3) in germinants from this treatment is of concern. ISOX and OXAD show the least promise as pre-emergence herbicides on Sitka spruce seedbeds, with all variables being adversely affected. OXAD gave the worst results.

Despite the results presented here, further testing of ISOX, OXAD and NAPR herbicides at different concentrations than those used here may be needed. NAPR, for example, appears to be a promising pre-emergence herbicide for Sitka spruce and other conifers if used at approximately one-third of the label rates (Williamson *et al.*, 1993). The same may also be true for the other herbicides.

Herbicide treatments had little effect on the frequency of mycorrhizal associations, although the number of samples examined was small. Similarly, Trappe (1983) found that three herbicides (bifenox, DCPA and napropamide) applied at two different rates did not reduce the proportion of feeder roots colonised by mycorrhizae fungi in Douglas fir and ponderosa pine seedlings, compared with the controls. In fact, Trappe noted that some treatments slightly enhanced mycorrhizal associations. Others have also found that herbicides had little effect or enhanced mycorrhizal associations in several tree species (Pope and Holt, 1978; South and Kelley, 1982; Palmer *et al.*, 1980).

In conclusion, OXYF is recommended as a viable alternative pre-emergence herbicide to DIPH in Sitka spruce seedbeds. However, given that the results are based on a greenhouse trial, it is recommended that nursery managers conduct small-scale trials of their own before using the herbicide operationally. Factors such as weather conditions and soil type may influence the response to the herbicides (Williamson and Morgan, 1994). The efficacy of the herbicides in controlling weeds was not evaluated in this study.

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## REFERENCES

- Czabator, F.J. 1962. Germination value: an index combining speed and completeness of pine seed germination. *For. Sci.*, 8:386-396.
- Daughtridge, A.T., Boese, S.R., Pallardy, S.G. and Garrett, H.E. 1986. A rapid staining technique for assessment of ectomycorrhizal infection of oak roots. *Can. J. Bot.*, 64:1101-1103.
- Delorit, R.J. and Ahlgren, H.L. 1973. Crop protection. 4th Ed., Englewood Cliffs, New Jersey. Apprentice Hall. 744 pp.
- Ingleby, K. 1990. Identification of ectomycorrhizae. Institute of Terrestrial Ecology Publ. No. 5. 112 pp.
- Klingman, G.C. and Ashton, F.M. 1975. Weed Science: principles and practice. John Wiley and Sons, NY. 431 pp.
- Kozłowski, T.T. and Saskai, S. 1968. Effects of direct contact of pine seeds or young seedlings with commercial formulations, active ingredients, or inert ingredients of triazine herbicides. *Can. J. Plant Sci.*, 48:1-7.
- Mason, W.L. and Williamson, D.R. 1988. Recent research into weed control on seedbeds in forest nurseries. *Asp. Appl. Biol.* 16:23-28.
- McDonald, S.E., Isaacson, J.A. and Fisher, B.E. 1974. Using dephenamid herbicide for seedbed weed control cuts hand-weeding labor by 75 percent. *Tree Planters Notes*, 25:15-17.
- Owston, P.W. and Abrahamson, L.P. 1984. Weed management in forest nurseries. In: Forest Nursery Manual: Production of bareroot seedlings. Edited by Duryea, M.L. and Landis, T.D. For. Res. Lab., Oregon State Univ., Corvallis, OR. Martinus Nijhoff/Dr. W. Junk, Publ. pp. 193-202.
- Palmer, J.C. Sr., Kuntz, J.E., Palmer, J.G. Jr. and Camp, R.F. 1980. Mycorrhizal development on red pine in nursery beds treated with a herbicide. Univ. Wisconsin, Dept. For., Res. Notes 240. 5 pp.
- Pope, P.E. and Holt, H.A. 1978. Interaction of paraquat and napropamide with mycorrhizae. In: Proc. Annual Meetg. N. Central Weed Control Conf. 33:114-115.
- Sandquist, R.E., Owston, P.W. and MacDonald, S.E. 1981. How to test herbicides at forest tree nurseries. USDA, For. Serv., Gen. Tech. Rep. PNW-127. 23 pp.
- SAS Institute Inc. 1982. SAS user's guide: statistics. 1982 Edition. SAS Institute Inc., Cary, NC, USA.
- South, D.B. and Kelley, W.D. 1982. The effects of selected pesticides on short-root development of greenhouse-grown *Pinus taeda* seedlings. *Can. J. For.*, 12:29-35.
- Sumaryono and Crabtree, G. 1989. Differential tolerance of woody nursery crop seedlings to napropamide. *Weed Tech.*, 3:584-589.
- Trappe, J.M. 1983. Effects of herbicides bifenox, DCPA and Napropamide on mycorrhiza development of ponderosa pine and Douglas fir seedlings. *For. Sci.*, 29:464-468.
- Williamson, D.R., Mason, W.L., Morgan, J.L. and Clay, D.V. 1993. Forest nursery herbicides. Forest. Comm. Tech. Pap. 3. 11 pp.
- Williamson, D.R. and Morgan, J.L. 1994. Nursery weed control. In: Forest Nursery Practice. Forest. Comm. Bull. 111. Edited by Aldhous, J.R. and Mason, W.L. pp. 167-180.

## Irish forestry – an investment for prosperity

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Paper presented at the Annual Symposium of the Society of Irish Foresters, May 1996

*Old Houses were scaffolding once  
and workmen whistling*

(T.E. Hulme, 1883-1917)

### Summary

Following centuries of deforestation, the eighteenth century saw the first move towards re-afforestation. This involved the earliest known state planting grant scheme, which was administered by a private organisation. The Land Acts from 1881, transferring land ownership from landlord to tenant, led to a further phase of deforestation. The current afforestation programme was begun in 1919. Planting was slow until the late 1940s, when the Government set an annual planting target of approximately 10,000 ha. That was reached in 1959, but after 1964 there followed a gradual decline until funds from Brussels in the 1980s triggered an accelerating rate of planting, both state and private, in the 1980s and '90s. It exceeded 23,000 ha in 1995. The expansion of planting in the 1950s is currently reflected in increasing harvest volumes. State investment in forestry, adjusted for inflation, was initially directly proportional to the planting programme but continued to increase up to the 1980s. The position since the establishment of Coillte Teoranta in 1989 has not been examined. Published valuations of the state forests vary within the range £600-£1,100 million.

### Prelude

The deforestation of Ireland is a fact of history – the causes and influences may be debated and argued but the end result was a landscape which was largely treeless. The regrets expressed by contemporary and recent observers may be generally classified as the 'Kilcash Syndrome'<sup>1</sup>, and need not be discussed further here. I hope to deal with the developments which, over time, have helped the reverse the process.

<sup>1</sup> This refers to the well-known Irish poem (c.18th century) usually translated under the title "Kilcash" with its interminably quoted opening lines (in Frank O'Connor's translation) "What shall we do for timber?/The last of the woods is down".



### **The eighteenth century**

In eighteenth century Europe, the age of enlightenment, the vulnerability of forests was coming to be recognised and the need for sustainment of production led to the development of scientific forest management. It was natural that well-informed citizens in all countries should be conscious of this as a general climate of opinion, even without any knowledge of the details. Thus in Ireland we find Jonathan Swift, in a personal letter of 1732, describing County Tipperary as "like the rest of the whole kingdom, a bare face of nature, without houses or plantations". His public attitude, however, was a very positive one. In a pamphlet written in 1729 we find: "I do not believe that a greater or quicker profit could be made than by planting large groves of ash a few feet asunder" (Swift, 1765). In the last of the Drapier's letters, written in 1725, he regrets the absence of felling controls: "If men were restrained from that unlimited liberty of cutting down their own woods before their proper time, as they are in some other countries, it would be a mighty benefit to the kingdom. For, I believe there is not another example in Europe, of such a prodigious quantity of excellent timber cut down, in so short a time, with so little advantage to the country, either shipping or building" (Swift, 1735) (in the event, we had to wait for our own Forestry Act in 1928 before any felling controls were introduced). Swift was perhaps looking even further ahead in his suggestion that the bogs be improved by drainage and that the margins of the drainage canals might be planted with "quickens, [i.e. rowan or mountain ash] birch and other trees proper to such a soil" (Swift, 1765).

Swift was a skilled and effective communicator, and an articulate promoter of the enlightened thinking of his time. The more widespread acceptance of the need to plant trees was converted into action when the Dublin Society (now the Royal Dublin Society) set up a scheme in 1741 to promote planting by the award of medals and premiums (cash grants). In 1761, money to support the awards was voted by the Dublin parliament, thus creating what was probably the first state planting grant scheme anywhere. The vote-in-aid was cancelled by the Imperial parliament in Westminster soon after the Act of Union (1801), thus emphasising the specifically Irish nature of the grants.<sup>2</sup> During the period of operation of the scheme, a total of about £20,000 in grants (perhaps £2 million in today's money) was paid out (Moss, 1908).

### **The nineteenth century**

Private investment in planting continued during the nineteenth century, but in the absence of incentives there was little provision for a record of progress. Professor William Smyth, in a recent presentation to the Society of Irish Foresters, gave some details of the procedures which tenants in that period had to follow in order to establish their ownership of any trees they planted, and quoted from some of the surviving records. McCracken (1971) cites records showing that, by 1841, there was a plantation area, in addition to natural forests, of 140,000 ha, or 1.7% of the land area.

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<sup>2</sup> George O'Brien (1918) has suggested that grants for public works and development by the Dublin parliament at this period arose from a determination by that parliament to avoid revenue surpluses which it would have been compelled to surrender to the Crown.

This trend went into reverse with the implementation of the successive Land Acts from 1881 onwards. While this reverse was widely known, there was no formal means to articulate the public concern, until a departmental committee was set up by the Department of Agriculture and Technical Instruction (DATI) in 1907 to assess the forestry situation and to suggest what might be done about it.

The committee reported, in the first instance, that "forestry has been deplorably neglected by Government in Ireland", and that even the existing area of forest "is being wastefully diminished... chiefly under the influence of the Land Purchase Acts". The position was that, while the acts did provide for the transfer of purchased land to trustees, including the Department or County Councils, to plant the lands or preserve the woodlands, no funds were provided to put this provision into effect. The end result was that woods and plantations were clearfelled either by the owner before the estate was transferred, or by the new tenant purchaser immediately after the transfer, and nothing could be done to stop either of these practices (Departmental Committee on Irish Forestry, 1908). It may be pointed out here that something of the spirit which motivated and permitted those clearances continued to be reflected in Irish forest policy for some years afterwards. No land which was considered to be of agricultural value was to be planted. This policy was implemented very simply: it was decreed that the maximum price which the state could pay for forest land would be £10 per ha (£4 per acre). This limit remained in force until it was doubled in 1949, and the £20 limit continued to apply until 1969. After that, the price was more closely related to the forestry value of the land, although still strictly constrained. Table 1 shows the equivalent in 1995 money values of the earlier price limits. While direct comparisons would not be reasonable, it is still relevant to advert to these values when judging the success of the state investment in forestry.

**Table 1.** *Maximum prices payable for land for state planting, 1922-1969, expressed in 1995 money values.*

<i>Price</i>	<i>£10</i>	<i>£20</i>
1922	£337	
1949	£200	£399
1969		£185

The Departmental Committee recommended the planting of about 300,000 ha, either by the state directly or by funds given to County Councils to do so. It also indicated appropriate sources of funds to implement this<sup>3</sup>, and suggested that a return of 4.5% on the capital invested might be expected.

<sup>3</sup> It proposed that the project should be funded from the proceeds of the Irish Quit and Crown Rents. These were hereditary revenues of the Crown, being rents arising from grants of confiscated Irish land from the reign of Henry VIII to that of Charles II. The Committee established that while those revenues were intended for the public benefit, almost none had been reinvested in Ireland. The proposal that this money should now be used for the re-afforestation of Ireland displayed a nice historical symmetry.

In the meantime, the DATI had begun to promote private forestry, but something about the nature of its target clientele may be deduced from a public notice in 1905 offering advice on the management of existing woods or on proposed planting operations “for a fee of £2... where the visit does not entail an absence from headquarters of more than 3 days”, in which case a special fee might be arranged.

### **State forest enterprise**

The first statutory provision for a state forest enterprise in Ireland was the Forestry Act, 1919, which established the Forestry Commission. The powers of the Commission were subsequently transferred to the Irish Department of Agriculture upon its inception. The state scheme of planting grants was provided for in the Forestry Act, 1928, which repealed the act of 1919 in so far as it applied to the Irish state.

Irish state investment in forestry in the 1920s was cautious. For example, by 1930, just over 8,000 ha had been planted. Research summarised by Rea (1985) records the development of planting policy from the 1930s. Before 1948, the annual planting target was 4,050 ha (10,000 acres), to be planted over a period of 50 years. In 1948, the newly-elected inter-party government adopted a policy of planting 10,120 ha (25,000 acres) per year for 40 years. It is interesting that this large increase was the result of the direct influence of Sean McBride, who, as Minister for External Affairs in that Government, had no responsibility for forestry policy other than that deriving from his position within the Cabinet.<sup>4</sup> The adoption of that policy and its implementation, however patchy from time to time, may reasonably be identified as the birth of the Irish forestry industry and its downstream derivatives.

The long term commitment to an annual 25,000 acre planting programme until 1 million acres had been planted was removed by a Dáil motion in December, 1956. In 1982, the Government reconfirmed the planting programme at 10,000 ha per year, but now it was to include the reforestation of clearfelled land and private afforestation. The millionth acre of afforestation was achieved in 1991.

A Research Branch within the Forest Service was established in 1957. As a former researcher, I am conscious of the danger of assuming causality in relation to a succession of events (*“post hoc ergo propter hoc”*), but I can have no hesitation in claiming that the work of the Forest Service Research Branch contributed substantially to the more recent success of the state forest enterprise.

The next major influence on the rate of planting, particularly but not exclusively on private planting, was the Western Package Scheme, introduced with the aid of European funds in 1981. That was the first of several EU schemes which have hugely stimulated Irish afforestation in recent years.

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<sup>4</sup> Gerard Sweetman, Minister for Finance at that time, must also be credited with providing the necessary funds from the Exchequer.

## Progress

Figure 1 shows planting progress from 1923 to 1995, together with the total volume of logs harvested. The data for areas planted do not include data for reforestation (the routine replanting of clearfelled areas).<sup>5</sup> Historical events can be seen reflected here, e.g. the greater availability of land caused by the 'economic war' of the 1930s, the wartime scarcity of seed and fencing material, the steady increase in planting after the Government decision of 1948, etc. Readers may wish to supply their own interpretation of later fluctuations. It will not be necessary to emphasise here that the rapid increase in harvest volumes from the 1970s reflects the increased planting in the late 1940s and '50s. The decline in planting after 1960 will have its inevitable effect on future production, while it is to be hoped, assuming adequate maintenance, that the recent sharp increase in planting will, in time, be echoed by a proportionate increase in harvest volumes.

Figure 2 illustrates state investment in forestry from 1933 to 1988, together with revenues, both converted to 1995 money values.<sup>6</sup> In both cases, gross sums are reported. Thus, the expenditure includes all functions of the Forest Service, both authority and enterprise, including expenditure on private forestry, research, etc. It may be noted that the expenditure data are slightly exaggerated after 1970 by game development and wildlife conservation costs, but not so as to significantly distort the general trend. Likewise, the revenue data include a small amount for game licences and, in the last years, for payments from Brussels. The display of these data is stopped at 1988, due to the following reasons.

1. The establishment of Coillte represented a major change in the management of the state investment in forestry.
2. Significant quantities of private assets, including land, not easily quantifiable, began to flow into forestry.
3. Rapidly increasing sums of EU funding became involved.

## Valuation

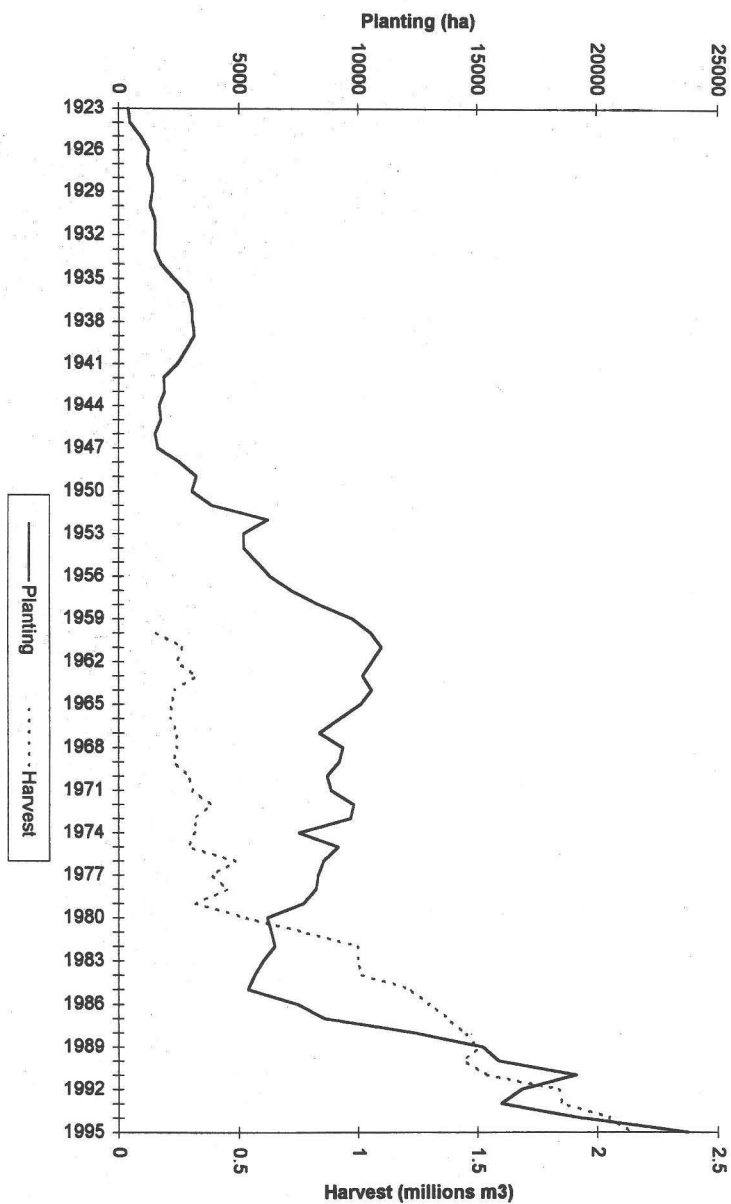
The question of how to value forests has been much debated. The practice in Britain and Ireland until recently has been to use the method of net discounted revenue (NDR) with an arbitrarily selected discount rate. This remained the position until 1994, when the Forestry Commission (Great Britain) (1994) altered its practice to accept an open market valuation based on a hypothetical assumed sale between a willing seller and a willing buyer. Some long-established commercial forestry companies value their forest asset at cost.

The first published valuation of Irish state forests was that produced by the Review Group (1985). This value covered a range of assumptions in respect of stumpage prices,

<sup>5</sup> The Forestry Act, 1946, presumes the continuation of afforested land as forest. The provision for a General Felling Licence (the normal "licence to practise forestry") specifies that "there shall be attached" to each such licence, a replanting condition, and there is no power, at any level, to rescind that obligation.

<sup>6</sup> The sharp dip for 1974 represents the nine month transition between government accounting periods from year ending 31st March to year ending 31st December.



Figure 1. *Planting and harvesting, 1923-1995.*

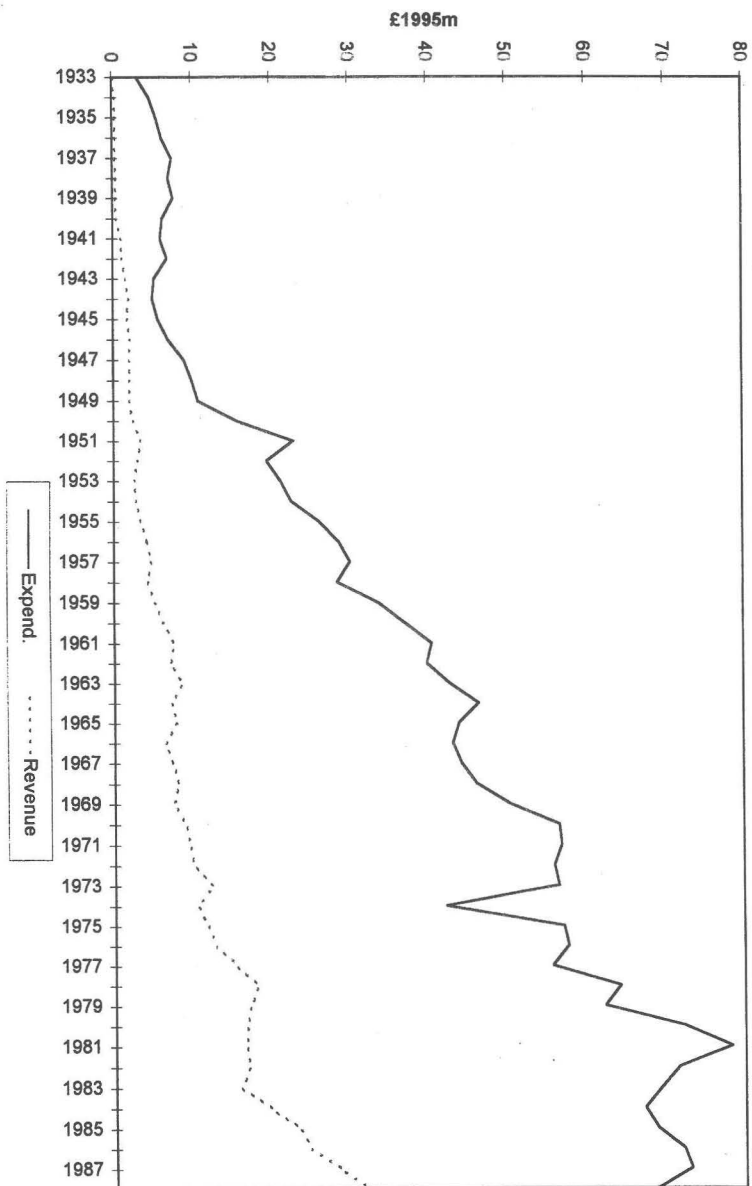


Figure 2. Expenditure and revenue, 1933-1988 (converted to 1995 money values).

productivity increases and discount rates. It also included only those items of expenditure specifically related to the planting and management of the state forests, as costs related to forestry authority functions were excluded. The central values ranged from £354 million (at a discount rate of 4%) to £2,659 million (at a discount rate of 1%). The central values, at discount rates of 2% and 3%, were £1,104 million and £606 million respectively. The discount rate at which the net revenues and the net investment most nearly coincided was 2%, with an investment of £1,243 and a valuation of £1,104 million (in considering this outcome, the land price limits shown in Table 1 ought to be borne in mind). A consultant familiar with the British market situation indicated a 1985 value of £819 million.

