IRISH FORESTRY

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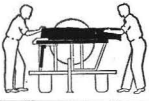

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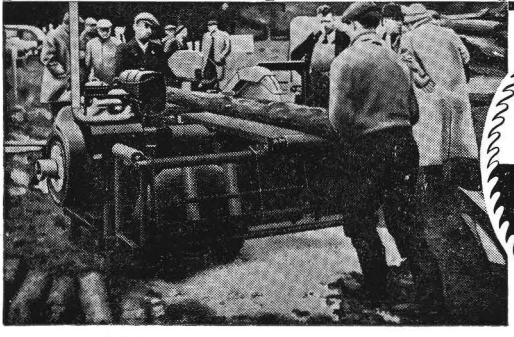
CROSS CUTTING



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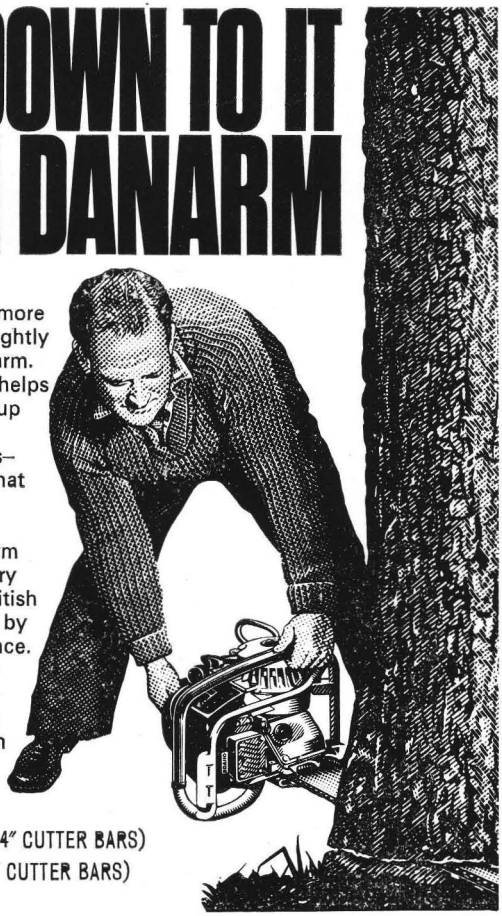

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