Subsequent valuations for the years after 1989 are published in Coillte's Annual Reports (taking the value shown for "forests and land") (Coillte, 1990-1995). These are listed in Table 2.

**Table 2.** *Valuation of state forests, 1983-1994.*

<i>Year</i>	<i>Source</i>	<i>Value (£ million)</i>
1983	Review Group	606-1,104
1985	Consultant	810
1989 (1st Jan.)	Coillte	568
1989 (31st Dec.)	"	619
1990	"	670
1991	"	724
1992	"	755
1993	"	795
1994	"	708

Note: The reduction in value from 1993 to 1994 is ascribed to the implementation of Financial Standard No. 3.

## Conclusion

I have tried to record the main steps which have led to the creation of a viable state forest estate and the prospect now of a considerable area of privately owned forest. It may be assumed that the success of the former has provided the public confidence which is giving rise to the latter. Among the indicators of this success are the present annual forest outputs of about £170 million, employment for 12,000 people and annual exports of approximately £80 million. If the future as indicated by the graphs in Figures 1 and 2 can be achieved, then a prosperous future is indeed to be expected.

## REFERENCES

- O'Brien, G. 1918. *The Economic History of Ireland in the Eighteenth Century*. Maunsell and Company, Ltd., Dublin.
- Departmental Committee on Irish Forestry. 1908. Report. HMSO, Dublin.
- Forestry Commission. 1994. 73rd Annual Report and Accounts for the year ending 31 March 1993. HMSO, London.
- Coillte. 1990-1995. Annual Reports & Accounts, 1989-1994. Coillte Teo., Dublin.
- McCracken, Eileen. 1971. *The Irish woods since Tudor times*. David & Charles, Newtown Abbot.
- Moss, R.J. 1908. Notes on the measures adopted by the Royal Dublin Society to encourage the planting of trees in the 18th century, and the results obtained. Department Committee on Irish Forestry. Minutes of evidence, appendices and index. HMSO, Dublin. 439-43.
- Rea, T. 1985. Irish state forestry: government policy 1948-1959. *Irish Forestry*, 42, 7-15.
- Review Group on Forestry. 1985. Report to the Minister for Fisheries and Forestry. The Stationery Office, Dublin.
- Swift, J. 1735. A humble address to both houses of Parliament. Letter No. 7 of M. B. Drapier, written 1725.
- 1765. An answer to several letters sent me from unknown hands. Written in the year 1729.



## Conflicts in forestry – a changing culture

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Paper presented at the Annual Symposium of the Society of Irish Foresters, May 1996

### Introduction

I have no qualifications in forestry. I am one of those people who sometimes describe themselves by using the amorphous title 'environmentalist'. But my work in the media does give me an insight into attitudes towards forestry, both by the general public and by the environmental movement.

The profession of the forester is obviously one that has more 'environmental impact', to use a fashionable phrase, than most. Coillte is the largest single landowner in the country and everything it does has a profound effect on our countryside. Private forestry and farm forestry are growing so rapidly that their environmental effects have become something that concerns everyone in Ireland.

The context in which this is happening is one of general environmental concern which is growing so rapidly no forester can afford to ignore it. In less than the time-span between planting a spruce and harvesting the first thinnings, the green movement has completely de-marginalised itself. It is no longer the arena of cranks and crackpots. It has become a major element in the election manifestos of all the political parties, the concern of a large Directorate in EU headquarters, and something that consumes an increasing amount of the energies of the media, government and legislators.

Brendan Howlin, Minister for the Environment, captured the Zeitgeist earlier this year when he announced new draft planning guidelines on forestry development. He said, "While the development of afforestation can make a positive contribution to sustainable development and bring economic benefits to the rural community, it must also be recognised that afforestation can sometimes give rise to environmental problems".

But 'environmental' is a large and very ill-defined word. If we accept that foresters will, to an increasing extent, have to defend their activities to a generally hostile public, where will the battle lines be drawn? What are the contentious issues?

My thesis is that forestry developments, private or public, now need to justify themselves to the outside world under three headings, *viz.* economic, aesthetic and environmental. I would now like to look at the public perception of how traditional forestry is performing under each of these headings.

### Economic justification

To an outsider, forest accountancy seems more like an art than a science. The enormous time-span between investment and return, and the huge percentage of unrealised assets which result from this, seem to make a mockery of most normal business methods. But

there is a growing public belief that most conventional forestry in this country does not really make money, that it is failing to justify itself under the 'economic' heading.

It doesn't take a financial genius to discover the price per tonne of Sitka spruce delivered to the pulp mills or the ports, to work out the cost of felling, extraction and transportation, to add on site purchase and preparation, planting and maintenance costs and to come up with a balance sheet which would have my bank manager calling me in to his office for a serious talk.

### **Aesthetic justification**

The 'aesthetic' heading is one which responds less to actuarial skills. But money does come into it too, if the broader view is taken. One third of this country's Gross Domestic Product is now derived from tourism-related business. It is accepted that the beauty of our landscape is one of our principal tourism products. The bulk of this tourism is located in parts of the country where land prices are low and the visual impact of forestry is high. So, leaving conservation and our rights to our natural heritage aside, it is possible to argue that a geometrically shaped plantation of monoculture spruce planted up a hillside is bad for business.

Added to this is the fact that people live in our countryside and are increasingly demanding a say in what the countryside surrounding them looks like. They want some control over the view from their windows. They want it in West Wicklow, in West Cork, in Leitrim and in an ever-increasing list of places. Most of them do not like the look of conventional forestry plantations.

### **Environmental justification**

Under the 'environmental' heading, the arguments get even more complicated. On the one hand, Ireland has less tree cover today than any other country in the world where tree cover is the natural climax vegetation. The achievement of the forestry profession in increasing the tree cover from around 5% of the total land area to close to 8% in a century should be something for which all environmentalists need to congratulate them. This is particularly true in the context of the destruction of bogs, as bogs are nearly as efficient as forests when it comes to sequestering atmospheric carbon.

On the other hand, the amount of broadleaf or 'semi-natural' tree cover in the country has actually declined in the past century. From an environmental viewpoint, foresters, motivated by the unrealistic targets of politicians, have been planting the wrong trees in the wrong places. 'Wrong' because monocultures are not as environmentally benign as mixed woodlands. 'Wrong' because exotic species are not as environmentally benign as native ones. 'Wrong' because fragile and valuable sites, particularly on upland and lowland bogs, have been sacrificed to the trees. 'Wrong' because clearfell management systems adversely affect the environment in several ways. 'Wrong' because some direct environmental damage has been caused by drainage, fertiliser runoff and the acidification of soil and water.

Incidentally, the claim made by some foresters that soil and water acidification caused by conifer needle drop is 'unproven' is particularly annoying. Darwin's Theory of Evolution is unproven - that's why it's a theory. The same is true of most other things in the life

sciences where, as often as not, we are working on a definite balance of probability. The balance of probability is definitely that, as all vegetable matter produces humic acids when it decays, needle drop in forestry plantations further acidifies what are normally acid soils to start with. Anyone with any pretensions to understanding scientific method who argues to the contrary is being downright dishonest.

This dishonesty arises, of course, out of defensiveness. Foresters are intelligent people who are aware of the swelling body of public dislike and distrust for their profession. But it seems to me that there are other possible reactions to this pressure apart from going on the defensive.

### **The way ahead?**

Irish foresters inherited a method of forestry from their British forebears which was radically 'state of the art' in about 1880. It consisted of abandoning many older silvicultural principles in favour of the new 'crops' from North America and the continent. These crops were managed in the familiar way of planting nursery-grown stock on 'green field' sites, thinning, clearfelling and replanting. In the course of the past century, this method of forestry has remained fairly static. About the only development has been a reduction in the number of species planted. Today, Coillte virtually relies on Sitka spruce, while only small quantities of other species are planted by the private sector.

It seems to me that, coming up to the turn of another century, it is an ideal time for a new generation of Irish foresters to make another radical change and develop a new forestry method which will take account of all the pressures that are bearing down on the profession. The 'global village' leaves us with no excuse for ignoring other approaches to forestry in other cultures. We must accept that there are alternatives to monocultures of exotic conifers, alternatives to green field planting and clearfelling, and alternatives to Sitka spruce. And it seems to me that many of these alternatives would perform rather better under my three suggested headings.

The old problem that has bedevilled Irish forestry has been government policies that insisted on large annual planting targets but only provided the sort of funds which would buy very cheap land. The accepted escape from this problem today is to get the trees on to better land by expanding on-farm forestry. Another solution would be to stick to the bad land and change crops and management practices.

A huge amount of cutaway bog will become available for tree planting over the next 30 years (over 100,000 ha of Bord na Mona land alone by 2030). Many of the upland forestry sites will mature, but when they do, they will be incapable of being returned to the type of habitat they were before planting. It will remain the responsibility of foresters to find something to do with them which is both valuable and acceptable.

I would suggest to the new revolutionaries in Irish forestry that they need to look at native birch as a crop in both upland and lowland sites. They need to research how it could be improved and what it could be used for. They need to investigate growing it in mixed plantations with species such as aspen, rowan and the willows. They need to look at selective felling and coppice-wood regimes in other countries and how they work with these species.

I also suggest to these cells of subversive foresters that they should examine carefully some of the prejudices that surround the forestry of the older generation. They need to

explode the myth that 'broadleaved trees are only suitable on good land', and the one claiming that there are only two types of forestry, 'commercial' and 'amenity'. They should challenge the notion that cropping can only be on a medium to long rotation and that wood pulp should be the principal product of our forests.

## **Conclusion**

There is a growing public and political perception that forestry is too important to be left to foresters. But we certainly need trees. The challenge is to show that forestry professionals are imaginative and innovative enough to develop a method that is profitable, acceptable and beautiful, which perform under the headings of 'economic', 'aesthetic' and 'environmental'. It can be done. In fact, it must be done.

## **The professional forester – shaping the future**

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Paper presented at the Annual Symposium of the Society of Irish Foresters, May 1996

### **Summary**

The past decade has been one of rapid change in forest policies. There is growing acceptance that a wide range of individuals and interest groups (representing conservation, recreation, socio-economics, etc.) are legitimate stakeholders in forestry along with the timber processors. These new demands came to a head at the United Nations Conference on Environment and Development (UNCED), and again in the 1993 Helsinki Conference, the conclusions of which are binding upon all European states, including the Republic of Ireland. In this environment, it is not the function of the professional forester to set policy, but rather to achieve the balance between all competing demands.

### **Introduction**

We live in a new age. Forests are no longer simply the domain of the forester, woodman and lumberjack. They now have a plethora of 'stakeholders' ranging from the rambler, through the conversationalist, to those interested in global climate change. Most recently, people who live in and around forests have staked their claim to be heard, and are now increasingly demanding a share in the wealth created by the forest.

It has become commonplace to remark that today's foresters have greater demands placed upon their professionalism than at any time in the recent past. It then becomes pertinent to ask three questions. First, what are these demands and who or what are shaping them? Second, what is the nature of the response professional foresters should be making if they are to retain the claim to professionalism? Third, and finally, if we are a profession, how should we be organised and what responsibilities do we have to each other, to society at large, and to the forest?

### **Increased professional demand**

As already mentioned, we now acknowledge a wide constituency of stakeholders with a legitimate interest in forestry. In their recent discussion of the new concept of forest certification, Upton and Bass (1995) state that forest certification will take place "by assessing the effects of forest activities against standards previously agreed as significant and acceptable to stakeholders". They earlier suggest that these stakeholders would be "those who live in forests, forest industries, governments, and the public at large - who depend in different ways on the environmental, social and economic benefits provided by forests". It is easy to dismiss such sentiments as referring to the extensive old-growth forests of the Tropics, the Pacific coast of North America, or Russia. However, history already shows that, with very little modification, the concepts apply to Europe, including



the Republic of Ireland and Britain. With regards to Britain, it is interesting to look back only 10 years when, in 1986, the then Nature Conservancy Council published *Nature Conservation and Afforestation in Britain*, in which it called for the re-examination of the objectives of public support for forestry, with a move away from "narrowly timber-orientated" grant schemes. While government made no immediate and decisive response, the entire trend over the ensuing years has been to emphasise the social role of the nation's forests and to slowly restructure the grant scheme so that it can be increasingly regarded as buying public good rather than subsidising private gain. Furthermore, the opportunity for, and transparency of, consultation over award of grants have been greatly increased.

These trends are not isolated developments within Britain, but reflect a much larger international trend that came to its sharpest focus at the United Nations Conference on Environment and Development (UNCED) at Rio de Janeiro in June, 1992. The cataclysmic importance of this event is taking some time to dawn on most of us. Yes, the forest debate at this conference was bedevilled by suspicions across the north-south divide. Yes, as a result of these divisions, the Principles on Sustainable Development of Forests were accepted only as a non-legally binding authoritative statement. Nevertheless, the leaders of most nations were present and these leaders signed the statement which, though it did not commit them to action in the forest, did commit them to review and report on their own procedures. A host of regional conferences followed, of which that relevant to European countries was the Helsinki Conference (Ministry of Agriculture and Forestry, 1993). This produced the Helsinki Agreement which was signed by, and does legally commit, European governments, including that of the Republic of Ireland. The Helsinki Agreement was just the start of the 'Helsinki Process'. Since the signing at Helsinki in 1993, meetings have been held in Geneva, Paris and elsewhere to define and develop means of monitoring the commitment to sustainable management and biodiversity. Similar developments, such as the Montreal Process, are taking place for other regions of the world. Meanwhile, on a global scale, developments include the monitoring of the implementation of Agenda 21 by the United Nations Commission on Sustainable Development and the establishment of the Intergovernmental Panel on Forests.

An important point is that Ireland has a legal obligation to abide by the Helsinki guidelines. Put another way, these guidelines are now part of the forest policy of the Republic of Ireland, as they are for other European states. It is therefore necessary to examine these guidelines in a little detail. They call, *inter alia*, for avoidance of damage to sites or ecosystems, for long term land use policies, for a commitment to multiple use management, for particular care of landscapes of cultural, heritage or protective importance, for maintenance of forest health (implying stringent quarantine measures where relevant), for the rejection of afforestation where it negatively impacts on other important ecological features, and for preference for native species and provenances "where appropriate". The latter two clauses may well impact on forest practice in our two countries, while our commitment to multiple use management may still have some way to go.

It is probably with the very term 'multiple use' that we are facing our greatest professional challenges. Whilst we do not have a truly indigenous forest population to worry about, nor do we have to allow for subsistence food collection from the forest, we do have to contend with increasingly vociferous stakeholders from among recreationalists and conservationists (including conservation of landscapes and archaeology as well as fauna

and flora). The Institute of Chartered Foresters (ICF) recently brought together recreationalists, conservationists and timber processors to attempt to determine whether they could establish a consensus about the future values and directions for UK forestry. There was surprising goodwill on all sides and it proved to be not too difficult to draw up and agree a UK Forestry Accord (Institute of Chartered Foresters, 1996). In summary, the six main principles are as follows.

- Investment in sustainable forestry of all types should be encouraged.
- Conservation of biodiversity and natural resources should be at the heart of forest management.
- Forest management should safeguard and enhance landscape and heritage resources.
- Sustainable productive forestry to provide timber benefits should be encouraged.
- Research, education and training should cover all aspects of sustainable forestry.
- The public should be widely involved in and consulted on forestry matters.

As with the Helsinki Agreement, this Accord is seen by its sponsors as the start of an ongoing process of discussion and investigation. It entails acceptance that forests should be managed and that timber matters. By implication the skills of the forestry profession are acknowledged, but the forest manager in turn is required to acknowledge the legitimate interest of all stakeholders in the forest, including those outside the timber trade. Professional foresters should consult and respond to such interests and in so doing seek their assistance in improving sustainable management and increasing the biodiversity of forests under their charge.

This then requires examination of these two new, or not so new, imperatives of sustainable management and biodiversity. Taking the latter first, the idea of biodiversity is not difficult to comprehend but impossible to fully define and difficult to monitor. To assess all species present, and the impact of management actions upon them, is beyond the capabilities of science and probably will always be so. The adoption of certain indicative species may be one way forward but brings with it its own dangers. Recently, Ratcliffe (in press) suggested that the only guidance of value is to strive for as near natural conditions as possible within other legitimate restrictions, e.g. timber extraction, enhanced growth rates, etc.

The response of governments to UNCED and Helsinki will bring new legal obligations on forest managers. Initiatives such as the UK Forestry Accord are entered into voluntarily and highlight ethical imperatives. A new force has been the attempt to harness consumer power to enforce sustainable management. The requirements here are laid down in the ten principles and criteria of the Forestry Stewardship Council (FSC). These require (i) compliance with all legal demands of the state, (ii) that land tenure is clearly defined and established, (iii) that the rights of indigenous people be fully respected, (iv) that social and economic well-being of forest workers and local communities be maintained and enhanced, (v) that management be based on multiple use, (vi) that biodiversity and ecological functions and integrity be preserved, (vii) that proper management plans be produced and updated as necessary, (viii) that performance and chain of custody be monitored, (ix) that natural forest be protected, and finally, and only recently agreed, (x) that plantations should not replace natural forests but should augment them. This approach brings with it problems in relation to small sized forests, the role of government regulatory authorities, interference with trade, and so on. Putting these aside, however, these

recent developments do illustrate the extent to which society is making new demands and the probable powers it has to see them implemented.

This is a very different scene to that of only five years ago. Suggestions that the demands come from non-representative corners of society are no longer tenable when the most important thrust is through governments implementing the Helsinki Agreement. If our profession cannot take up the challenge, it will be displaced and others will take it up for us.

### Responding to the demand

It should first be emphasised that the position is not one of 'them and us'. Foresters have sometimes argued for change, although until recently these have been the unusual individuals. It has been stated elsewhere (e.g. Miller, 1993) that it is not the role of foresters to set national policies or to interpret them into objectives for individual forest enterprises. These functions properly belong to governments and to forest owners, state or private. With their professional skills, foresters will inform these processes and will ultimately have to interpret them into management actions. Over recent years, forest policy at the international level has been handled by diplomats, with senior foresters finding themselves displaced to the advisors' bench. This must be welcomed, as it is a measure of the importance the subject has achieved.

Foresters not unfairly sometimes protest that terms such as 'sustainable management' and 'biodiversity' which seem so exciting in the conference hall are rather harder to focus when deciding on particular management steps in the woods. But this is to misunderstand what is expected of us. The requirement is not to be able to point to a particular square metre and say there is the biodiversity, or to equate yield with increment in order to qualify management as sustainable. Rather, these concepts, for that is all they need to be, are the ethical starting points for our decision making. Restated as a responsibility to the forest and its present and future users and it is no longer difficult to comprehend. Many forestry societies, including the ICF, have already inserted a green clause into their code of ethics. The recently promulgated UK Forestry Accord is a further manifestation of this process.

On the last page of his important book, *Natural Woodland*, Peterken (1996) writes, "Having marginalised themselves from woodland nature conservation for 40 years, the foresters have now moved decisively to centre stage... it seems to me that the prospects are encouraging. The pendulum may swing, but the fulcrum has moved to a more balanced, multiple-use forestry. There is nothing intrinsically wrong with timber growing at a profit, so long as other interests are fully considered. The emerging generation of middle and senior forestry managers undoubtedly espouse a far broader view of forestry than their predecessors". What brought about this change? The pressure from outside the profession, notably from conservationists, was critical, but so too was the willingness among well-placed foresters to listen and respond – surely in the last analysis this is the only useful definition of professionalism. What we were being asked often seemed unattainable but invariably proved to be attainable following sensible discussion.

Peterkin's final sentence is "In the long term, it would be prudent to maintain an active role for conservation organisations within forestry, for a strong independent voice will

periodically be needed to maintain environmental standards against other pressures on forestry". There should also be independent voices speaking up for recreation, archaeology, local communities, timber processing, and so on. To the professional foresters lies the task of balancing all these demands and, in consultation with the owners, drawing up the necessary management strategies.

### **Shaping the profession**

Listening with humility is the start of professionalism. Finding a way to balance all the demands is the rest of it. It is not sufficient that a few leading foresters behave professionally. It is necessary that they all, or at least the vast majority, so behave. In plying our trade we will survive or fall together. It is but a small step to then argue for a professional society or institute that sets standards of entry to the profession, ensures continuing competence in a changing world, and demands adherence to codes of ethics and conduct that protect the forest, the public and the clients.

The first of these issues, that of the standards of entry to the profession, is often thrown back as being the responsibility of the colleges or universities and ultimately the employers of their graduates. Colleges and universities throughout the world are being starved of resources. It is in their interest to be resource-efficient by creating large classes. Forestry departments seldom have a large intake and persist in the luxury of whenever possible teaching their students in classes unique to their degree programmes. Until recently in both Britain and Ireland, this could be justified by making reference to the requirements of the main employer, the state forest service. In both countries, the state is now far from being the largest employer. Furthermore, deregulation and variations of privatisation mean that the state forest service no longer takes a central and guiding role within the profession. There remains a vacuum that must be filled by the forestry profession itself. In Britain, the ICF, through its Part I syllabus, is increasingly coming to dictate the syllabus of forestry programmes in universities and colleges, as do the examination systems of other professions ranging from law and medicine to engineering and surveying.

Dictating standards of entry is not enough. Throughout their careers, professional foresters are expected by their colleagues to keep up with changing technical (and ethical) demands. A programme of Continuing Professional Development (CPD) is called for.

Finally, and by no means least, are the standards of behavior professionals can expect from their colleagues. Ethical aspects, such as responsibilities to current and future society, are clearly central, as is the requirement that foresters only practise within their competence. Codes of behavior should also govern the relationship of foresters with their employers (e.g. requirements for professional indemnity), with their colleagues (e.g. advertising should be fair) and with the public.

Given these three strands, i.e. examinations, CPD and codes of ethics and conduct, it is possible to explain to the public and to government bodies, both national and international, what they can expect from professional foresters. Furthermore, and as important, it is possible to ensure that foresters behave professionally by seeking out and responding to the desire and needs of that large and diverse section of the community that can legitimately claim to be stakeholders in the forests and forest policy of Ireland.

## REFERENCES

- Institute of Chartered Foresters. 1996. The UK Forestry Accord. ICF, 7A St. Colme Street, Edinburgh.
- Ministry of Agriculture and Forestry. 1993. Ministerial Conference on the Protection of Forests in Europe. Helsinki, Finland.
- Miller, H.G. 1993. How to link social sciences and extension and communication in professional and technical level forestry education curricula. *In: Forestry Education, New Trends and Prospects.* FAO Forestry Paper No. 123. FAO, Rome. pp. 38-50.
- Peterken, G. 1996. Natural Woodland, Ecology and Conservation in Northern Temperate Regions. Cambridge University Press, Cambridge, UK.
- Ratcliffe, P. In press. The potential for biodiversity in UK upland spruce forests. *In: Proc. Conf. Plantation Forestry: A Sustainable Resource.* ICF, Edinburgh.
- Upton, C. and Bass, S. 1995. The Forest Certification Handbook. Earthscan Publications Ltd., London.



## The forest industry beyond 2000

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### Introduction

The topic which the President of the Society of Irish Foresters, Gerhardt Gallagher, originally proposed for my presentation was "The forest industry in 2050". Looking back a corresponding fifty-five years into the past, I realised the following.

- The second world war, with all its horrific implications, had only just begun.
- The microchip and its far-reaching ramifications for industry and society were unheard of.
- Much of rural Ireland had still to be electrified.
- The national forestry cover was only 1.5%, with the post-war afforestation programme yet to be conceived.
- MDF and OSB products, now one of the mainstays of our industry, had yet to be invented.

So what can be said about the forest industry in 2050? The answer is not a lot, except in the most general of terms. We know that forestry is a renewable natural resource capable of meeting a wide variety of basic needs such as energy, shelter, literacy, recreation and biodiversity. Most interesting is that it meets the needs of societies at radically different stages of development. In many parts of the world, the basic need is still for energy – half the world's wood is used for fuel. Meanwhile, in the most developed societies, literacy, recreation and biodiversity are the most important uses. It is very difficult to predict what society will be like in the year 2050. Will the green agenda dominate over economic development? Will climate change have become a reality? Will fundamental values have changed? What new applications for wood will have been invented? While I don't know the answers to these questions, I am certain that wood, being the highly versatile raw material that it is, will adapt to meet whatever needs of society which do emerge.

Much however will happen between now and the year 2050. From today's knowledge and perspective, it is possible to see what some of these developments might be. Firstly, if current planting levels can be maintained and the full forestry potential of suitable land realised, Ireland will be a major wood producer by that time. Secondly, sustainable development of resources is becoming a prerogative worldwide. Thirdly, genetics is still at a very early stage of development in forestry. Biotechnology will become a vital part of the forester's tool kit beyond 2000, with far reaching implications.

These seem to be the three major topics which will dominate the development of forestry beyond the year 2000 and about which we can say something realistic at this stage. Accordingly, my presentation has three parts, as follows.

1. To consider how the industry might develop in Ireland as the resource grows.
2. To analyse the implications of sustainability for the industry.
3. To foresee how genetic management and biotechnology might impact on forestry in the years ahead.

### **Timber supply and demand**

The national timber supply will be approximately 3.8 million m<sup>3</sup> by 2010, and, provided current planting levels are maintained, should increase to about 12.0 million m<sup>3</sup>, or six times its current level, by the year 2030. By 2050, if the national target of 30,000 ha per annum can be maintained, the potential sustainable timber supply could well reach over 15.0 million m<sup>3</sup> per annum.

Ireland's forestry output will be expanding at a time when the worldwide supply and demand balance is undergoing fundamental change. Industry experts believe that the industry is moving from being predominantly supply driven to being demand driven. If this happens, it will lead to more stable prices and reductions in the notoriously cyclic nature of the industry. It is also expected that the change taking place in the supply and demand balance will lead to slightly higher prices for softwood, and that prices will increase in real terms by about 1.0% per annum – all good news for our fledgling industry. Overall, however, demand is expected to grow relatively slowly, and there is unlikely to be any overall shortage of softwood globally.

### **Industry development**

Our current industry structure, including the new OSB and Masonite projects, is geared towards a total wood production of about 3.0 million m<sup>3</sup> per annum. This level will be reached around the year 2000. Growth will be slow after that for at least five years, before resuming again to reach almost 4.0 million m<sup>3</sup> by 2010. This means that, apart from necessary sawmilling restructuring, I do not see scope for substantial new capacity in either sawmilling or pulpwood processing until about the year 2005. It will, however, be necessary to start planning this new capacity from around 2000 onwards.

In Coillte, we have already given some thought to what the next industry might be. Our studies suggest that mechanical paper-making, such as lightweight coated or super-calendered newsprint, could be viable in Ireland. I believe that pulp paper should be the next stage of development, so as to provide a strategic balance with the current dependency on panel and sawn products.

In the longer term, if we continue to increase our forest resource as currently planned, we will have sufficient supplies to support a chemical pulpmill – a facility which requires approximately 2.0 million m<sup>3</sup> for viability. Our long-fibre *Sika* spruce is an excellent pulping material and we will need a major outlet for pulpwood and residues to support the anticipated growth of production to over 10 million m<sup>3</sup>.

There are major environmental and economic implications in the development of a pulp paper industry, particularly if we move to chemical pulping. There are new developments, such as the emergence of chlorine-free pulps with closed loop systems, which reduce or eliminate the more negative environmental impacts of the pulp industry. Such plants will,

however, still carry major environmental considerations which will have to be properly resolved. It is not too soon to start planning for such industries now.

From the economic viewpoint, pulp paper projects are enormously capital intensive. An integrated mechanical papermill would cost in the region of £400 million, while a chemical pulpmill would cost closer to £1 billion. We need to monitor both the technological and economic developments of the industry to ensure that we get the optimum industry structure for Irish conditions. There are implications for forestry growers. For example, once the establishment of such industries is certain, growers have the option of growing short pulp-wood rotation crops. Consideration may also be given to growing short-fibre pulp species such as poplar or eucalyptus, to complement our excellent long-fibre Sitka spruce.

While I believe that the pulp paper industry will feature in our portfolio beyond the year 2000, there will also be changes in our more traditional product areas. Engineered wood products are becoming more and more significant and they allow for the potential to develop value-added products away from current commodity areas. We have already seen the dramatic development of MDF over the past 10 years. More recently, OSB is replacing plywood. The technologies associated with basic materials such as MDF and OSB are in turn creating a new range of end products made from reconstituted timber. The Masonite door skin project in Leitrim is a good example. Similarly, pallets could be produced from OSB material at a substantially lower cost than fabricated timber pallets. Products such as laminated veneer lumber (LVL) are growing in significance in the US, driven by a combination of developments in gluing technologies and a shortage of large section lumber. LVL could be made from palletwood, representing a better end use of this assortment. With LVL and OSB, laminated beams are possible – just one example of how engineered wood technologies offer us an opening to expand the application of our timber to create new business opportunities.

### **Industry structure**

The biggest change in the structure of the industry in Ireland beyond 2000 will be the gradual emergence of a large private forestry sector, much of it farmer-owned. By 2010, private log production should reach approximately 300,000 m<sup>3</sup>, increasing quite rapidly thereafter. While this will involve fragmentation of the growing side of the industry, we welcome the emergence of a larger private forestry sector, in particular, the emergence of farmers as timber producers. We believe that substantial farmer participation is an essential prerequisite for the proper and more complete utilisation of the substantial land areas suitable for forestry. The emergence of these new smaller growers will bring its own issues to be resolved. Chief among these is how to maintain the quality of plantations, given that the experience elsewhere has shown that, for a variety of reasons, small plantations tend to fall short of their potential. Education and training for these new growers are vital. Another issue is the probable emergence of new log trading systems. In Coillte, we are developing a new log sales system under which log allocation and pricing will be determined by open competitive bidding. The system is being designed so that, over time, it could evolve into a form of exchange which might be of interest to new private growers.

While the growing side of the business will inevitably become more fragmented, there is also a need for greater integration and scale in the industry. We are not well equipped in

Ireland to capitalise on the higher added-value opportunities in the industry. The international industry is led by big international companies with long traditions in the business. They have been restructured into even bigger entities in response to fairly massive investment needs in the more lucrative parts of the business. Ireland currently has a very fragmented forest industry sector, with timber growing, sawmilling and pulpwood processing all independent of each other. This is not conducive to the long term strategic view of how the industry should be developed here. Nor is it conducive to the development of an internationally competitive industry. In particular, the long term and consistent market and product development needed to support the correct strategies is not being done. While the current fragmentation persists, the industry will continue to be opportunistic and short term in its decision making. Our joint venture with Louisiana Pacific is a first step towards integration. Beyond 2000, we will require a radically different industry structure if it is to be internationally competitive and still in Irish ownership. I believe that there is an important policy choice to be made at this stage which will determine whether or not our industry is Irish or overseas owned in the longer term. Integration and scale in the Irish part of the industry are required. Otherwise, the industry will be uncompetitive and will eventually end up in the control of some of the big overseas companies. Maybe that is what we want, but I believe that we can do much better by creating the kind of indigenous owned international companies which have already emerged in the Irish food sector.

Coillte is planning its strategic development around the issues which I identified earlier, namely the growth in timber supply, timber demand and prices, the structure of the industry internationally, the need for product and market development, and the need for scale in the Irish forest products sector. If our forest products sector is to be developed in Irish ownership – and that should be an imperative – it needs an Irish company with the scale and resources to operate internationally in a very competitive environment and in a sector dominated by strong resourceful companies. Accordingly, our objective is to develop Coillte into a broad based international scale forest products company. The steps we have taken to date, such as the efficiency improvements within the company, the joint venture with Louisiana Pacific and the development of a new market-based sales system, are all elements of a strategy to build Coillte into a company which can lead the development of the industry on the international stage. It will not be easy but there is no other Irish entity that can fulfill this role. The alternatives are a fragmented, uncompetitive industry sector or one which is dominated by overseas companies – neither of which would be in the best national interest.

Parallel developments in the Irish industry, such as the emergence of a new family of timber growers, the further integration into processing and the internationalisation of Coillte, will take place in a world which is undergoing rapid changes. The most fundamental of these is the notion of sustainable development. Currently, there is some very confused thinking about the role of forestry in relation to sustainability and the environment. Plantation forestry of the type which we practise in Ireland will, I believe, play a very fundamental role in enabling our planet to sustain itself in the face of the pressures arising from a variety of sources such as population growth and the depletion of non-renewable energy resources. This takes me on to the second major part of my presentation – sustainability.

## Sustainability

The United Nations Conference on Environment and Development (UNCED), held in Rio in 1992, brought into focus concerns that the ever-increasing world population is creating impossible demands on the world's resources, including tree cover and timber. These pressures will be even more acute beyond 2000, due to further growth in population, ever-increasing living standards and the depletion of non-renewable resources. Forests in Ireland have always been managed according to the principles of sustained yield, whereby the rate of cutting is less than the annual increment. This is the cornerstone of good forestry and environmental practice. In Ireland, the principle of sustainability is enshrined in our Forestry Acts, with the felling of trees carrying with it a replanting obligation. The great international effort in forestry is to make the world's forests sustainable by encouraging developing countries to implement sound management practices in their own forests, whether natural forests or plantations.

Internationally, there are many contradictions in the debate on sustainability and the environment. Old growth forests and plantations are being confused. For example, many environmentalists are negative towards plantation forestry due to concerns about monoculture. Yet there are many examples of monoculture in nature – the forests in Scandinavia, Siberia and North America are predominantly monocultures, as are the eucalyptus forests of the Southern Hemisphere. Indeed, a recent Oxford study concluded, contrary to common perception, that the greatest invertebrate number in Britain per square metre is to be found on the canopy of conifer crops.

Plantation forests like ours are increasingly important in reducing pressure on natural forests globally. The world's population is growing and will continue to grow, and with it a demand for timber which cannot be met from natural forests, many of which are in developing countries and are not managed on a sustainable basis. In the temperate regions, well-managed and highly productive forestry plantations will increasingly be the means of meeting demands for wood fibre while occupying land which is marginal for agriculture. Foresters have a major task to ensure that the real environmental benefits of plantation forestry are fully understood by the public, who are inundated with contradictory and often inaccurate and biased information on the environmental aspects of this type of forestry.

The problem is that the really serious environmental issues are global while the focus of attention is invariably local. This is the kind of ambiguity and contradiction that practising foresters will have to live with more and more beyond 2000. The younger generation who are now coming into adulthood are much 'greener' in their thinking, and yet they also expect to enjoy the full benefits of economic development.

There is at present a very intense debate worldwide on the future role of forestry. As incomes grow, there is a greatly increased public awareness in the developed world of the wider benefits of forestry in terms of non-timber values such as wildlife habitats, biodiversity, aesthetics, recreation, wilderness areas and ecosystem protection. We need to be very careful in Ireland that environmental and sustainability issues which are relevant in old growth forests in areas such as Canada and Scandinavia are not transferred to Irish conditions which are quite different. We need to clearly articulate the issues relating to plantation forestry and to ensure that the inevitable increase in regulations governing forestry operations and product certification are appropriate to our somewhat unique Irish conditions.

We will not be immune from these international developments. Irish foresters also need to take account of and adapt to these changing values in the wider society, so that an acceptable balance between traditional timber values and the non-timber benefits is achieved. There is a real danger that the green agenda could be hijacked by fringe elements with political or other motivations informing an increasingly urban population on environmental matters. Foresters whose lives and work bring them into daily contact with such groups and who have an empathy with the environment need to re-establish their authority as educated and informed environmentalists.

Recent developments in Ireland are worrying. The most fundamental of these is the gradual transfer of the control and regulation of forestry away from professional foresters to local authorities who do not have the expertise or resources to assess forestry. There are new threshold limits for Environmental Impact Statements and provisions for further consultation with local authorities on forestry development. I believe that this is an issue which ought to concern the Society of Irish Foresters. In particular, if forestry is to be regulated through the local authority structure, the local authorities need to employ professional foresters. How else can forestry in Ireland be properly assessed or planned?

Sustainability is an issue which will have a major impact on forestry beyond 2000. The fundamental concerns regarding future life on our planet which were brought into focus in Rio might seem remote from the day-to-day activities of Irish foresters. They are however presenting an opportunity and a challenge to the profession. The opportunity is to ensure that the growth and development of the Irish forestry industry contributes towards creating a new sustainable supply of wood for the future. The challenge is to ensure that this is done in conformity with best forestry management principles. What is certain is that there will be many real issues regarding sustainability in the wider context for Irish foresters well into the next century. Foresters will need to communicate a great deal more into the depth and breadth of their contribution to the environment and to sustainability.

### **Genetics and biotechnology**

The third major force which should have a fundamental impact on both the production and sustainable aspects of forestry over the next fifty years is technology, in particular, biotechnology. Tree genetics is in its infancy but a lot of basic work, including work in Coillte, has been done on genetic improvement of Sitka spruce and broadleaves. One of the privileges of my position is that I have ready access to the intelligence and knowledge of our Research Department. Accordingly, my contribution in this area is attributed largely to the expertise of Alistair Pfeifer and David Thompson.

The first big breakthrough in terms of production and improvement in timber quality is likely to come from new developments in propagation technology. New developments are starting to give us the means to overcome biological restrictions such as ageing effects, long reproduction cycles and periodicity of seed years. The sequence of development is likely to be as follows.

- Cost effective methods of producing superior genetic stock using conventional rooting techniques are being developed. Coillte already has a pilot project at its Aughrim Nursery to produce 300,000 genetically improved plants per annum in 1996, rising to one million by the year 2000. Refinements of micro-propagation techniques such as



photoautotropic technology promise to lessen some ageing limitations that occur with conventional cutting methods, while at the same time increasing propagation rates and reducing production costs.

- Later, a process known as somatic embryogenesis has the possibility of producing an unlimited number of seedlings of selected clones. This is a process in which multiple embryos are first grown in tanks of a nutrient solution under a controlled environment. The embryos are then encapsulated in a gel or other material to make an 'artificial seed', which can be sown in the nursery and grown in the usual way. A continuous supply of high quality genetic material would be available on demand – a situation which does not apply at present.

The twin problems of restrictions in mass propagation and continuity of supply of high genetic material will, in all probability, be solved by the middle of the next century. Many of the techniques which are currently considered as being novel will be standard practice within forest nurseries. This ability to solve the problem of mass propagation will in time lead to the wider development of clonal varieties for production forestry.

The second major development is likely to be that of clonal varieties of common tree species which will be available with greatly improved characteristics tailored for certain end uses. Clonal varieties are already common in many garden plants and in agriculture.

The development of clonal varieties of Sitka spruce, oak, ash and sycamore has already started in this country. Superior individuals have been selected in our forests and are being tested in field trials. As the propagation systems develop, foresters will be able to order from the nursery a variety of Sitka spruce which has superior wood density for chemical pulp production, or a variety of oak which has superior stem form and growth rate. Propagation techniques and cloning have the ability to greatly increase the productivity and quality of the timber we produce in our forests, by the capture and exploitation of existing varieties within wild tree populations. Additional variations will be possible through the recombination of genes using conventional breeding technologies.

The third major development in tree breeding is likely to be in the field of genetic engineering, which is presenting us with exciting possibilities for new genetic material. The identification, isolation and insertion of genes that confer specific characteristics into a different species is already a reality. For example, poplar clones containing the glyphosate resistance gene have already been developed. Such developments are likely to increase and accelerate. As more information on the genetic structure of our trees becomes known through molecular genetic studies, and as genetic engineering techniques are refined, a greater range of new transgenic species will arise. The new species will combine the best attributes of a number of natural species which, due to reproductive barriers, are not possible to create using conventional hybridisation techniques. We can therefore envisage a variety of spruce which combines the nitrogen fixing properties of alder with the growth of Sitka spruce and the late flushing properties of Norway spruce which would thrive on frosty sites of poor nutrient status.

The development of transgenic species is already underway in agriculture. Development with forest trees will not be as fast, due to the complexity of tree genomes and the long rotation cycles and testing periods required. They are however a real possibility in the next century. By the time they are developed, difficulties regarding their use will have been debated and resolved using models from agriculture.

The development of domesticated varieties of forest tree species is running contrary to the current European trend towards a more natural ecological approach to forest management. While the new varieties will certainly have a narrower genetic base than wild material, it will not be so restricted as to present a threat to the long term survival of our forests. Their use has great advantages, particularly in intensively managed production plantations where high inputs of labour and ground preparation are best invested on the culturing of high quality genetic stock, rather than on mediocre material. They will enable plantation forests to meet a wider variety of objectives including production, amenity and conservation. All objectives can be accommodated to a greater extent than at present. The skill of the forester will be to find the right balance for each particular site by choosing from a much wider palette of commercially viable species. His or her task will be much more complex, but all the more interesting for that.

The effect of domesticated varieties of crop plants has revolutionised the quality and quantity of agricultural production. It is conceivable that similar gains await us with improved forest tree varieties, although maybe over a longer period. If so, this third major development in forestry over the next fifty years will facilitate the other two of increased production and sustainability.

## Conclusion

To conclude, the years to 2050 will see forestry and the forest products industry becoming an industry of major significance in Ireland. Most of the trees which will be felled over that period are already planted. This means that we can predict the quantity and quality of the supply, but not much more. From today's perspective, it seems likely that the pulp and paper industry and engineering timber products will be the important new industry developments over that period. Lessons from the past suggest, however, that new technology and new products could well change the picture radically.

Sustainability in its broadest sense will almost certainly become a major issue, and sustainability of forests will be seen to be a major element in ensuring that this planet can sustain itself in the face of population growth and other forces in the environment.

Finally, there are exciting developments in genetics and biotechnology which should come to fruition in forestry over the period. It has made little impact to date but advances in propagation technologies, genetic improvement of trees and in genetic engineering have the potential to radically alter the practice of forestry as it is known today. These advantages should make it possible for plantation forests to meet a wider range of uses by facilitating greater diversity while improving the overall productivity of the plantations.

We are privileged to work in an industry of such fundamental importance. We cannot predict what the sociological, environmental and technological changes will be over the next fifty-five years to 2050, but we can be sure that the forests and wood fibre which are being planted today will serve future generations well.

## Managing our forests for the future

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### Summary

The pressures experienced by forest managers today reflect a growing public interest in the environment and in forestry. There is an increasing awareness that inappropriate management could reduce the potential of ecosystems to supply the goods and services which society may demand in the future. This concern for the future finds its expression in the world-wide movement towards sustainability. Sustainable management has been practised in forestry for centuries. Although subjected to various interpretations, it has usually been seen in this part of the world as sustained yield in a wood supply-oriented context. Modern ideas of sustainability embrace all the goods and services of the forest and suggest that 'sustained yield' should be replaced by the broader concept of 'sustainable forest management'.

The commitment to sustainable forest management in Europe has been developed in the Helsinki Process, one of several major international forums currently addressing the issue of sustainability in forestry. The Helsinki Process was established in 1990, and its membership encompasses most European countries, including Ireland. It has developed criteria of sustainable forest management and for each criterion, a series of indicators against which progress can be measured over time.

Both the concept and definitions of sustainable forest management are unsatisfactory in several respects. They tend to ignore the fact that soil, climate and even the ecosystems we are asked to manage on a sustainable basis are all dynamic and that the natural tendency in soil development within temperate regions is towards acidification. Definitions also tend not to be explicit on whether sustainable development should be pursued for the benefit of future generations or for the sake of the forest itself. This uncertainty suggests that the value systems defining the concept are to a large extent derived from the views of society, rather than from forest or ecological science.

We need to be very clear that forestry is an economic activity. Plantation forests are not natural - they are artificial ecosystems established for the purpose of supplying timber, but with the potential to deliver a range of goods and services to society. Nor were the ecosystems they replaced natural. The Irish landscape is the product of many centuries of human interference and, in the case of the uplands, has been significantly degraded as a result of this disturbance.

Nevertheless, as foresters, we have a responsibility to show a clear commitment to the concept of sustainability. Most of our forests were established long before sustainability, in the context in which it is now being used, became an issue. Our management systems were developed to meet the primary objective of timber production. It stretches credibility to think they could all easily fit into the broader template of sustainable management. Questions relating to resource depletion, biodiversity and impacts on other ecosystems all have to be examined in the context of our forests, particularly those on thin, poorly buffered acid soils.

We need to face these questions honestly in open debate. We need to support foresters by making available opportunities for further education on the principles and techniques of ecosystem management. Our investment in research has not been adequate and if we have a real commitment to the forests of the future, we must show a greater level of commitment to research now.

We should openly discuss the issue of sustainability and participate actively in public debate. Our survival as professionals may depend upon it. Ultimately, if we fail to produce the sort of forests society requires, we will be subject to ever-increasing controls by society. In other words, our ability to function as professionals will be taken from us. We owe it to our profession and to forestry to demonstrate that in managing our forests we can accommodate the primary goal of timber production with society's changing views on the role of the forest.

### **Ecosystem management**

The management of forests requires of its practitioners a long term view and a considerable act of faith in the future. The forester, in the latter years of his career at least, can say, These trees will be here long after I am gone, there will be a market for them and people will be grateful for what I did at their establishment. The hallmark of the professional forester is his commitment to sustained yield. This is the basis upon which our forests have been managed throughout this century. Through all that time, the primary management objective – the production of wood – has also remained unchanged. It is therefore fair to say that foresters must be conservative in their professional outlook. They cannot allow themselves to become the prisoner of every changing fad and fashion, but must keep their sights firmly set on the goal of timber production.

Now, in this industry characterised by gradual evolution rather than rapid transformation, all is changed. Afforestation is at record levels, and control of the bulk of the forest estate has passed from a government department to a commercially motivated company. The private sector is also growing at an unprecedented rate and is having a significant influence on site type and choice of species. On top of all this, forestry is no longer just the business of foresters. Everyone, including fishery managers, landscape architects, tourism officials, conservationists, ecologists, journalists and worst of all, some might say, the dreaded environmentalists, all want to have their say about forestry. Forests established for one objective only – timber production – are now being criticised because they do not meet other objectives – amenity, water quality, habitat conservation – for which they were never designed. Little wonder then that the forester, used to working within a well defined framework, finds himself confused and disturbed. The goalposts have been moved, and the forest manager is being asked to don the garb of an ecosystem manager – a hat which doesn't always fit so well.

Similar pressures are being felt by foresters all over the world. Yet, I wonder has the forester's role changed so much? In Central Europe, the forester has always been a wildlife manager - he knows the habits of the forest animals and he feeds the deer through the harsh winter. In Slovenia, I remember on our Final Year university study tour meeting foresters whose primary role was not the production of timber, but the management of streams. The protection forests within their charge, located high in the Julian Alps, are vital for the conservation of the soil resource and the prevention of flooding in the valleys far below.

The difficulty for foresters in dealing with these pressures was illustrated for me by an incident in Sweden, in 1978, when some forest companies planned to use herbicides to control birch in the coniferous forests of the north. Swedish forests are open to every citizen to ramble, camp, and most importantly, to pick berries. It was therefore hardly surprising that *skogsbesprutning* – the spraying of the forests – became a national issue

with a well-organised protest campaign. The forest companies, anxious to establish their right to manage the forests as they saw fit, went ahead with their plan and, with all the subtlety at their command, sprayed the forest and the protesters with 2-4-D.

## **Sustainability**

It is important to analyse what is happening to forestry today. Political action represents, however imperfectly, the will of a proportion, not necessarily a majority, of the population. People today are more interested in the environment than ever before. They have feelings about what sort of activity is appropriate in the countryside, and they are worried about possible damage to natural resources. Controls on forestry, environmental impact assessments, Forest Service guidelines and the requirement for fishery board approval for afforestation projects, all represent the political response to their expression of concern. Forest managers are constrained by this new legislation. They feel it is unnecessary and misdirected, and are frustrated at being able to do so little to control it. The environmentally-aware public, on the other hand, is reassured. Government is responding to their concerns and taking care of the problem.

When people express concern about water quality, monoculture or a loss of biodiversity, they are demanding the wise management of the ecosystem. Although they may not always realise it, they are espousing the cause of sustainability.

Sustainability is a fundamental goal of ecosystem management. At the heart of the concept is an awareness that the planet's resources are not inexhaustible. They must be used responsibly and in the best interests, not only of this generation, but of those who will follow us.

The history of sustainable forest management is a long and indeed, a proud one, dating back to the latter half of the 17th century. The idea of sustainability arose from a responsibility to ensure that the utilisation of the forest resource by the present generation should be such as to allow future generations to benefit from it to the same extent (Wiersum, 1995). Since its inception, its interpretation has gradually become more inclusive. In the United States, a social dimension of sustainability was recognised over 60 years ago. Sustainability was interpreted as community stability, i.e. management of the forest so as to ensure that forest-dependent communities and industries would be sustainable. In Ireland, we have espoused the principle of sustainable management, but as we have a rapidly expanding forest estate and are still a long way from attaining a normal forest with equivalent areas at each age class, we have not had to explore the concept to any depth. In essence, we see the implementation of the sustained yield principle as management designed to balance output with growth and to ensure an even supply of material to the market. Underlying this interpretation is the idea that the productive capacity of the site must be protected and maintained. This is a relatively narrow, supply-oriented interpretation of the sustained yield concept. Modern ideas of sustainability embrace all the goods and services of the forest and suggest that 'sustained yield' should be replaced by the broader concept of 'sustainable forest management' (Wiersum, 1995). As the view of the forest and its functions has developed, so too has thinking on sustainability. It would be foolish indeed to imagine that the last word has been spoken or to predict with confidence how future generations will interpret the concept.

The commitment to sustainable forest management in Europe has been developed in the Helsinki Process<sup>1</sup>, one of several major international forums currently addressing the issue of sustainability in forestry. The Helsinki Process was established in 1990, and its membership encompasses most European countries, including Ireland. It has developed criteria of sustainable forest management and for each criterion, a series of indicators against which progress can be measured over time.

Sustainable management of forests has been defined under the Helsinki Process as “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.”

The six criteria of sustainable forest management set down by the Helsinki Process are as follows.

1. Maintenance and appropriate enhancement of forest resources and their contribution to global carbon cycles.
2. Maintenance of forest ecosystem health and vitality.
3. Maintenance and encouragement of productive functions of forests (wood and non-wood).
4. Maintenance, conservation and appropriate enhancement of biological diversity in forest ecosystems.
5. Maintenance and appropriate enhancement of protective functions in forest management (notably soil and water).
6. Maintenance of other socio-economic functions and conditions.

These criteria are conceived so as to make them all applicable both locally (at the management unit) and at higher planning levels, especially at the national level (Lanly, 1995). Indicators are intended to be assessed as trends. Monitoring indicators over time will allow an assessment of progress towards sustainability of forest management at national level (Anon., 1995a). FAO has taken on the task of harmonising the various initiatives on sustainable forest management and has brought together representatives of countries involved in the various international initiatives.

There is a good deal of concern that criteria identified by international consensus are not necessarily appropriate, nor the related indicators readily applicable, at national level (Lanly, 1995). Indeed, it may be unrealistic to try to develop a single, internationally acceptable definition of sustainability. It would be more appropriate to establish domestic criteria and indicators, recognising that our understanding of sustainability will evolve over time.

This view highlights one of the most immediate difficulties with the sustainability debate, namely the definition of the term. Many interpretations of sustainable management

<sup>1</sup> Ministerial Conference on the Protection of Forests in Europe, held in Helsinki, 16-17th June, 1993. Information presented here is from the General Declaration and the Helsinki Resolutions issued following this conference, and from the criteria and indicators for sustainable forest management adopted by the First Expert Follow-Up Meeting of the Helsinki Conference, held in Geneva, 24th June, 1994.



have been suggested, but I select the above definition because Ireland is a contributor to the Helsinki Process and, while no nation is bound by the outcome of the Process, it may be assumed that we have some degree of commitment to it.

I find both the concept and definition of sustainable forest management unsatisfactory in several respects. There is no time scale. We are asked to assume that the planet is indefinitely sustainable. The basic resources for forest growth are climate and soil. The natural tendency in soil development in temperate regions is towards acidification and impoverishment (Ball, 1975). The mountains are being washed to the sea. No matter what we do, we can only slow down the process, not stop it.

The definition of sustainable forest management fails to make clear why we should manage forests sustainably. The sustained yield concept embodied the idea of forest management for people, whether by regulating the supply of goods and perhaps services from the forest or by concentrating on the sustainability of communities. Definitions of sustainable forest management tend not to be explicit on whether sustainability is for people or for the forest itself. In 1992, the Society of American Foresters added a new canon to their Code of Ethics, reflecting professional commitment to a "land ethic". Interpretation of its meaning are diverse, with disagreement as to whether it represents an ethic of the land that is people-centred or for the land itself (Craig, 1992; Proctor, 1996). The latter idea is related to the concept of the inherent right of nature to exist. The fact that such a view commands support suggests that the value systems that define the concept of sustainable forest management are to a large extent derived from the views of society, rather than from forest or ecological science (Wiersum, 1995).

This conflict was well expressed in an editorial in *Unasylva* a few years ago (Anon., 1992). The point was made that many of the definitions of sustainable development suggest that the objective is "to 'maintain' the resource base as an end in itself and not as a means to the ultimate goal of improving, on a sustainable basis, the living standard of humankind. This is an important distinction because, almost without exception, economic development requires using up energy and raw materials and, in turn, creating waste which the planet must absorb. That is to say 'green growth', at least on a universal level, is not possible. Sustainable development necessarily involves change and a series of trade-offs and compromises."

We need to be very clear and forthright on this point. Forestry is an economic activity. Plantation forests are not natural. They are artificial ecosystems established for the purpose of supplying timber, but with the potential to deliver a range of goods and services to society. They are of course part of the environment, but they are not part of 'nature'. In most cases, nor were the ecosystems they replaced natural. The Irish landscape is the product of many centuries of human interference and, in the case of the uplands, it has been significantly degraded as a result of this disturbance.

All crop production accelerates the process of soil acidification. While the acidifying effect of agricultural crops can be corrected by lime application, supplies of limestone, although large, are not infinite and are being used at an unsustainable rate. In current forest practices, liming is uncommon and, based on experience to date, tends to induce rather than reduce negative impacts.

Coniferous forests are vulnerable to resource depletion because they occur largely on thin acid soils which are poorly buffered and therefore ill-equipped to counteract the

effects of losses of organic matter and nutrients in the harvest and the influence of acidifying processes. Peatland forests present a special problem in the long term, because the soil material is biodegradable. The development of peatlands for forestry begins a process of peat subsidence and oxidation. Whether or not decomposition will continue indefinitely will depend, *inter alia*, on peat type and management regime. While the wasting of the peat resource is of concern in itself from several perspectives (for example, its contribution to the global carbon balance), the impact it will have on the sustainability of the forest will be influenced by factors such as the character of the sub-peat mineral soil and the hydrology of the area.

There is another important question that must be asked at the risk of being accused of lacking a commitment to future generations. Is sustainability always the correct option to follow? I suggest that long term sustainable management of forests may not be possible on certain poor site types. I have no evidence for this, as the necessary information is not yet available. However, even if it were true, I believe that a case could be made for plantation forestry in some such situations. As I have previously explained, the ecosystem replaced by the establishment of the plantation, take heathland as an example, is itself disturbed, grazed and very likely, non-sustainable. A plantation forest, managed for several rotations to achieve both increased production and a greater level of sustainability, may well be a better option for society than the maintenance of an unsatisfactory *status quo*.

It is difficult to think in the time frame implied in the sustainability concept. Little account is taken of the dynamic nature of the environment, a factor which increases in importance as the time scale extends. Given the current debate on climate change, this seems a curious inadequacy of the criteria. Management systems and technological development are also constantly changing, and it is quite possible that new techniques will be developed which will allow the inexpensive enrichment of the soil, for instance, from renewable sources. Who knows? After all, it is only 100 years since the Frank-Caro process and a few years later, the much more successful Haber-Bosch process, were developed to extract nitrogen from the atmosphere and convert it into a form which could be applied as a fertiliser and taken up by plants.

Today, we recognise that two of the major pressures on the sustainability of crop production in the future are acidification of the environment and climate change. In this case, acidification refers particularly to the impact of pollution, which accelerates the natural rate of acidification in the soil. Fifty years ago, who would have considered either of these factors as potential threats to sustainability? We must recognise that these pressures may decline in importance in the future, but equally that others, as yet unknown, may emerge.

The deficiencies in the Helsinki Process, and there are many, give credence to the feeling that this is a political process in which the views of scientists are of secondary importance to the assertion of governments that they are committed to a rather nebulous idea of sustainability. Despite this, sustainability is a noble aspiration and we should examine our forests and our management practices to see how well they conform to the ideal.

The really big problems for sustainable management of forests are in regions where exploitation, rather than sustained yield forestry, is practised. Practices of overcutting are clearly unsustainable and their correction presents enormous problems of a social and economic nature. In such regions, the preservation of biodiversity is also often a major issue.

By comparison, the problems for plantation forestry are less severe, although they have been the subject of considerable debate in some parts of the world, such as New Zealand (Biggsby, 1994; Hughes, 1994; Perley, 1994; O'Loughlin, 1995).

Many of our forests are still in their first rotation. They consist entirely of introduced species and they are growing on sites never previously afforested. These man-made ecosystems are not closed like crops in a glasshouse. They interact with the environment around them. They receive inputs from the atmosphere and they may export nutrient or toxic ions to surface waters. They modify streamflow, influencing both hydraulic discharge and flow patterns. Under these circumstances, it is inevitable that they raise questions regarding their long term sustainability. Most of our forests were established long before sustainability, in the context it is now being used, became an issue. Our management systems were developed to meet the primary objective of timber production. It stretches credibility to think they could all easily fit into the broader template of sustainable management.

The world-wide loss of biological diversity, which is seen as a serious threat to development, was highlighted at the 1992 Earth Summit. The conservation of biodiversity at population, species and gene level has become a primary objective of the journey towards sustainability. Biodiversity is certainly an appropriate consideration in the context of natural forests or managed forests derived from natural stands. It is more difficult to see how it should be applied to plantation forests such as ours. It is often assumed that biodiversity is a prerequisite for sustainability. This leads to a further assumption that monoculture is incompatible with biodiversity and therefore, with sustainable forest management. There is little scientific evidence to support either of these contentions. There are indications that complexity, of which diversity is an aspect, within ecosystems contributes to sustainability, by increasing both the stability (resistance to impoverishment) and the resilience (ability to recover from damage) of an ecosystem. However, the information which would indicate the relevance of this to our plantation forests is lacking. Of course plantation forests alter the ecosystem, change vegetation and modify the habitat for fauna, leading in many cases to changes in species occurrence and numbers. Whether or not this will actually influence biodiversity is another issue, which is probably site-specific. It is all too easy to judge from the absence of vegetation on the forest floor of a thicket stage plantation that crop establishment has resulted in a reduction in biodiversity. This assessment takes no account of the fauna and microflora of plantation forest ecosystems, which may actually be enhanced by the forest's presence. The issue of biodiversity is important on a regional basis. For example, if the Slieve Blooms were totally covered in forest, would the existing species of plants and animals die out or be reduced in population to the extent that they were no longer viable? If so, the biodiversity of the region would be threatened. However, a mix of properly monitored land uses will not represent a threat to any of the existing species. As far as I am aware, there is no research in progress in Ireland on this important issue. We need to look both at how we can increase biodiversity within our plantations and what effects might follow for the sustainability of the ecosystem, the protection of other ecosystems or the enrichment of rural landscapes. Potentially valuable research topics include the management of plantation margins, the effects of introducing a proportion of broadleaf species into conifer plantations, the potential contribution of dead wood in the forest and the effects of varying the size and shape of clearfells.

Artificial ecosystems require management intervention to keep them in existence. It is easy to forget that without management, something as simple as grassland would, over most of Ireland, revert to broadleaf scrub within 30 years, and ultimately, to deciduous woodland. Management is therefore essential to the sustainability of man-made ecosystems, whether they be forest plantations or cereal crops. Management practices can of course have negative implications for sustainability, if they induce soil damage or water pollution.

### Commitment to the future

To ask, Are you in favour of sustainability? is rather like asking, Do you support motherhood? We are all the beneficiaries of it and the generations which will follow ours depend upon it. That said, there is no doubt that it is still a fairly crude notion. It requires considerable refinement before it can realistically embrace the inevitable conflict between the utilisation of natural resources and the perpetuation of their productive potential *ad infinitum*.

The concept of ecosystem management is also very attractive. It has a seductive appeal and, as with all seduction, the seduced may be led on, heedless of the pitfalls on his path. The recent *Report of the Ecological Society of America Committee on the Scientific Basis for Ecosystem Management* (Anon., 1995b) highlights the difficulties of practising ecosystem management. The difficulties are many and are to a large extent derived from the paucity of existing data on ecosystems and the limits in the current understanding of ecosystem processes. Indeed, the problems surrounding the implementation of the concept of sustainable forest management have recently resulted in the beginning of what may be a retreat to a softer commitment towards 'well-managed forests' and 'forest quality' (Wright, 1995).

The criteria and indicators of the Helsinki Process are in several respects based on poor scientific reasoning. The conditions prevailing in a country with an expanding forest estate established on land previously forested and subsequently degraded as a result of the clearance of that forest, are hardly considered at all. Foresters need to make a much stronger contribution to the further development of the Process. While I recognise that it may be difficult to influence the Process significantly at this stage, we certainly should make an effort to do so.

While addressing the Helsinki process with greater vigour than we have up to now, we should examine the practicalities of applying the principles of sustainable forest management in Ireland. This can best be done by first developing a series of best management practices or guidelines for the forest manager in the application of the principles of sustainable forest management. We should consider all aspects of sustainability and examine approaches such as resource accounting (Xu *et al.*, 1995) as possible tools for integrating the economic and ecological aspects of forest management. We should support research which will deepen our understanding of ecosystem processes and improve our knowledge of the interaction between forest management practices and the environment. The level of research funding on the interaction of forestry and the environment in Ireland is very low. The failure of the private forestry sector and the processing industry to support it significantly does no credit to either group and will, in all likelihood, be to their financial detriment in the longer term. Existing research is inadequately funded and tends to be of

the trouble-shooting variety, reacting to current or impending problems. To address sustainability issues effectively, a stronger research base will be required, affording the opportunity to study ecosystem processes at a more basic level. If we have a real commitment to the forests of the future, we must show a greater level of commitment to research now.

As foresters, we have a responsibility to show a clear commitment to the concept of sustainability. We should openly discuss the issue and participate actively in public debate. Our survival as professionals may depend upon it. Two quotes from the *Journal of Forestry*, where these issues have been vigorously debated over the past few years, express this sentiment clearly.

... it is the public that grants any profession its authority to practice so that that profession may satisfy a societal goal or need. If the public perceives that the profession no longer addresses societal goals, the authority is simply placed elsewhere.

(Banzhaf, 1993)

... if forestry is not to be accused of paying lip-service to a fashionable buzz-word, we must continue the process of defining forest stewardship through actions that demonstrate a commitment to our highest aspirations.

(Coufal and Cornett, 1992)

Associated with the concept of sustainable forest management and good forest stewardship is the idea of 'green certification' initiated by the Forest Stewardship Council. Indicators are being identified at forest level which can be used for the certification of wood as the product of a sustainably managed forest (Lanly, 1995). Already, there is a commitment from one of the largest DIY chains in the United Kingdom to buy wood only from well managed forests (Wright, 1995). Countries which had established their credentials for sustainable forest management would be entitled to declare this, thereby giving them a competitive advantage in the sale of their forest products. This may appear to be an important step towards sustainable forest management. It also presents a marketing opportunity, of which we could probably avail. However, I believe that it would be a serious error to adopt such a system of certification, as it would undoubtedly hinder rather than assist progress towards sustainability. Let us suppose such a system were in place. Pity the poor scientist who uncovers any evidence suggesting unsustainable forest management in Ireland. I fear the temptation to shoot the messenger might become overwhelming. Unfortunately, to oppose the introduction of such a system will be interpreted as supporting a *laissez faire* attitude to forestry, but if the sustainability concept is to have any real value, it must be discussed openly and honestly. We owe that much to our children.

To emphasise that the debate on the sustainable management of forests is far from over, let me conclude with two further quotations. The first is from Jacob Bronowski who, during his career as a scientist, travelled the difficult journey from physics to biology and found that the road led on to philosophy. In his book, *The Ascent of Man*, he writes:

There is no absolute knowledge. And those who claim it, whether they are scientists or dogmatists, open the door to tragedy. All information is imperfect. We have to treat it with humility. That is the human condition.

(Bronowski, 1973)

The second quotation carries a similar message, although it was written over 2,000 years ago. Socrates, describing a politician he met, said:

I formed the impression that although in many people's opinion, and especially in his own, he appeared to be wise, in fact he was not. I reflected as I walked away, 'Well, I am certainly wiser than this man. It is only too likely that neither of us has any knowledge to boast of; but he thinks that he knows something which he does not know, whereas I am quite conscious of my ignorance. At any rate it seems that I am wiser than he is to this small extent, that I do not think I know what I do not know.'

(Plato, Apology)

## REFERENCES

- Anon. 1992. Sustainability. Editorial. *Unasylva*, 43:169.
- Anon. 1995a. Sustaining the world's forests. The Santaigo Agreement. *Journal of Forestry*, 93(4):18-21.
- Anon. 1995b. The report of the Ecological Society of America Committee on the Scientific Basis for Ecosystem Management. Webpage  
[http://www.sdsc.edu/1/SDSC/Research/Comp\\_Bio/ESA/ecmtext.htm](http://www.sdsc.edu/1/SDSC/Research/Comp_Bio/ESA/ecmtext.htm)
- Ball, D.F. 1975. Processes of soil degradation: a pedological point of view. In: The Effect of Man on the Landscape: the Highland Zone. Edited by Evans, J., Limbrey, S. and Cleere, H. Council for British Archaeology Research Report No. 11.
- Banzhaf, W.H. 1993. Ethical decision making: a roundtable discussion. *Journal of Forestry*, 91(4):10.
- Bigsby, H.R. 1994. Sustainability and the role of economics. *New Zealand Forestry*, November, pp. 31-34.
- Bronowski, J. 1973. The Ascent of Man. British Broadcasting Corporation. London. 448 pp.
- Coufal, J.E. and Cornett, Z.J. 1992. The ethics of forest stewardship. *Journal of Forestry*, 90(8):43.
- Craig, R. 1992. Land ethic canon proposal: a report from the task force. *Journal of Forestry*, 90(8):40-42.
- Hughes, H.R. 1994. Towards sustainable plantation forestry. *New Zealand Forestry*, August, pp. 16-18.
- Lanly, J.-P. 1995. Sustainable forest management: lessons from history and recent developments. *Unasylva*, 46:38-45.
- O'Loughlin, C. 1995. The sustainability paradox – an examination of The Plantation Effect – a review of the environmental effects of plantation forestry in New Zealand. *New Zealand Forestry*, February, pp. 3-12.



- Perley, C. 1994. Forest 'value', sustainability and utilisation. *New Zealand Forestry*, November, pp. 2-3.
- Proctor, J.D. 1996. Will the real land ethic please stand up? *Journal of Forestry*, 94(2):39-43.
- Wiersum, K.F. 1995. 200 years of sustainability in forestry: lessons from history. *Environmental Management*, 19:321-329.
- Wright, M. 1995. A greener forest is just around the bend. Environmental News Network Weekly Features. Webpage <http://www.enn.com/enb/10em30/forest2.htm>
- Xu, Z., Bradley, D.P. and Jakes, P.J. 1995. Measuring forest ecosystem sustainability: a resource accounting approach. *Environmental Management*, 19:685-692.

# The history of Irish forests since the Ice Age

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## Introduction

As you can tell from my accent, I come from Belfast. I was born close to the centre of that great city. Like all little girls who grew up just before the 'Age of Television', I loved to read fairy stories. As I grew older, I devoured the stories of Hans Andersen and the Brothers Grimm. All who love those old tales remember the descriptions of the huge forests into which the principal character would often stray. They were big, dark, forbidding places full of gingerbread houses, giants and all the stuff of European tales and myths.

Even as a small girl living in a big city, I soon recognised that the landscape immortalised in the European stories was very different from the landscapes described in the tales of my native Ireland. When I first read the Irish legends and folktales, I learned that Cuchulainn's chariot was drawn by two wonderful horses across a land which was more plain than forest. Even a little girl could grasp that the landscape of Ireland's best loved stories was different from that of Germany and Scandinavia, because of its lack of trees. Perhaps this realisation does not come to all young people, but it came to a young Belfast girl who was as fond of plants and trees as she was of legends and folktales. Perhaps this would please Augustine Henry. He too was a person with an enthusiasm for plants and a love of folklore (Pim, 1996).

Were there ever great dark forests in Ireland like those in Germany? Some historical accounts from Ireland in the Middle Ages suggest that, in those days, there were very extensive forests of oak in Ireland. It is recounted that these disappeared four hundred years ago when the English destroyed Ireland's oakwoods for good timbers to build the 'wooden walls' of her navy (McCracken, 1971; Hall, 1992). Is this statement true? If so, where did such forests come from, and where do we go for the answers?

Like all those who want to understand the landscape of the past, we could go hunting for fossils. However, if we go to places where the old documents tell that once forests grew, and dig down into the ground, it is most unlikely that we will find any bits of old trees. Nevertheless, our ancient forests have left their fossils in copious amounts, but not usually on the spot where once they grew, and not in a form visible to the naked eye (Jessen, 1949).

To find the true story of Ireland's forests, for indeed we once had sumptuous forests almost from coast to coast, we must first go to the boglands and lake muds of the Irish lowlands and uplands, where vast numbers of minute pollen grains are pickled in the acids of the peats. When the surrounding packaging of peat is destroyed by chemicals in the laboratory, the pollen grains can be seen with a microscope (Mitchell, 1986).

Just as each tree species has a characteristic leaf and bark, it also has a characteristic pollen grain. If we identify the pollen grains of trees contained in any slice of peat from

anywhere in Ireland, we can soon learn which trees were growing near the bog while the peat was developing. Using this science of pollen analysis, or palynology, we can trace our forest history.

It is the bogs and the lake muds which preserve numerous relics of the Irish forest of the past. Some of our lowland boglands are over 12,500 years old. They are made up of peats which grew slowly from that time and contain an unbroken record of preserved tree pollen from those long-past days until the present. In addition, some bogs also contain the bits of wood, bark and needles of the very trees which grew there thousands of years ago.

### **Post-glacial development**

Our story starts in an ancient landscape which shares one feature with the landscape of today – almost no trees. We are back 12,500 years ago, at the end of the last Ice Age. If we could stand on a low hill in the early summer somewhere in the Dublin area and look out over the land, we would see familiar features such as lakes, small streams and rivers with grassy, sedgy meadows full of bright flowers, birds and insects. Perhaps a small herd of Great Irish Deer grazing, but no trees. We would see small patches of low scrubby vegetation such as dwarf willow, dwarf birch and juniper in many places, but certainly nothing the Irish people of today would dignify by calling a tree.

At the end of the last Ice Age, most of Ireland had just been released from great thick sheets of ice. It may be that it was only the southern regions which escaped the ice and these may have been joined to Britain as reduced sea levels exposed tracts of low-lying land now long-lost under the Irish Sea. Botanists believe that if any trees survived in Ireland at this time, it was most likely that they did so in the favoured south. There are those who are sceptical that any trees survived even here.

About 12,500 years ago, Ireland, like Britain and the rest of Europe, was beginning to warm. The soils recently freed from the ice were colonised by the vanguards of plants advancing from the warmer south. In places such as France and the Iberian Peninsula, trees were already established and were beginning their advance towards Ireland along the low-lying traces of land which may have followed the present coast. All seemed poised for the return of the trees at this last phase of the Ice Age, when suddenly the cold returned. While the massive ice sheets remained absent – for it did not stay cold for eons – the bitter conditions returned for some hundreds of years, and plants which had begun to thrive received a great setback.

By the time the ‘cold snap’ ended, some time before 10,000 years ago, any advances which plants had made in recolonising the Irish landscape were greatly depressed. Some scattered tracts of scrub capable of tolerating alpine conditions remained in a few areas, but these represented a relatively minor feature of the landscape. However, once conditions began to warm – and this time they stayed warm – the first of the proper trees was well on its way to Ireland.

Imagine a landscape with nothing much growing above waist height. In summer, it was well lit for there was little growing to create shade. These are just the conditions which favour invasion by birch. Invasion is not too strong a term, as the pollen record from the start of the warm period, which we now call the post-glacial or Holocene period, shows that the advance of birch was indeed swift.

## Early woodland composition and dynamics

Those who love and are familiar with woodlands and forests appreciate that it is the mixture of trees, low-growing shrubs and leafy plants which give each wood its unique character. It must also have been so in the first Irish woodlands. However, the pollen analytical techniques which give such useful information about the different types of trees do not yield the same quality of information about the lesser members of the forest community. Most of our native trees are pollinated by the wind and so produce vast quantities of pollen during late winter and early spring. Considerable quantities of pollen are carried off into the air and end up dying on the surface of the bog. The lower growing plants such as blackberries, bluebells and primroses have different conditions with which to contend. Many of the later flowering plants are pollinated by insects and produce very much less pollen than the wind pollinated trees. In addition, it is difficult for the pollen of low growing and summer flowering plants to escape from the leafy tree canopy. For these reasons, we know little of the ground flora of these early woodlands.

Even as birch woodland was expanding, other trees were beginning to colonise the early forests. The arrival of hazel and pine altered the character of forests sometime around 9,500 years ago, as reflected in the increasing amount of their pollen in peats which accumulated at that time (Smith and Goddard, 1991). The dynamics of forest cover and composition were in a constant state of flux. The expansion of the first birches altered the composition of the forest soils as they contributed organic material. Hazel and pine grew taller than the birch and cast shade. As a result, the birch forests went into decline and were replaced with woods of hazel and pine, which were later joined by oak and elm.

Even though we see the same trends repeated in the pollen diagrams from lowland sites throughout Ireland at this time, it must not be assumed that the same woodland story was told from coast to coast. Pollen studies have shown that each region had its own particular variation. For example, in the north of Ireland, hazel may have predominated in many lowland areas, with pine dominating the uplands.

The expansion of oak and elm changed the character of the woodlands still further. These great trees cast shade which was unsuitable for the growth of birch which may, by this time, have already been restricted to the forest edge. We can assume that in some places, hazel still dominated the woodlands, whereas in others, it assumed the role of a shrub beneath the oaks and elms. Other species which are poorly represented in the pollen record include members of the family to which the roses and hawthorns belong – the *Rosaceae*. These beautiful trees of the woodland edges are, like the primroses and bluebells, pollinated by insects and, as such, do not produce far-flung pollen which is incorporated in abundance into developing peats. However, even the few grains of blackthorn or hawthorn in the five hundred or so pollen grains which I could identify and count as part of a routine pollen analysis are enough to show that these woods had botanical diversity. Careful analysis reveals the pollen of ivy, honeysuckle, rose, blackberry and many other small trees and shrubs which are components of the native Irish woodland flora.

Trees came into Ireland during the early part of the first millennium of the Holocene era, but not without hindrance. The question of when the Irish Sea was sufficiently well-established to prevent the invasion by further tree species is not the subject of this paper.

Nevertheless, the sea was a great barrier to the vanguard of the warm-loving trees coming in from warmer Europe behind the oaks and elms. There are trees native to southern Britain which are not elements of the Irish tree flora. The warm-loving lime, beech and hornbeam did not get as far as Ireland, possibly due to the sea and other physical barriers.

If one likes to think of Irish people living in harmony with their environment, then this is the time when it is most likely to have happened. We have some evidence of people coming to Ireland about 9,000 years ago. It is difficult to know just when they came, as the evidence they left behind is scant. The impact which our earliest ancestors had on the landscape is minimal, even though they used the native plants as a source of food. As the pollen record demonstrates that hazel was abundant at that time, we simplistically assume that hazel nuts were an important food source. Only further archaeological investigations will yield fresh evidence of the importance of hazel in the diet of Mesolithic people.

There is an interesting phenomenon in pollen diagrams from peats which developed about 7,000 years ago. Suddenly we see a dramatic increase in the amount of pollen of alder in pollen diagrams from Ireland and throughout Europe. Alder is a tree which favours wet conditions, and today one of its commonest habitats is on the margins of lakes. Could it be that this increase in alder pollen marks an increasing number of alder trees, which in turn, indicates that the climate 7,000 years ago was getting wetter? There is a certain amount of supporting evidence for this premise, but equally, another suite of evidence implies that alders colonised the damp soils around lakes when their levels fell as a result of the climate becoming drier! Over the last fifteen years, there has been an upsurge in interest in the use of changing vegetation patterns as indicators of past climatic changes. The example of the expansion of alder shows the complex relationship between vegetation and climate.

### **Early human influence**

The first significant impact of people which we can detect through the pollen record from Ireland dates to about 5,500 years ago. In every 500 to 1,000 pollen grains which the pollen analyst identifies and counts, there may be one or two pollen grains which look like those of grasses but which are much bigger. These pollen grains belong to primitive wheat, and provide us with the first pollen evidence for arable farming. Later, the amount of wheat pollen increases and is joined by other indicators of increasing arable activity, such as oats, barley, flax, and all their attendant weeds.

Coupled with the first pollen evidence for farming is the first evidence for people managing the landscape. With the first of the cereal pollen grains came a reduction in the amount of tree pollen in peats growing at that time. People were cutting down trees with polished axes to make clearings to encourage the spread of grass for their cattle. We may not consider our Neolithic ancestors as being 'environmentally friendly'!

At this time, the tree which seems to have suffered the most is the elm. In the early years of palaeobotanical research, it was thought that this reduction in elm pollen values, seen throughout Europe, was brought about by the Neolithic people cutting off the young branches to fodder cattle, as young elm foliage is both sweet and nutritious. A recent botanical ravage has shed new light on this issue. Palaeoecologists now think that elm pollen values may have been greatly depressed by a prehistoric infection of Dutch Elm

Disease. However, until we find elm wood radiocarbon-dated to the period around 5,000 years ago and containing the remains of the disease vector, the beetle *Scolytus scolytus*, we cannot be certain. It is however a good example of the continual revision of our views on ancient woods and their dynamics.

Throughout the later Neolithic, Bronze and Iron Ages, the overall trend was a reduction of land under forest. Forested land survived in many places throughout the thousands of years spanned by prehistory and the early historical period, primarily where the terrain was rough or soils were too difficult to cultivate. In other places, land was cleared for agriculture and worked until it was exhausted. It was then abandoned and in many places the trees came back, but not always. In some areas, nutrient depletion and major soil changes favoured the growth of blanket peat over the regeneration of woodland. Extensive pollen studies in the uplands have shown that huge areas of Connemara, the Mourne and the Antrim Plateau were once forested. Today, they are covered by blanket peats without a tree to be seen for miles. In spite of these details and extensive investigations, the link between tree-felling in prehistory and the development of blanket peat is still not fully understood. Nevertheless, we now know that people partly caused deforestation and the subsequent development of the blanket peats which are such a feature of today's Irish uplands.

There is evidence for the fortunes of the forests of the past preserved in Ireland's bogs other than pollen grains. Many cutover bogs yield tree stumps. This is intriguing because trees do not grow on wet boglands today. Here we have excellent evidence for an environment which no longer exists in Ireland. Research on these ancient oaks and pines shows that oaks grew on some bogs from about 5,000 to about 2,000 years ago. Bog hydrology and nutrient status at that time allowed these trees to grow well. Bogs are however ecosystems which are constantly changing, and today no bog supports the growth of oaks. Pines grew on bogs even before the earliest oaks. However, as pines dislike growing with their roots submerged in water, they may have survived best where the early bogs dried out from time to time. Dated bog pine and oak timbers are good proxy records of past hydrological and climatic change. Research in these palaeoenvironmental disciplines is continuing.

### Later human influence

There is no specific time when the changes which lead to the relatively treeless landscape of today began. The pollen record shows that in some places, trees may have disappeared thousands of years ago. In others, such as Killarney and the Lower Bann valley, written evidence from the early seventeenth century states the existence of extensive oak forests. These woods are cherished in folk memory as the last of the great Irish woodlands which never heard the sound of the axe. These are the woods said to have been decimated for ship-building timbers for the Elizabethan and Jacobean Navy.

Pollen evidence from lowland bogs within the areas of forests indicated on early seventeenth century maps is at odds with the documentary record, both in the Lower Bann valley and in Killarney. The most recently published research at the northern sites, not far from Augustine Henry's birthplace of Draperstown, shows that there was widespread woodland depletion in the ninth century, and that, after agriculture went into decline in the



eleventh century, there was some regeneration of woodland (Hall *et al.*, 1993). This too was removed over a period of centuries with final eradication of the remaining scrub during the eighteenth century. Indeed, there is nothing in the pollen evidence for the Lower Bann valley region to suggest either widespread oak woodland in the sixteenth or seventeenth centuries or its wholesale removal between 1600 and 1650. This area was gradually cleared of trees over the last one thousand years, first by the Gael and then by the Planter – something which Augustine Henry would have deplored.

## Conclusion

Henry was a man who looked to the innovative for a solution to difficulty. He was interested from his earliest days of forestry training in Nancy in the particular problems of establishing woodlands on peats. We know that he was a man with a love of botanical diversity and I suspect that the great tracts of conifer forest which make large patches of sombre green on our mountainsides today may not have been entirely to his liking. The current research into mixed plantings of native hardwoods and exotic conifers may have met with his approval as they support the diversity of life which gave him so much pleasure. His work continues to inspire all who learn of this industrious, scholarly man with a love of “innocent gaiety”.

Henry himself summed up so much of that which enriches any life intimately associated with woodlands and forests, past or present, in distant places or here at home in our island which remains “a botanical province as yet undivided”, when he said, “A forest is the finest thing in the world”.

## REFERENCES

- Hall, V.A. 1992. The woodlands of the Lower Bann valley in the seventeenth century. *Ulster Folk-life*, 38, 1-11.
- Hall, V.A., Pilcher, J.R. and McCormac, F.G. 1993. Tephra dated lowland landscape history of the north of Ireland, AD 750-1150. *New Phytologist*, 125, 193-202.
- Jessen, K. 1949. Studies of the late Quaternary deposits and flora history of Ireland. In: *Proceedings of the Royal Irish Academy*, 85-290.
- McCracken, E. 1971. The Irish woods since Tudor times, distribution and exploitation. Newton Abbot.
- Mitchell, F. 1986. *Shell Guide to Reading the Irish Landscape*. Country House, Dublin.
- Pim, S. 1996. The wood and the trees. A biography of Augustine Henry. MacDonald, London.
- Smith, A.G. and Goddard, I.C. 1991. A 12,500 year record of the vegetational history at Sluggan Bog, Co. Antrim, N. Ireland. *New Phytologist*, 118, 167-187.

# The Greening of Ireland – tenant tree-planting in the eighteenth and nineteenth centuries

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## Summary

Trees have always been central to the functional and symbolic life of communities. In Ireland, the conquests and plantations of the second half of the sixteenth and all of the seventeenth century saw the almost total eradication of the woodland cover both for economic and strategic purposes. Consequent to these changes, a cultural landscape of landlordism was created from the late seventeenth century. The planting of trees became a central symbol of this new civilisation. A series of parliamentary acts between 1698 and 1791 progressively provided greater incentives to tenants to plant and eventually to claim ownership of the trees they planted. A Register of Trees for 13 counties provides detailed evidence of the scale and character of tenant tree-planting between c.1760 and c.1900.

This paper seeks to locate tenant tree-planting in the wider economic and cultural contexts of the eighteenth and nineteenth centuries. It explores who the tenant tree-planters were, where they planted and what number and types of tree species they favoured. The greatest surge of tenant tree-planting was from the end of the eighteenth century to the period of the Great Famine. In this short phase, an enduring rural landscape of hedgerows, avenues, shelter belts and woodland plantations was created. For a variety of reasons, this expansive phase of tenant planting faded over the latter part of the nineteenth century, when the landlord system faced its last crisis and tenants were transformed into farm-proprietors.

## Introduction

As a cultural-historical geographer, I must confess I know very little about trees and woodlands. I do know how to identify a good ash tree that curves into the primrose bank and has the makings of a few good hurleys. I still have an eye for orchards and ripe apples. Robbing the odd ash tree for hurleys and the parish priest's orchard for apples were part of my growing up in North Tipperary. Now, I wish I had paid more attention to my father when he talked about the many species of trees, their uses and folklore. But I did not. Today, I find myself returning to trees and see them as central to our life and being. It is a pleasure to speak here in the world of the Royal Dublin Society (RDS), which, from its beginning, was one of the great patrons of tree-planting in Ireland. It is a great honour to speak at this annual lecture in honour of Augustine Henry, whose volumes on *The Trees of Great Britain and Ireland* I have perused and whose crisp replies to the Irish Forestry Committee of 1906 I have just read (Departmental Committee on Irish Forestry, 1908, 164-168).

My theme tonight is tenant tree-planting in the eighteenth and nineteenth centuries. I wish to share with you some thoughts on the overall spread and development of tree-planting across the country during these centuries, to discuss the changing fashions in the

species of trees planted, and to examine who these tenant tree-planters were to begin with. I also want to explore the meaning of all these developments and in particular, what tree-planting tells us about the wider changes in Irish society and culture in these centuries.

When looking for meaning, we probably should first listen to the poets and the writers. My first poetic source is an anonymous writer from the late seventeenth or early eighteenth century. Most of you know this verse well:

Cad a dhéanfaimid feasta gan adhmaid  
Tá deire na gcoillte ar lár  
Níl trácht ar Chill Chais ná ar a teaghlach  
Is ní bainfear a cling go bráth.

What shall we do for timber  
The last of the woods is down  
Kilcash and the house of its glory  
And the bell of the house are gone.

(O'Connor, 1959, 45)

My second poetic voice is that of Austin Clarke:

When night stirred at sea  
And the fire brought a crowd in  
They say that her beauty  
Was music in mouth  
And few in the candlelight  
Thought her too proud,  
For the house of the planter  
Is known by the trees.

(Garrity, 1965, 65)

My final speaker is Elizabeth Bowen, one of the great Irish writers of – amongst other things – the decline of the ascendancy. In 1940, she wrote:

Life in the big house, *in its circle of trees*, is saturated with character: this is, I suppose, the element of the spell. The indefinite ghosts of the past, of the dead who lived there and pursued the same routine of life in these walls add something, a sort of order, a reason for living, to every minute and hour. This is the order, the form of life, the tradition to which big house people still sacrifice much.

(Bowen, 1984, xvi)

Cill Chais (Kilcash) speaks not only of the destruction of the woodlands, but also the destruction and dislocation of the old aristocratic elites during the revolutions of the sev-

enteenth century – that most bloody and most devastating of all Irish centuries. Austin Clarke's poem points out the irony that the descendants of the settlers who often destroyed the seventeenth century woodlands were distinguished in the eighteenth and nineteenth centuries for their care and passion for trees – for the landscape of the planter is known by the trees. The subject of Elizabeth Bowen's part biographical, part historical *Bowen's Court* is the loss of an ideal – the story of a minority when they lose confidence and go into decline. One of Bowen's central concerns is that this world of rootedness, acquisitions and permanence was and is at risk as she reflects on the fragility of what had looked like a lasting, enduring order (Lee, 1984, xvii).

As we shall see, a majority of the tenant tree-planters were connected with the cultural world of the Big House – indeed some were actually landlords. While sharing in the culture of tree-planting, some other tenant tree-planters came to participate in divergent socio-political movements, including that of the Land League, which would eventually engulf and destroy the Big House and create over much of the century a new state system and a farmer proprietorship.

### Landlord culture and tree plantations

The Big House and its hedged and walled enclosures was to become the centre of rural life by the early eighteenth century, replacing the older tower house, bawn and adjacent hamlet cluster. Plantations of trees and estate villages were two great symbols of that new civilisation. The once relatively open landscape of banks and wattled fences yielded to a grid-iron pattern of regulated hedged fields. By the 1730s and 1740s the now large fashionable windowed mansion provided extensive views of the often exotic trees planted in the parkland demesnes. A new world of order and regimentation was being put in place – a classic Augustan landscape where, as Elizabeth Bowen points out, the now more secure, more confident descendants of the settlers began to feel and assimilate the influence of European fashions and ideals, including the fashion of constructing a timbered, disciplined and designed theatre of action (Bowen, 1984, 130-131). We therefore have to see the Big House and its tree plantations as symbols of a new maturing civilisation in Ireland, as part of a wider Enlightenment period which placed particular emphasis on order, progress, science, building and planting. This is the age of Improvement and Enclosure – of improvements in manners, speech and house-building, improvements in agricultural husbandry and the building of estate villages, and, above all, improvements in the landlords' rental incomes. Here the building of demesnes and tree-planting were central motifs. From the writings of, say, Jonathan Swift, and Thomas Prior of the RDS, who wrote his book on absentee landlords in 1729, one gets the feeling of a moral imperative to improve, of a kind of cultural crusade in favour of better styles of living (McMinn, 1992, 36-53; McMinn, 1994). In Swift's travel writings, an Irish countryside without quicksets and trees is seen as a symbol or badge of inferiority, whereas an Anglican sense of order is both celebrated and symbolised by new roads, big houses and hedged demesnes. The new alignment of Irish culture and society, therefore, also meant a total realignment of the landscape.

Thus, the new landed elites gained a feeling of greater security, an illusion that their society was destined to endure – just like the trees. Apart from their commercial and functional roles, the trees can therefore be seen as symbols or projections of a specific

hegemony, ideology and psychology. Trees stood for order, improvement and superior culture. Trees stood for privacy and private property, Trees were – like all ideologies and illusions – also involved in hiding things, and in particular, keeping the world beyond the demesne gates – the world of the ragged poor – out of sight and out of mind.

Table 1 summarises the main phases in the relationship between landlord culture and the destiny of the tree plantations. At least six of the seven periods illustrated are relevant to the story of tenant tree-planting. It is clear from the detailed lease provisions required by landlords for ‘middlemen/developers’ tenants from the 1690s onwards that ditching, hedging and tree-planting were essential instruments in farm development. Almost invariably such leases required the building of substantial two or one and a half storied stone-walled and slated dwellings as the battle between slate and thatch began. In addition, these leases generally required the head-tenant to plant a specific number of oak, ash and other trees on the outbounds of the farm, while also requiring the building of farms and stables and, most especially, the creation of one to three acre enclosures for the planting of orchards. These plantations of apple trees were potent symbols of the new culture. Parallel to these leaseholding requirements, the RDS involved itself in encouraging all forms of improvement through its premium schemes from the early 1740s (Berry, 1915, 59, 63, 386). By the third quarter of the eighteenth century, most of the wealthier lowland regions, for example, the commercial grazing lands of the Golden Vale, were enclosed, ditched and

**Table 1.** *Phases in the relationship between the landlord culture and trees.*

<i>I. HACKING OUT THE FRAMEWORK</i>		
c.1550-c.1660/90	‘Clearing a Space’ Conquest and plantations	Woodland clearance
<i>II. THE INFRASTRUCTURAL PHASE</i>		
c.1660/70-c.1730	‘Putting down Roots’ New towns, bridges, roads	Bounding, enclosing, classical Big House and parks
<i>III. THE PHASE OF ELABORATION</i>		
c.1730-c.1770	‘Growing Self-Confidence’ Swift, Prior, RDS, canals	Completion of lowland enclosures, Palladianism
<i>IV. THE CLIMAX PHASE</i>		
c.1770-c.1815/20	‘The Blossoming of the Culture’ Georgian Dublin as apex	Trees, Big Houses proliferate growing role of strong tenants
<i>V. REORIENTATIONS</i>		
c.1815/20-c.1870	‘Pruning Back’ In debt, sales, consolidations	Greater commercialisation, stronger tenantry
<i>VI. DISESTABLISHMENT PHASE</i>		
1870s-1930s	‘Uprooting’ The Land Acts	Hacking out again, farm proprietorship
<i>VII. EPILOGUE</i>		
Post-1930s	‘The Twilight of the Ascendancy’	New state afforestation

hedged with trees. It is therefore clear from the Register of Trees and other evidence that by the second half of the eighteenth century and especially from the 1790s onwards, a tenant class of significant substance had emerged to follow the lead of the landlord class. This group was to form a broader base in society for embellishing their holdings with fine trees and avenues. An increasing tendency is also evident in the early and middle decades of the nineteenth century to plant trees for commercial purposes.

### **Tree-planting acts**

Behind all of this was close on a century of state and institutional encouragement of tree-planting and conservation. Exclusive of support for 60 nurseries, the RDS granted premiums for a total of 55 million trees planted between 1766 and 1806. Between 1697 and 1791, there were at least seven parliamentary acts relating to tree-planting in Ireland. An act for planting and preserving timber trees and woods was passed in 1698 and came into force in 1703. Leaseholders for 11 years or more, who were renting less than 500 acres of land, were to plant each year for the term of 31 years, 10 trees of oak, fir, elm, ash, walnut, poplar and elder in some ditch or elsewhere. Such trees were to be preserved from destruction but it is relevant to note that they still remained the property of the landlord. Legislation also required those involved in ironworks – the old bogey of the woods – to plant and enclose 500 able trees per annum. Those holding leases for over 500 acres were required to enclose and hedge one plantation acre of trees per annum for a period of 20 years. In total, the 1698 act envisaged the compulsory planting of one-quarter million trees per annum and obliged the landlords to ensure that the tenants also planted. Target planting lists were drawn up for each county and barony. Supervision of planting was to be carried out by the county Grand Juries, while the parish constable and church wardens were involved in the monitoring of tenant planting within the parish.

After 1698, there followed a series of acts on tree-planting and preservation in 1708, 1710, 1721, 1731, 1765, 1789 and 1791 (McCracken, 1971, 135-141). The 1721 act was the first that granted tenant proprietorship to one-third of the trees they planted. However, no rules for the registration of such trees appear to have been included in the act. The key year of 1731, which saw the foundation of the RDS, the debate over Prior's publication on absentee landlords, the building of the first – 'Newry' – canal, and Swift's writings on Ireland's need for economic self-sufficiency, also saw the introduction of a series of acts relating to the improvement of barren and waste land, the planting of timber trees and orchards, and the proper bounding and enclosing of farm units, with greater stress being placed on ditching, quicksetting and hedging. The act relating to tenant tree-planting stressed that half of such trees planted were the property of the tenant, provided he/she completed a very cumbersome process of certification. There is, however, little if any evidence that this act was a successful initiative, although RDS premiums for tree-planting did become a feature in the next decade.

The first really effective act was that of 1765, which enacted that any tenant holding for years exceeding 12 unexpired years who planted sally, osiers and willows could cut and use the same. It goes on to state that a tenant who planted any trees of oak, ash, elm, fir, pine, walnut, chestnut, horse chestnut, willow or poplar, should be entitled to these trees, provided that each person carrying out such planting within six months lodge with the



Clerk of the Peace of the county a certificate under the name of the tenant containing the number and kind of trees planted. Such a certificate was to be kept in a separate file among the records of the county and entered into an alphabetical book. The 1765 act therefore entitled tenants to ownership of the trees or their value on the expiry of the lease.

The 1789 act is equally important and even more deliberately detailed. It begins by commenting on the failure of earlier schemes and notes that whereas the laws for the encouragement of tenants to plant trees had proved generally ineffective, tenants with a 14 year lease or more were now entitled to cut and fell trees during the time of their lease, providing that they register such trees within 12 months of planting.

In contrast, the 1791 Act is more confidently concerned with issues of tree preservation. It is also relevant to note that Col. Samuel Hayes of Avondale published *A practical treatise on planting* in 1791. The scene had been set for a great surge of tenant tree-planting with Grattan's Parliament providing for a large increase in monies to the RDS to be used in premiums to encourage tree-planting.

The recording and registration of tenant-planted trees took place at the quarter sessions of the county, were printed in the Government Gazette and entered into a ledger. These ledgers, each called a Register of Trees, have survived, in whole or in part, for 13 Irish counties. However, those for Longford, Louth and Monaghan are so incomplete as to be not very useful for research purposes. The better ledgers relate to Cavan, Cork, Kildare, Kilkenny, Limerick, Londonderry, Offaly, Sligo, Tipperary and Waterford. The information entered in these ledgers vary. Some, like that for Co. Cork, are very detailed and include entries in chronological order which state the names of the tenant and the landlord, the location of the plantation by parish and barony, the date of plantation and the number of each types of trees planted. Some county records do not detail the number or type of trees but simply provide a record of the number of tenants registering per annum. It must again be emphasised that the information contained in these ledgers only relates to tenant tree-planting, since landlords had no need to prove possession of their trees.

Now and again one actually gets a glimpse of where precisely the trees were being planted. In 1773, Robert Power of Moone parish, Co. Kildare, distributed his small plantations of 396 trees as follows. -

Nineteen ash, 19 alder and 10 elm in hedgerows at the back of the Castle Paddock, 144 ash and 11 alder in the lime kiln field and 121 ash and 8 alder in the Grove Park as well as 28 ash and 36 alder in the Paddock at the rear of the dwelling house.

Meanwhile, Joshua Hubbard of Ballymurn planted 180 ash on "the ditch of the road leading from my dwelling to Maynooth" (McCracken, 1973-4, 312-313). John Leader in Cullen parish near Millstreet, Co. Cork, planted 156 fir in the ditch south of the road near the Blackwater Bridge, 134 alder in the ditch between the bog meadow and the bog and Garrane, "as well as 60 fir on the east side of the bog meadow and 78 alder at the same place" (McCracken and McCracken, 1976).

### The scale and distribution of tenant tree-planting

As illustrated in Table 2, the majority of tenant tree-planters put in less than 5,000 trees, while a quarter planted less than 1,000 trees.

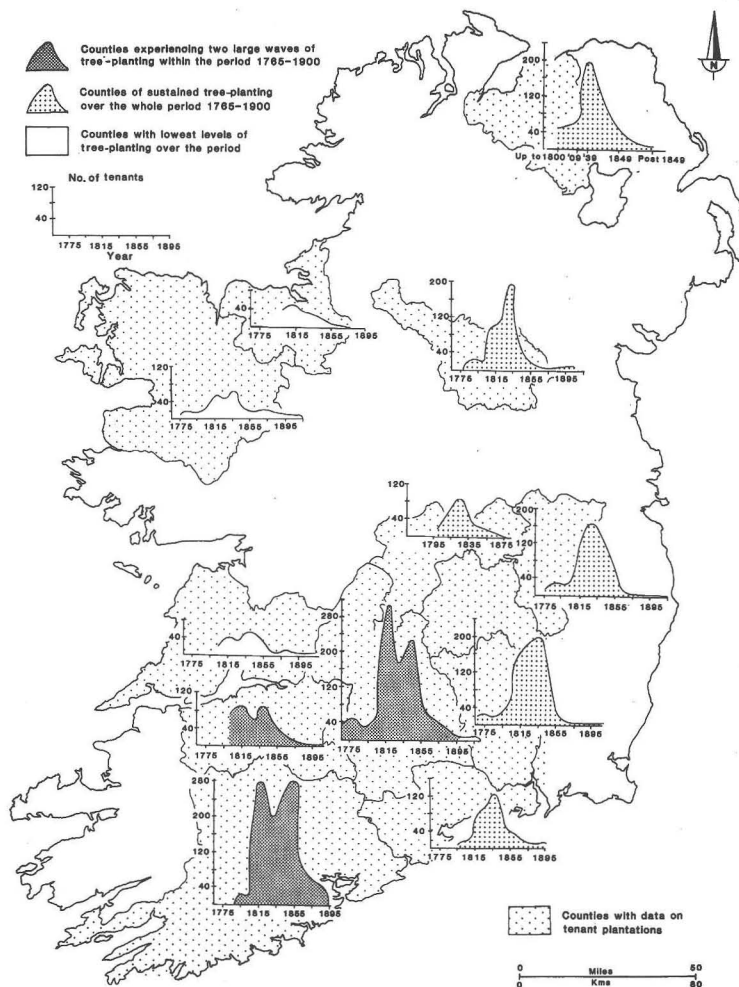
**Table 2.** *Percentage of planters in each of three categories.*

<i>Number of trees planted</i>	<i>Percentage distribution of planters in each category</i>					
	<i>Cork</i>	<i>Tipperary</i>	<i>Kildare</i>	<i>Offaly</i>	<i>Sligo</i>	<i>Londonderry</i>
Under 5,000	58	75	67	75	64	67
5,000-10,000	19	12	15	15	15	17
Over 10,000	22	13	18	10	21	16

Clearly, the Register of Trees documents the actual construction of the often still surviving rural landscape of trees in hedgerows, along domestic avenues, as shelter belts, in small field corners, along river-banks and roads, and in parklands. These tenants - often small tree-planters - therefore completed the process of landscape enclosure and embellishment in the latter end of the eighteenth century, and especially over the first half of the nineteenth century, a process which had been initiated by the landlords from the 1660s onwards. Large tenant tree-planters with a strong commercial bias were more unusual. Co. Cork was to the forefront with members of this group. Nine Cork planters alone accounted for 14% of the total tenant tree-planting in the county of nine and a half million trees. These commercial planters were much more geared to coniferous tree-planting and related timber sales. The largest planter amongst them - Benjamin Clarke-Fisher - planted only 10,000 deciduous trees out of his crop of 402,000 trees (McCracken and McCracken, 1976, 43).

In terms of regional variations in the timing and number of trees planted by tenants, Figure 1 highlights three clear regional trends between 1765 and 1900. The three regions identified are (i) the West, (ii) the East and North, and (iii) the Munster counties excluding Co. Waterford. Both for ecological and class reasons, western counties show a more reduced rate of tenant tree-planting over the period. Problems of soils, altitude and exposure, but more particularly, the absence of a solid tenant farming class, militated against tree-planting in these areas. Eastern and northern counties display a stable and solid distribution of tree-planting over the whole period. These counties occupy the modal position in the islandwide pattern. In contrast, the Munster counties display a double boom in tree-planting. The first expansive phase of tree-planting dipped strongly between 1815 and 1820 and dramatically increased again after the 1820s. The Munster picture, therefore, more faithfully reflects the crisis in the Irish economy that followed on from the ending of the Napoleonic wars. It could well be that changes in agricultural conditions and prices may have bitten deeper into the fabric of the hitherto buoyant regional economy of the South. Strategic adaptations to post-war agricultural trends may have, therefore, expressed themselves earlier and more strongly in these Munster counties.

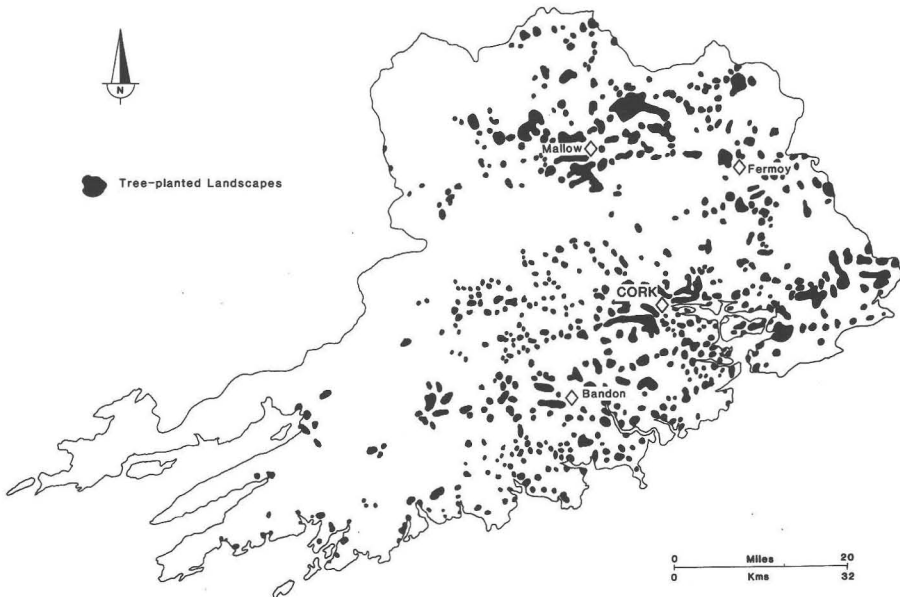
Large counties such as Cork and Tipperary - given their size, diverse ecologies, settlements and class structures - reflect a similar range of local responses in the timing and



**Figure 1.** *Distribution of tenant tree-planting by county, 1765-1900.*  
*Source: Register of Trees, National Archives. (Figures 1, 2 and 3 were first used in Cork, History and Society, Geography Publications, Dublin, 1993.)*

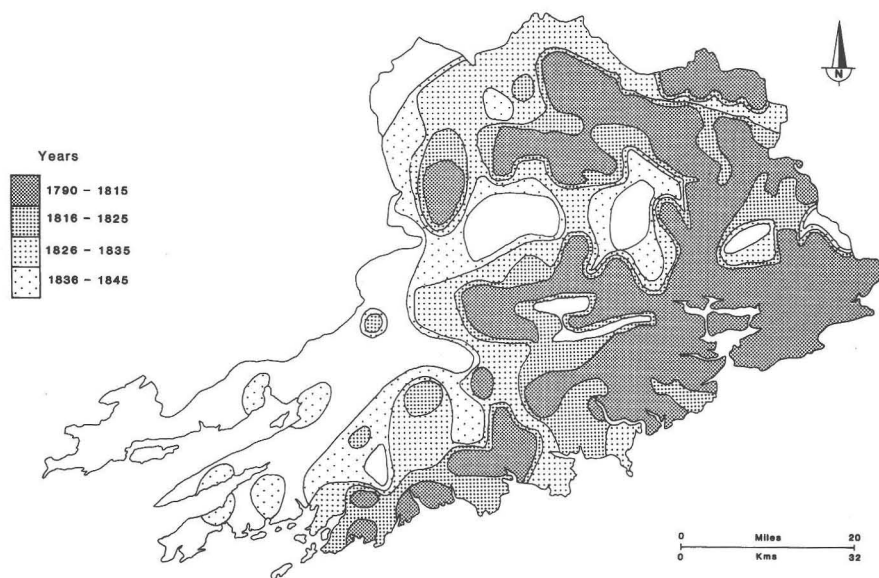
intensity of tree-planting as orchestrated across the island as a whole. We can use Co. Cork as a quick case study to try and unravel the local processes operative in the spread and consolidation of tree-planting habits among the strong tenant classes. Since investment in tree-planting was very much a long-term one, the diffusion of tenant tree-planting is not only an indicator of landscape change, but also provides an indirect guide to the geo-

graphical distribution and expansion of rural wealth over the period 1760 to 1900. The diffusion pattern no doubt reflects the social aspirations of tree-planting tenants as the fashion of landlord landscaping is imitated at the next social level and moves sideways to be embraced by a wider spectrum of the society. These patterns probably also reveal the slow evolution of a more comfortable farming class. In addition, such tree-planting records provide clues as to the timing and distribution of new house-building as well as to the spread of ornamental gardens and avenues amongst the comfortable strong farmer group and the lesser gentry. It is probably safe to assume that these landscape transformations were also accompanied by internal changes in farm house arrangements such as the emergence of a separate kitchen area, the development of flower and vegetable gardens and the building of barns and stables. Charles Vallancey's map (Figure 2) illustrates how much of a gentrified landscape – created both by landlords and big leaseholders – had been already put in place in Co. Cork by 1778 (Smyth, 1993). Co. Cork is adjudged to have had 30 new mansion houses in 1660. By 1750, this figure had risen to approximately 259, and by Vallancey's time, to approximately 350. The number of Big Houses is likely to have doubled again by 1841.



**Figure 2.** *Gentlemen's seats and tree-planted landscapes in County Cork, c.1780.*  
*Source: Vallancey's Military Survey of the South of Ireland, 1778-1782.*

The actual diffusion pattern of tenant tree-planting in Co. Cork from 1790 to 1870 (Figure 3) is due to a variety of factors such as varying tenurial and class structures, landlord patronage or its absence, the quality of land, size of farms, nature of farm economy, proximity to towns and villages, and access to a range of information and skills which regard the tree registration together with the ecological factors affecting tree-planting, such as altitude and exposure. Yet the geographical picture that emerges is not an unsurprising one. The core area of early tenant tree-planting and landscape embellishment is the great arc of mixed farming and tillage land that curves from Cork Harbour to Youghal and pivots around the rich barony of Imokilly. Even as early as 1778, Vallancey was to observe that "plain neat houses, small pleasure gardens and pretty tree plantations began to rise in proportion as traffic to Cork city rises" (Vallancey, 1778, 8). While all Cork regions may have shared in the great upsurge of economic activity that characterised the climax period of landlordism from 1770 to 1820, it is likely that it was the most commercialised mixed farming and malting barley regions which benefited most from the upsurge. These were the zones of most advanced farming systems, and had the most stratified rural societies with a plentiful supply of labour power. For example, the wider Cork city region centered on Barrymore and Imokilly were also regions of early cowhouse building. The spread of innovative farming societies is also relevant to the early diffusion of tree-planting. Castle-martyr, between Cork city and Youghal, had such an agricultural society as far back as the



**Figure 3.** *The diffusion of tenant tree-planting in County Cork from 1790 to 1845.*  
*Source: Register of Trees, National Archives.*

mid eighteenth century. By the first decade of the nineteenth century, six such societies had emerged, all except one – Fermoy – within a 15 mile radius of Cork city.

The north Cork lowlands were also innovative and gentry-led, not only in relation to tree-planting but also in cattle breeding, cowhouse building and stall-feeding. After 1815-20, however, as the wave of tree-planting reached saturation stage in the south-east, the surge of planting spread westwards and northwards, perhaps also reflecting the greater prosperity of the cattle dairying areas in the post 1820s. Later it is also noticeable that as timber imports from Canada and elsewhere started to grow, the great coniferous planters became less enthusiastic. This also appears to have been the case near the port-cities of Derry and Sligo. This commercial group were major players in the tree business, especially between 1820 and 1850.

### **Types of trees and tenant tree-planters**

Trends in the types of trees planted is very instructive. In the last decade of the eighteenth century and the first decades of the nineteenth century, broadleaf species were favoured over coniferous species by about a 7:3 ratio. A significant shift began in the 1820s, however, and by the 1840s, coniferous varieties outnumbered the broadleaved by 6:4, and by the 1850s, by as much as 4:1. Amongst the broadleaves, ash was the most favoured, followed by beech, oak and alder. Three-quarters of all broadleaf trees planted in Cork, Londonderry, Offaly and Sligo were of these four types. Sycamore, birch, elm and poplar were also reasonably common in mixed plantations, with mountain ash, horse chestnut, willows and other species bringing up the rear. It appears that approximately 80% of tenant tree-planting – as in the detailed examples provided above – were of mixed plantations. The actual ratio as revealed in the 1841 Census was 67% to 33%, but these figures include orchards where there was a 12:1 ratio in the number of orchards *vis-à-vis* apple trees planted individually in hedgerows.

The most favoured coniferous trees in mid nineteenth century Ireland were larch, Scots pine and Norway spruce. In Co. Kildare, almost a million larch trees were planted out of a total of 1.7 million coniferous trees registered by tenants – of the latter, 0.5 million were Scots pine and 0.2 million were Norway spruce. In Co. Cork, of the 6.25 million coniferous trees planted by tenants, over three million (47%) were larch, 2.3 million (36.6%) Scots pine, and 0.8 million Norway spruce. All other conifers represented only 3.1% of the total planted. There was, therefore, a high level of specialisation in the type of coniferous species planted.

Of Co. Cork's broadleaves, 21.6% or over 0.7 million were ash, 20.5% or under 0.7 million were beech, 18.9% oak (0.6 million), 15.1% alder, 12.0% sycamore, 7.1% elm and 3.0% birch. The remainder constituted 5.4% of the total. These remaining trees were very interesting species in their own right. In Co. Kildare, they included poplar, willows, horse chestnut, limes, hornbeam, other chestnuts and many hollies, as well as arbutus, copper beech, walnut, other kinds of pine and oak, the occasional maple, acacia, juniper, bird cherry and cedar, and the rare monkey puzzle and wellingtonia. These trees best epitomised the embellishment functions of tree-planting and carry the aroma of the mini-arboreta that is sometimes still to be found around sturdy old farmhouses. These are now museum pieces of the tree-planting fashions of mid nineteenth century Ireland.



Changing fashions and tastes bring us to the social background of the tenant tree-planters. Five categories of planters can be identified. For a small but very significant group of planters, the term 'tenant', while strictly correct, is misleading. Quite a number of landlords are included in these lists precisely because they were renting land from other landlords - often on very long leases - and so were obliged to register their tree plantations on such lands so as to secure their ownership. For example, the O'Callaghan family of Viscount Lismore at Shanbally Castle near Clogheen in Co. Tipperary planted 70,000 trees on a nearby rented townland in 1817/18. Similarly, out of one-third of a million trees planted after 1840 in Co. Offaly, 160,000 were planted by the Earl of Rosse in Eglish parish on lands owned by Lawrence Parsons. And in Sligo, the Gore-Booths planted 78,000 trees between 1822 and 1827 on rented land in Drumcliff parish "under Ben Bulbin's head" (McCracken, 1973, 225-226).

A second group of really strong planters belonged to that class which Arthur Young dismissed as "parasitic middlemen" in the 1780s. These were the often wealthy leaseholding tenants who held a prestigious home farm but made their incomes from intensive subletting of other townlands which they held on very long leases from landlords, whether absentee or not. At a popular level, many of these middlemen would have been perceived as landlords in their own right and in economic terms they were often just as powerful. They too were obliged to register the trees they planted on such leasehold lands.

A third major group of planters were the emerging rural and urban bourgeoisie - the well-to-do flour millers, brewers, distillers and linen drapers who built big spacious houses and parklands to reflect their wealth and status. A fourth group comprised the now growing middle-classes, led by parson and priest, but also including solicitors, doctors, agents and others who likewise surrounded their new Georgian houses with avenues and parklands.

Finally, it is clear that the biggest single group were the strong 'working' farmers, actively engaged in the business of improved farming and building ditches, hedgerows and shelters. These farmers planted less for ornamental purposes and much more for the protection of their cattle and crops, the better draining and hedging of their fields, for timber needs and for all the practical reasons associated with farm improvement current at the time.

I have examined in detail the social origins of the tenant tree-planters for two regions - my own home area around Roscrea on the Offaly-Tipperary borderlands, and more particularly, the barony of Offa and Offa west in south-west Tipperary which borders on the counties of Waterford, Cork and Limerick. In this latter region, half of the tenant planters are working farmers - very often of the strong farming class but also including some go-ahead small farmers such as Michael Lonergan of Boolakennedy, who planted 1,000 trees on the edge of his Galtee Mountain farm. Close on one-quarter of the tree-planters were of the gentry class and involved landlords and major leaseholding middlemen. A very significant 17% were mill-owners of various kinds while a further 8% came from the professional middleclasses (Smyth, 1976, 47-48). Much the same proportions emerge from the Roscrea region. Yet in the Co. Cork lists it is clear that the gentry class is somewhat more significant. Another group which emerges more strongly in this county centered on the great port city of Cork is the merchant investors in land and timber. Not surprisingly, Co. Cork heads the nation in the list of tree-planters of over 10,000 trees -

nearly one-quarter of its planters were involved at this level. Figures for Sligo, Londonderry and Kildare would also suggest that greater proximity to port cities and easier facilities for selling timber increased the merchant proportion among planters. In the counties of Cork and Sligo, however, the greater availability of poorer land for coniferous planting may also have influenced these regional patterns.

The tree-planting tenants were therefore a mixed and highly interesting elite group. Using surname analysis, one can also attempt to gauge what proportion of the tree-planters bore pre-sixteenth century surnames as opposed to settler names brought into Ireland from the late sixteenth century onwards. In Co. Tipperary, 55% of the names belong to long established families such as the Meaghers, Ryans, Burkes and Butlers, while 45% belong to the post sixteenth century period of colonisation. In Co. Kildare, the ratio was 60:40 in favour of 'new' immigrant names. In Cork, the ratio was 62% 'new' to 38% 'old' surnames.

Given the composition of the population as a whole, it is clear that a disproportionate number of tenant tree-planters came from either the Protestant ascendancy class or the next well-to-do leaseholding layer beneath it. David Dickson (1982) has emphasised that from the late seventeenth century and for most of the eighteenth century, landlords preferred to grant long leases to "the industrious improving Protestant head tenants". On the other hand, the significant proportion of 'working farmers' bearing old surnames point to the crucial bridging role played by this class in the wider Irish society. These middlemen farmers, whether Protestant or, more particularly, Catholic, were the cultural and economic brokers between the needs and fashions of the landed elite on the one hand, and the people of the townlands on the other. This elite tenant group often mediated issues of rent and agricultural prices, encouraged the use of slated housing and better farm implements, and led the charge in the planting of orchards and tree-lined hedgerows. Examples of the lifestyles of this group really emerge from the novels of Charles Kickham, the Banim brothers and Gerald Griffin. But it is important to emphasise that these tree-planters still constituted the elite of the tenants. In Co. Cork, for example, this group still only comprised one-half of the total number of occupiers with first class houses in the 1841 Census.

## Summary and conclusions

The great wave of tenant tree-planting was coming to a close when that most exhaustive of surveys - the 1841 Census - was made. A quite extraordinary two-page summary of woods and plantations in the Census (Report of the Census Commissioners, 1841, xxix-xxx) allows us to catch a glimpse of the *islandwide* story of tree-planting by tenants and landlords in 1841. There are clearly problems in establishing how comprehensive this tabular data set is. However, given Thomas Larcom's involvement - and his checking of some dubious tree returns against the first edition Ordnance Survey six-inch maps - I am happy to see these tables as providing the most reliable indicators we have of the distribution of trees in the mid nineteenth century.

The overall acreage of trees planted - whether in woodland plantations or elsewhere - was returned as close on one-half million acres of trees (487,558 acres). This figure is in part estimated. While the acreage of the woodlands could be more readily checked, the equivalent acreage of detached trees in hedgerows, etc. is estimated at a ratio of 160 trees

per acre. It is not clear if a single multiplier is sufficient to allow for the varying spacing requirements of either different species of trees or young mature plantings. Therefore, the figures for detached trees must remain a 'guestimate' (Tim Crowley, pers. comm.). A second great unknown is the ratio of landlords to tenant tree plantations. In Co. Londonderry, the major landowners were the London Companies and the Established Church. Yet these owners only planted 700 out of the total of 7,000 acres in the county. As Eileen McCracken notes, "it is likely that tenant planting accounted for the remaining acreage". For Co. Cork, my guestimate is a 25% to 75% ratio in favour of tenant leaseholders.

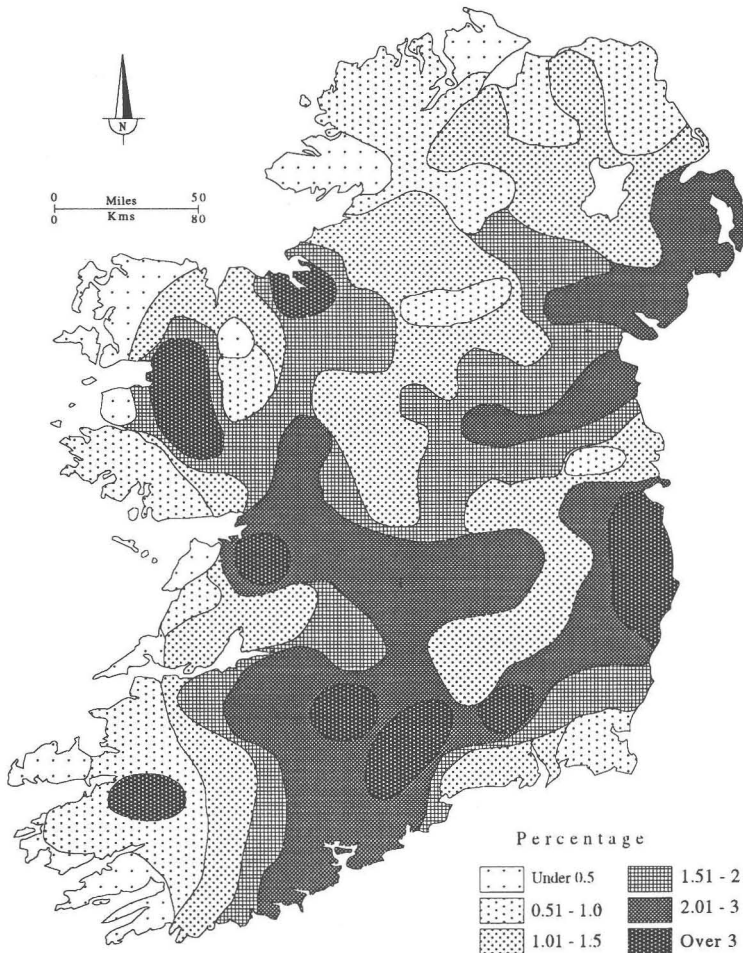
The cumulative impact of all tree-planting by 1841 is revealing. Three types of regions emerge – firstly there is an area of relatively high woodland and tree coverage led by Co. Waterford where 5.7% of the land surface was in this category. This belt of high tree density extends through South Leinster onwards into Louth and Armagh. A second region of intermediate but still significant levels of wood and tree-plantings stretches from Cork, Tipperary and Limerick through the Midlands and up to Derry and Antrim. Finally, in the more difficult and exposed parts of the west and north-west, where the rapidly expanding, often desperately poor, populations had other things to bother them apart from tree-planting, we find the lowest tree densities.

Mapped at the Poor Law Union level (but for the later time of 1890), pockets of very high tree-planting emerge particularly around Castlebar, Sligo and Gort in Connaught (Figure 4). The core of high planting in Munster is around Clonmel and Lismore, followed by the Killarney and Roscrea areas. In Leinster, the great fulcrum of tree plantations was along the eastern parts of Dublin and Wicklow, in the lower Nore valley of Kilkenny, as well as that great zone of plantations which cover much of Laois and South Offaly and continues into North Tipperary. In Ulster, the core areas are around Newry and the Mourne and in the Bangor-Ards area. By way of contrast, Bangor-Erris, the Glenties and the Dingle peninsula present the most exposed and naked landscape of the mid to late nineteenth century.

The 1841 Census also records the great surge of tree-planting between 1791 and 1841. The acreage under woodlands and trees is judged to have increased from 143,000 acres in 1791 to close on 500,000 by 1841. There was therefore at least three and a half times the number of planted trees in Ireland by 1841 than existed a half-century earlier. Landscape, economy and society had been radically transformed in these dramatic decades that stretched from the French Revolution to the Famine.

In terms of species type, the least change recorded was in the number and extent of oak trees. This old reliable aristocratic tree had become less fashionable over these decades but remained solidly anchored in the rich counties of the south. While occupying a similar distribution, ash may also have figured as a fashionable pre-coniferous type of planting in the poorer lands of the north and west in the later eighteenth and earlier nineteenth centuries. With the advance of larch and spruce, it then faded in these regions. New species such as beech and then elm were becoming more fashionable in the 1820s and 1830s respectively, but these were more clearly concentrated in the warm rich lands of the Pale, south Leinster and east Munster. Co. Cork was the elm leader, while Co. Wexford led with beech.

Mixed plantations which made up four out of every five woodland plantations reveal a very steady rise up to the 1830s and then tail off in the 1840s. The most dramatic change is in the planting of coniferous trees which saw a sixteen-fold increase between 1791 and



**Figure 4.** *Percentage of land surface covered by woods and plantations per poor law union c.1890. Source: Report of Department of Agriculture Committee on Forestry, 1908.*

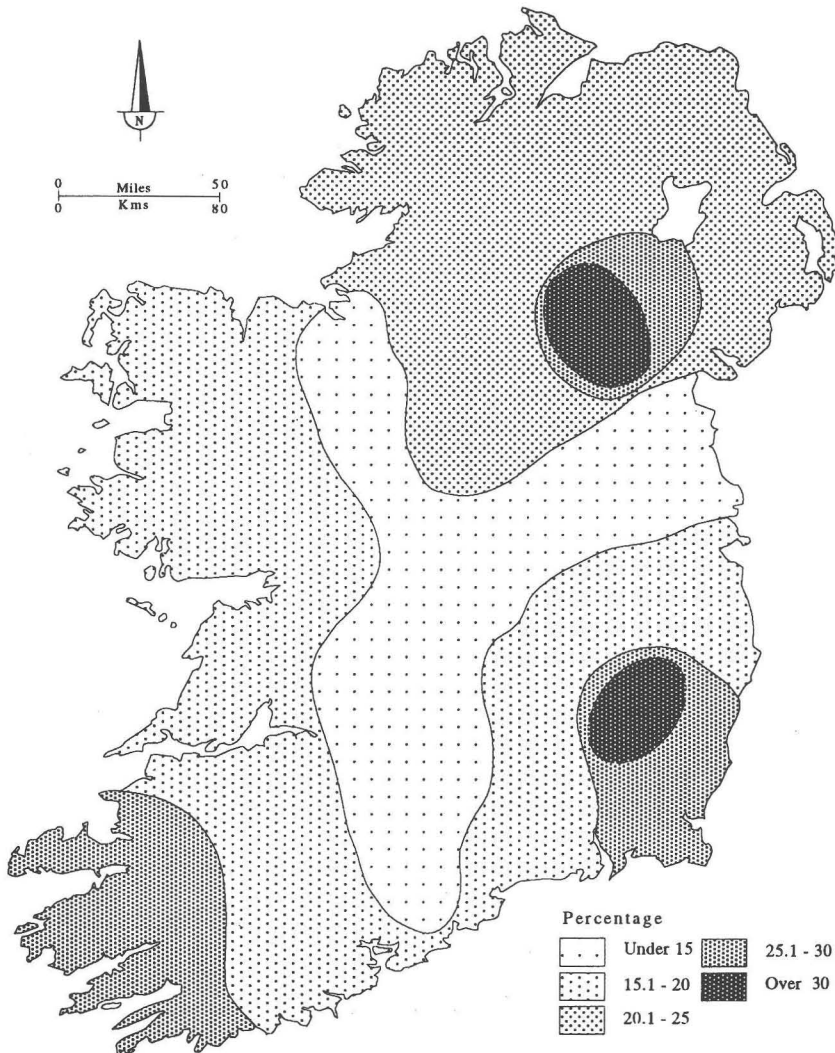
1841, as compared to only a fourfold increase in the overall tree total. Coniferous planting doubled between 1800 and 1810, doubled again between 1810 and 1820 in a great surge, and increased by 1.4 times by 1830. There is some reduction in the *rate* of coniferous planting by 1841. Yet the scale of planting in the Famine decade is still higher than in the 1810s or 1820s. By this time also, the coniferous tree plantations marked the end of the frontier of rural population and settlement expansion along the mountain and bog edges which had grown dramatically from the mid eighteenth century. Trees now colonised the

abandoned fields as landlords like Viscount Lismore planted more extensive woodlands along the edge of mountains such as the Galtees and Knockmealdowns. Famine deaths, large-scale emigration and tree plantations were all entwined in a single, complex but brutal equation.

Regional dynamics in hedgerow planting is very difficult to document as the 1841 Census does not attempt to detail their spread. However, one key diagnostic feature – and not documented in the Register of Trees – is the apple tree (and other fruit trees such as plums and cherries) which remained outside the terms of the various tree-planting acts. The Census does detail the planting of orchards for each decade in the previous half-century and orchards may be a likely indicator of the timing of the overall enclosure process.

Figure 5 illustrates the percentage distribution of orchards planted between 1821 and 1830. Apart from the western and most particularly, the south-eastern counties of Carlow and Wexford (where enclosures may have come later, due to their very intensive tillage economy), it appears that it is primarily the province of Ulster which is last in the completion of the enclosures and hedging process. Proudfoot's (1993, 231-232) comments on enclosures as evidenced in the first edition O.S. six-inch maps corroborate the findings shown in the regional variations in the timing and spread of orchard plantations. Another factor here is the growing industrial wealth of the north-east which saw a new class of wealthy linen drapers and industrialists building big houses at this time in countryside locations with their usual panoply of tree-lined embellishments. The last frontier of orchards and hedgerow planting appears to be in South Ulster, especially in the drumlin belt stretching from South Armagh through Monaghan into Cavan.

By the 1870s, the tide of tenant tree-planting had run its course. The Land Acts are central here, as later on was the cultural revolution inspired by Yeats and others, the Gaelic League, and that powerful popular movement orchestrated by the Gaelic Athletic Association, which in turn made for an assault on curved ash trees. The hurlers were on the green. This is where I began this story. But I will not stop there – I prefer to leave the last word to Elizabeth Bowen. Unlike, for example, Standish O'Grady's passionate attempt to reclaim a lost Irish past, what interests Elizabeth Bowen is her own culture's decline. That is not to say that she is unaware that the Big House settler world had driven 'Gaelic' culture underground to produce its rich poetry of lament. Rather, she tells the story of a new dispossession, as woodlands are again hacked down before the fall of the final curtain for landlordism. Elizabeth Bowen was to write that "only the dispossessed people know their lands in the dark". Kilcash and Bowen's Court had become the one story, part of the many braided river that is Irish life, on whose banks many trees of diverse origin stand and flourish.



**Figure 5.** *Relative distribution of orchards planted between 1821 and 1830.  
Source: 1841 Census.*

### ACKNOWLEDGEMENTS

My thanks to Mr. Tim Crowley, Cork Region Office, Coillte Teoranta, for valuable insights in relation to the stocking ranges of a variety of tree species.



## REFERENCES

- Berry, H.F. 1915. A History of the Royal Dublin Society. New York.
- Bowen, E. 1984. Bowen's Court and Seven Winters. 3rd Ed. London.
- Departmental Committee on Irish Forestry. 1908. Minutes of evidence, appendices and index. HMSO, Dublin.
- Dickson, D. 1982. Property and social structure in 18th century South Munster. *In: Ireland and France*. Edited by Cullen, L.M. and Furet, F. Paris. pp. 129-138.
- Garrity, D.A. 1965. The Mentor book of Irish Poetry. New York.
- Lee, H. 1984. Introduction. Bowen's Court and Seven Winters. 3rd. Ed. London.
- McCracken, E. 1971. The Irish Woods since Tudor times. Newton Abbot.
- McCracken, E. 1973. Tenant planting in nineteenth century Ireland. *Quarterly Journal of Forestry*, 1(17):221-226.
- McCracken, E. 1973-4. A register of trees, Co. Kildare, 1769-1909. *Journal Kildare Archaeological Society*, 15(3):310-318.
- McCracken, D.P. and McCracken, E. 1976. A register of trees, Co. Cork, 1790-1860. *Journal of the Cork Historical and Archaeological Society*, 16:39-60.
- McMinn, J. 1992. Jonathan's Travels: Swift's sense of Ireland. *Swift Studies: the Annual of the Ehrenpreis Center*.
- McMinn, J. 1994. Jonathan's Travels. Belfast.
- O'Connor, F. 1959. A Book of Ireland. London.
- Proudfoot, L.T. 1993. Spatial transformation and social agency: property, society and improvement, c.1700 to 1900. *In: An historical geography of Ireland*. Edited by Graham, B.J. and Proudfoot, L.J. London. pp. 219-257.
- Report of the Census Commissioners, Ireland. 1841. Dublin.
- Smyth, W.J. 1976. Estate records and the making of the Irish landscape. *Irish geography*, 4:29-49.
- Smyth, W.J. 1993. Social, economic and landscape transformations in Co. Cork from the mid-eighteenth to the mid-nineteenth century. *In: Cork, History and Society*. Edited by O'Flanagan, P. and Buttimer, C.G. Dublin. pp. 661-679.
- Tree register volumes are held in the National Archives and Public Record Office of Northern Ireland. See, for example, MS 1D.1.25, A register of trees, Co. Cork, 2 volumes.
- Vallancey, C. 1778. A military survey of the south part of Ireland and accompanying report. British Library, London.

## Trees, Woods and Literature – 21

*It is my decided opinion that this Blacklock will never pay any proper rent; and if Craig o' Putto were mine, I really think I would almost rather build a ring-fence round it, and leave it to the teewheets, than allow such an unprincipled ( I fear this is the word, unprincipled) sloven to farm it for money. I spoke of thinning the plantations! By Jove they have rather need of thickening: at every gap in the dikes you find somewhere between a dozen and a score of young trees cut down as if they were so many broom twigs, and carelessly dashed in to stop the gap, in place of building in the stones! Nay Alick and I computed some two hundred yards of wattle-work (vulgarly called stake and rice) absolutely formed entirely of young firs, some of which were as thick as my leg at the butt: the number of them we reckoned between two and three thousand. I should add, however, that most of this must have been the work of Thomas Macqueen; only some twenty or thirty yards seemed to have been repaired (with rather thicker trees I thought) by Blacklock. But what totally took away from me all pity, and made me use the harsh word unprincipled, was the fact, palpable beyond discussion, that the scoundrel had actually wintered his cattle (I mean had them lying over night thro' the winter) in the heart of that long stripe of planting that runs transversely from the height down towards the water! The fence had been broken down; and there had the kyloes been ranging and rubbing, and eating and breaking! Had he taken a furnished house in Heriot-row and driven in his cow to eat her draff and dreg on the Brussels carpet of the drawing room, I could sooner have forgiven him. It was altogether damnable. We tried to ascertain by inspection whether the gaps by which his bullocks had found access to this comfortable shelter had been accidental or intentional: one of the places was half and the other three fourths filled up; so that we could judge but vaguely; and all the charity we had corroborated the evidence for the milder hypothesis. The damage done extended indeed only to a score or two of yards; for the cattle had been of Christian spirit: but the spirit of their owner was too well marked by it. But why dilate on these things? The man is an utter and arrant sloven; and had simply gone upon the principle that most probably no mortal concerned in the farm would ever see it during the lease.*

Thomas Carlyle (1799-1881), from a letter to his wife dated 14th April, 1827.

“Craig o' Putto” is his wife's ancestral farm at Craigenputtock, near Dumfries in Scotland, which had been leased to Mr. Blacklock. Carlyle and his brother had gone to inspect its condition. (“Teewheets” are lapwings and “draff” is brewer's spent grains.)

Carlyle was born at Ecclefechan, also near Dumfries, the son of a stone mason who later turned to farming (he foresaw the rise of jerry-building). After periods as a school master and free-lance journalist, he moved to London and became rapidly famous with the publication of his *French Revolution* in 1837. (There is a well-known account of how the only manuscript copy of Part 1 of that work was destroyed. It was borrowed by J.S. Mill, then used by a maid to light the fire. It had to be re-written from scratch. Anyone who has laboured long over some piece of writing can understand the full horror of this.)

He eventually came to be one of the best-known men in Britain as commentator, historian and philosopher. (It is difficult to think of any modern equivalent: perhaps Bernard Shaw would be the most recent example.) He travelled extensively in the south and west of Ireland in 1849 studying the effects of the famine. His article "Trees for Liberty" about planting in Ireland was published in the *Nation*, the New Ireland journal, in November, 1849.

Carlyle is now largely unread, but the real genius of the household seems to have been his wife. The five volumes of the *Letters and Memorials of Jane Welsh Carlyle* (1883 and 1903) can be read with great pleasure by anyone who can find them.

Perhaps the extract from Carlyle's letter printed above acquires a new topicality with the current increase in farmer planting.

Selection and note by Wood Kerne

## Book Reviews

### **For Love of Trees – Trees, Hedgerows, Ivy and the Environment**

By Risteard Mulcahy. 1996. Environmental Publications, 17 Duke St., Dublin. 79 pp. & Introduction. Price £4.99 paperback; £12 hardback. ISBN 0 9527198 2 7.

Reviewed by J.F. Durand.

The author declares himself in the introduction as not being slow to express his views, and acknowledges that some of what he writes will be seen to be controversial. This slim volume justifies both statements. Professor Mulcahy professes himself as a longtime lover of trees. This book carries his uncompromising enmity for ivy. To use an expression employed on innumerable occasions in the text, the author is “heavily infested” with such enmity. The greater part of this neatly produced volume is devoted to word and picture of this message. We have to wait until page 62 before we leave the repetitive exposition and reach some balanced comments on the lack of agreement on the effects of ivy on tree growth. The author makes a sensible argument that adequate research is required, as the matter is by no means clear.

More than 30 photographs reproduced show nondescript hedgerows or single trees all carrying dense ivy growth. After inspection of a few of these, the reader will be replete. One infested ruin of a senile tree or hedgerow is pretty much the same as the next.

The book is not easy for a forester to relish, as ivy does not rate as a dreaded invader in adequately stocked stands. On page 23, the author puts his finger on the many influences acting on the growth of both the supporting tree and the ivy. The forester will note the emphasis on the aesthetics of single trees. The author speaks of ivy being almost ubiquitous in Ireland and many, from “wren boys” to lovers of the late foraging bees, gardeners and landscape planners, will all be ready to extol the virtues that they would attribute to ivy.

When the author states his belief that ivy takes from the elegance of broadleaf trees, one is prompted to question if all the trees shown in the photographs were elegant. Joyce Kilmer’s renowned tribute to the loveliness of a tree is quoted on the title page, but it is only reasonable to accept that not all trees are lovely and the author’s case is not strengthened by being so decidedly definite, and then laying all the blame on the ivy. With letters from the daily press, he does preserve balance by quoting extensively from those expressing benign views of ivy growth and also from those asserting that ivy gets the upper hand only on trees that have already died or are in gross decline due to senility or disease.

This reviewer agrees with the author when he decries the aesthetic damage done by gross ivy growth in Irish yew. How often, as illustrated by the author, is a specimen seen defaced. Early control of ivy is necessary, as delayed removal will leave long lasting areas of dead tissue on the tree which will take a considerable time to mask or grow over.

This reviewer clearly remembers the author’s approach to the then Forest Service on the subject many years ago, and discussing with him his views and interests in the study then being conducted. The study was carried out on collections of ash and sycamore trees, by setting up a number of similarly aged trees and removing ivy from some and then mea-

suring various characteristics of both trees and ivy during the period of the trial. The sycamore trial ended prematurely as an early visit to the site revealed that ivy had been severed on all the selected trees on which it had been purposely retained. Perhaps the work of a hederaphobic evangelist! Due to the heavy foliage of the sycamore, it was not expected that the species would yield much valuable information anyway.

In the case of ash, however, it was most interesting to measure, for example, the top heights of the trees and the top height of the ivy growth and to plot comparisons. On the vigorous middle aged ash measured over a number of years, the top heights of tree and ivy were precisely related. If the tree had grown a metre in height, so too had the ivy, and this was the pattern throughout. It appeared that one of the considerations was the diameter of the branches, as the ivy did not appear to have any strands attached to branches that had not grown to greater than five centimetres in diameter. It also seemed that the growth on ivy clad trees – and the trees chosen were well clad on the main stem – was marginally greater than on trees from which ivy had been removed. Again, the reviewer must agree with the author that such a trial over a period of a few years was less than adequate. It is not clear if any further studies have been done since those times.

Professor Mulcahy's plea for thorough research on the many aspects of ivy growth is worthy of foresters' support. With projected changes in mean temperature, it is to be expected that ivy would flourish more readily and may become an important factor in the management of broadleaf and second generation conifer stands. It must be admitted that our knowledge on many aspects of its growth is scant. For example, although known for its vigour, the particular form of the common ivy known as Irish ivy (*Hedera hibernica*) has in the past been recommended as a ground cover, as it showed no great affinity for climbing. When our lack of precise answers is evident on such a widespread element of the native flora, the author's heartfelt plea for research is applauded.

### **Guidelines for the Use of Herbicides in Forestry**

Edited by Declan Ward. 1996, Forest Protection, Research and Development Division, Coillte, Bray, Co. Wicklow. 68 pp. ISBN 0 9518612 2 0. Available from the Forest Service, Department of Agriculture, Food and Forestry.

Reviewed by Nick McCarthy, Department of Crop Science, Horticulture and Forestry, U.C.D.

In 1983, the UK Forestry Commission produced Field Book 8, *The Use of Herbicides in the Forest*, a number of editions of which have subsequently been published. Although applicable to Irish conditions, it is very repetitive and any consultation necessitates considerable 'weeding' to obtain the required information. Time is money in forestry, and managers require quick answers to questions. In the case of vegetation management, they want the answers to three simple questions regarding which herbicide is the most suitable, when is the best time to apply it, and what method of application to use.

This publication answers these questions in a stylish and refreshing way. To put it sim-

ply, this is a 'no frills' vegetation control manual useful to anyone involved in forest management.

The booklet is divided into seven sections covering all aspects of chemical vegetation control in forestry, from safety through to surfactants/adjuvant oils. It is printed on a high gloss paper, presumably to protect it from the ravages of the weather 'in the field'. Sections 1 and 2 cover the introduction and safety aspects of dealing with chemicals. In Section 3, commonly used herbicides are attributed approximately one page each, with trade names, crop tolerance, application rates and appropriate weather conditions for application clearly outlined. Section 4 contains the vegetation site type prescriptions, with each vegetation type addressed separately. These prescriptions are dealt with alphabetically, from bracken to scrub/woody weeds. Decision support is offered with the use of colour photographs, tables and flow charts. The final three sections deal with applicators, calibration and the addition of surfactants/adjuvant oils to enhance herbicide effectiveness. Although all sections are brief, each subject is dealt with thoroughly. However, with herbicides and their application methods constantly changing and being replaced with more efficient ones, this booklet will have to be revised and updated frequently.

Overall, the editor, who continued the work started by the late John O'Driscoll and his Herbicide Committee, has compiled a glossy, concise and user-friendly book suitable for anyone involved in forest management, be they forester or farmer.

### **Coillte Teoranta. Fifth Report of the Seventh Joint Committee on State-Sponsored Bodies**

Government of Ireland. 1997. 80 pp. Price £7.50. ISBN 0 7076 3842 9.

Reviewed by Niall O'Carroll, Former Chief Inspector, State Forest Service.

Your present reviewer may perhaps be forgiven for deprecating the fact that this report deals with research in one section (13.2) whose length totals one line and a half: "Coillte also carries out forest research, for its own purposes, for the Department and for the EU in relation to forest health". That is all. No assessment of the contribution of previous decades of research to the current success of the company. No data to indicate recent downward trends. No discussion of the implications of the current shift of emphasis from long-term projects to short-term contracts. A startling omission in a report of 80 A4 pages.

The report usefully brings together statistical data concerning the first seven years of the Company's activity, some of it hitherto unpublished.

The Committee in its report praises the Company's financial performance, which it describes as very satisfactory, having moved from a situation of a £4.2 million loss in 1989 to a profit of £12.52 million in 1995. It also shows that over the same period employment in the company has fallen from 2,476 to 1,326. It is not so happy about the quality of management and maintenance of the forest estate, quoting the Assistant Secretary to the effect that the Department are a little concerned with the level of Coillte maintenance, and emphasises the responsibilities of the Company to rectify any problems in relation to its



husbandry of the asset created from taxation over a long period. It questions the low level of expenditure on pruning. It is also disinclined to accept that a staff of 765 industrial workers is adequate to meet the needs of the forest.

This leads to the question of monitoring and supervision. The Committee takes the view that the present inspectorate staff of the Forest Service is inadequate to deal with the Department's present responsibilities both in regard to the planting grant and premium schemes together with the felling licence and replanting requirements.

The Committee understands that "the Department is not responsible for forest maintenance and would hold the view that they have no role in monitoring this aspect of Coillte's performance". This appears to overlook the fact that a General Felling Licence such as that issued to Coillte each year to validate its harvesting programme includes "the cutting down of trees in any specified wood on the land in the ordinary course of thinning, *in accordance with the general practice of good forestry*, that wood." (emphasis added). Who is to independently judge the quality of the forestry through the rotation if not the Forest Service Inspectorate? Further, the fact that Section 12(1)(a) of the Forestry Act, 1988, requires the Company to carry out its work in accordance with "efficient silvicultural practices" surely puts the onus somewhere to monitor that? And where else but the Department?

The Committee notes that in 1994 "the non-Coillte sector planted 23% of broadleaves in marked contrast with the 4-5% by Coillte", leaving the reader to infer that the 23% is the more desirable alternative. This may be a 'politically correct' suggestion but it gives no thought to the effect of such a broadleaf planting proportion on the overall level of wood production (and ultimate economic viability), and more urgently, the consequences for owners when the premiums dry up in 15 or 20 years with no significant income from the crop. (This consideration is even more acute in the case of farmer afforestation.) Twenty years is a short time in forestry.

There is a technical discussion of the Company's accounting procedures which is largely inaccessible even to someone who has been exposed to remedial tuition in such matters. But there is no reference to the straightforward fact that the annual addition of a theoretical value for current wood increment is questionable when the basic valuation of the asset transferred on Vesting Day – the forests – was based on the method of Discounted Cash Flow (DCF, or Net Discounted Revenue NDR). This approach takes account *now* of all future increment. Double counting surely? The practice of adding the increment was discontinued in 1994, but the reason given refers only to "Financial Reporting Standard No. 3" which a lay person would not normally have at the fingertips. In fact, the whole document reads as one emanating from a source more comfortable with a balance sheet than with a forest working plan. Perhaps that should not come as a surprise in the circumstances, but it is a sad look out for the future of forestry.

The Committee specifically recommends that a screen of five metres depth be left standing between clearfelling coupes and public roadways. This seems to reflect a somewhat hypocritical view that what cannot be seen is not happening. We should be proud of the fact that our work has come to fruition and that the cycle of production is about to recommence.

In the matter of the possible vertical integration of Coillte into the sawmilling sector the Committee is dubious, and recommends extreme caution.

It is difficult to see the basis for the apparent assumption (page 67) that the cost of planting new land is somehow related to the potential yield class of that land.

One must be permitted to express a high degree of surprise, indeed considerable concern, at the revelation that “in 1995 there were 1300 visits by Teagasc staff to farmers who had enquired about site suitability of their land for forestry”. As far as one is aware, Teagasc had no forestry advisory unit at that time.

The editing of the text could have been better. There is an impenetrably garbled parenthesis on page 63 “(site and site are permitting)”. A competent spell-check facility ought to have highlighted the misspelling “concensus” (page 7), and also the solecistically erroneous “premia” which appears on page 42, while the correct *premiums* appears five times in the same passage. Could not the Committee have been told that the latter years of forestry training were based in Kinnitty and not Avondale? And must we continue to be inflicted with an initial capital in lodgepole pine?

The Committee makes a number of recommendations, among them the following.

1. The preparation of detailed reports by the Forest Service Inspectorate on many aspects of Coillte's operations.
2. A more thorough examination of the Company's annual felling proposals.
3. The re-introduction of a three year diploma level forestry training course.
4. An “urgent evaluation” of the strength of the Forest Service's Inspectorate.
5. Amendment of the Forestry Act, 1988, to include the words “sustainable yield basis” in the statement of the Company's objectives.

This reviewer has personal as well as professional reasons for welcoming these recommendations, particularly the last.

The Committee acknowledges the assistance received from its consultant appointed for the purpose of this report, Mr. Paddy Howard (former Assistant Secretary, Department of the Marine, not his namesake formerly of the Forest Service).

The members of the Committee were Deputies Liam Kavanagh (Chairman), Martin Cullen, Seamus Brennan, Frances Fitzgerald, Seamus Kirk, Jim O'Keefe, Sean Ryan, and Senators Michael Finneran, Feargal Quinn, Dick Roche and Shane Ross.

### **Design for Outdoor Recreation**

By Simon Bell. 1997. E. & F.N. Spon, London. Paperback. 218 pp. Price Stg£39.95. ISBN 0 419 20350 8.

Reviewed by John Mc Loughlin, Chief Environmental Officer, Coillte.

Simon Bell is a prolific writer. In addition to this publication, another recent book penned by the author, entitled *Elements of Visual Design in the Landscape*, will be reviewed in a later issue of *Irish Forestry*. A new book, *The Landscape: Pattern, Process and Perception*, is also due to be published shortly. The author – a forester with a qualification in landscape architecture – is the Chief Landscape Architect with the Forestry Commission in Edinburgh. He has travelled extensively, has undertaken research into recreational building design and has been involved in studies on the public's perception of the countryside as a place to visit. He has also advised and trained staff from numerous

forest services and other public bodies throughout Europe (including Ireland), North America and Canada in the areas of recreation and landscape design. This book contains examples from many parts of the world, offering a fresh and up-to-date look at all aspects of the design of facilities required by visitors to outdoor recreational sites. The book will enable managers to find the best balance between their own needs and those of the visitor.

The philosophy and concepts of recreation originated in North America and were subsequently transferred across to Europe. The author quotes John Muir, who wrote over 100 years ago, "thousands of tired, nerve shaken, overcivilised people are beginning to find out that going to the mountains is going home; that wilderness is a necessity; and that mountain peaks and reservations are useful not only as fountains of timber and invigorating rivers, but as fountains of life". Since then, a much greater number of people are living in the city, with more leisure time and disposable income, a higher life expectancy and access to better transportation systems.

Why should recreational design concern foresters? Outdoor recreation is on the increase world-wide, and forests on these islands are now subjected to tremendous levels of use by the public. The author points out that uses change over time. For example, recreational sites in Ireland were initially designed with short walks in mind. Today, however, there is a growing trend towards long distance walking. Such walks require different design techniques and facilities which must be considered at the onset.

The majority of people in the developed world live in urban areas. They yearn for outdoor recreation to escape from the stresses and strains of city life. There are very few environments where one can get away to in today's world. Forests are one such environment. They are robust ecosystems which can absorb large numbers of people without compromising their inherent attractiveness, and are very often the only natural areas within easy reach from large centres of population.

Providing facilities for visitors is by no means a simple matter. This book, fully illustrated with sketches, diagrams and photographs, many in colour, taken from a wide range of locations in Ireland, UK, Europe, North America and elsewhere, provides a manual on the best practices available throughout the world. It takes the reader through the process of looking after the visitor right from the moment of arrival, with a section on signage and visitor information. The reader is instructed on the correct layout of parking and toilet facilities, picnic sites, children's play areas and nature trails. How to properly provide for visitors is a specialised, complex and sometimes formidable area, particularly among managers who also have responsibilities for other aspects of the overall enterprise, such as, in the case of the forester, the supply of timber. Having at hand a comprehensive and accessible manual dedicated to the subject will prove invaluable to such individuals.

This publication also removes the current uncertainty regarding what is right and what is wrong for an area. For example, there is a huge variety in the availability of picnic tables, even within these islands. With the ever-increasing danger of claims for damages, it is important that furniture and other man-made features are of a certain standard. Such standards are clearly set out in this book.

One area of recreational design which managers must consider is that of personal safety. Efforts should be made, for example, to minimise dark and secluded trails, given that they can lead to feelings of insecurity and even a fear of attack in men and women alike. Such routes are also dull from the design viewpoint, and should be opened up to

provide greater diversity and interest. The author suggests that the fear of attack may be the result of an exaggerated assessment of the risk, or that it may in fact go deeper, originating from feelings arising from long-established cultural associations with forests expressed in legends and fairy tales such as Little Red Riding Hood. Perhaps we have had some of our natural instincts for survival bred or tamed out of us, and like pet rabbits set loose, we are unable to cope with freedom.

Forestry is unusual in that the number of people directly involved in the industry is very small, while the number of people who have used forests for recreation at some point in their lives is very large. The quality and presentation of recreational facilities can have a major influence on how the public perceive forestry – poorly maintained sites and facilities send out the wrong signal, while properly maintained sites engender a positive impression.

Overall, *Design for Outdoor Recreation*, described by the author as a manual, will be indispensable to anyone involved in the provision of facilities for visitors, including foresters, conservation bodies and local authorities, as well as those involved in new recreational developments within the private sector. The book also provides a useful guide to the refurbishment of existing facilities and sites – an activity becoming more and more commonplace, given that many of our recreational sites have been in use for over 25 years. *Design for Outdoor Recreation* is a timely publication which will undoubtedly stimulate the reader to consider the needs of visitors. Addressing such needs will ensure a more rewarding experience for visitors to our forests, and by virtue of that, a more positive outlook of forestry among the public at large.

## Society of Irish Foresters

### Statement of accounts for year ended 31/12/95

1994	Receipts	1995	1994	Payments	1995
£17,138	Balance forward	£33,946	£7,868	Forest walks	£6,791
	Subscriptions		1,589	Meetings	498
7,141	Technical 1995	8,165	752	Display stand	—
1,436	Associate 1995	1,716	680	Study tour	—
260	Student 1995	60	523	Photos	—
1,330	Technical 1994	982	375	Advertising	180
365	Associate 1994	235	—	Symposium	1,452
50	Student 1994	—	9,189	Printing of Journal	5,435
1,046	Advances	609	2,730	Postage	3,041
853	Other arrears	763	1,494	Stationery & printing	3,971
66	Interest on investment	118	1,457	VAT	1,799
—	Study tour	618	1,387	Secretarial expenses	398
2,213	Journal	2,454	951	Purchase of ties	—
670	Book sales	232	909	Insurance premium	1,255
	Forest Service grants		428	Refunds	96
25,000	for office	—	200	Honoraria	200
7,850	for walks	7,000	—	Rent/Rates	5,244
48	Tie sales	30	—	Office equipment	3,656
2	Gain on sterling	—	—	Light & heat	149
—	Symposium pre-1995	1,186	—	Telecom	629
—	Symposium	2,761	—	Salary	12,318
10	Donations	—	—	Expenses	234
50	From Coillte	—	—	Legal fees	150
—	From Wood Ireland	2,062	—	Cleaning	288
			190	Affiliations	78
			164	Bank charges	246
			10	Fr. Browne books	—
			—	Loss on sterling	56
			686	Miscellaneous	1,358
			31,582	Total payments	49,522
				By balance	
			27,730	Current accounts	1,180
			—	Petty cash	105
			6,013	Savings	11,925
			203	EBS	205
			33,946	Balance forward	13,415
<u>£65,528</u>		<u>£62,937</u>	<u>£65,528</u>		<u>£62,937</u>

I have examined the above accounts, have compared vouchers and certify same to be correct, the balance to credit being £13,415 which is held in current accounts at the Ulster Bank, Ulster Bank Savings Account 08778241, Trustee Savings Investment Bank Account 30013591 and the Educational Building Society Account 11304413.

*Signed B. Lacey, Hon. Auditor*

# **Educational Award Fund** **Statement of account for year ended 31/12/95**

1994	Receipts	1995	1994	Payments	1995
£1,416	Balance forward	£989	£450	Awards	£-
23	Interest	16	989	Balance forward	1,006
<u>£1,439</u>		<u>£1,006</u>	<u>£1,439</u>		<u>£1,006</u>

Note: No award was made during 1995.

I have examined the above account, have compared with vouchers and certify same to be correct, the balance to credit being £1,006 which held in the Trustee Savings Investment Bank Account 30013591.

*Signed B. Lacey, Hon. Auditor*

## Society of Irish Foresters

## Statement of accounts for year ended 21/12/96

1995	Receipts	1996	1995	Payments	1996
£33,946	Balance forward	£13,415	£6,791	Forest walks	£5,141
12,530	Subscriptions	13,801	498	Meetings	512
118	Interest on investment	105	180	Advertising	1,402
618	Study tour	379	1,452	Symposium	2,528
2,454	Journal	1,287	5,435	Printing of Journal	5,658
232	Book sales	103	3,041	Postage	2,618
	Forest Service grants		3,971	Stationery & printing	1,578
—	for office	22,500	1,799	VAT	—
7,000	for walks	9,345	398	Secretarial expenses	92
30	Tie sales	50	1,255	Insurance premium	1,255
—	Gain on sterling		96	Refunds	—
1,186	Symposium pre-1995		200	Honoraria	200
2,761	Symposium	3,341	5,244	Rent/Rates	4,779
—	Donations	45	3,656	Office equipment	—
2,062	From Wood Ireland	46	149	Light & heat	500
			629	Telephone	751
			12,318	Salary	15,254
			234	Expenses	278
			150	Legal fees	—
			288	Cleaning	365
			79	Affiliations	1,340
				Legal & professional	2,023
				Show expenses	682
				Educational awards	200
			246	Bank charges	249
			56	Loss on sterling	—
			1,358	Miscellaneous	49
			49,522	Total payments	47,454
				By balance	
			1,180	Current accounts	3,449
			105	Petty cash	54
			11,925	Savings	13,254
			205	EBS	206
			13,415	Balance forward	16,963
<u>£62,937</u>		<u>£64,417</u>	<u>£62,937</u>		<u>£64,417</u>

I have examined the above accounts, have compared with vouchers and certify same to be correct, the balance to credit being £16,963 which is held in current accounts at the Ulster Bank, Ulster Bank Savings Account 08778241, Trustee Savings Investment Bank Account 30013591 and the Educational Building Society Account 11304413.

*Signed B. Lacey, Hon. Auditor*



**Educational Award Fund**  
**Statement of account for year ended 21/12/96**

1995	Receipts	1996	1995	Payments	1996
£989	Balance forward	£1,006	£—	Awards	£—
17	Interest	12	1,006	Balance forward	1,018
<u>£1,006</u>		<u>£1,018</u>	<u>£1,006</u>		<u>£1,018</u>

Note: The two awards made during 1996 were made from central funds.

I have examined the above account, have compared with vouchers and certify same to be correct, the balance to credit being £1,018 which is held in the Trustee Savings Investment Bank Account 30013591.

*Signed B. Lacey, Hon. Auditor*



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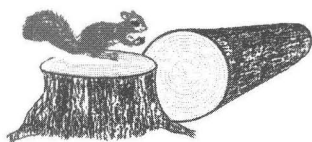
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**Irish Timber Growers Association**

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Volume 54, No. 1, 1997

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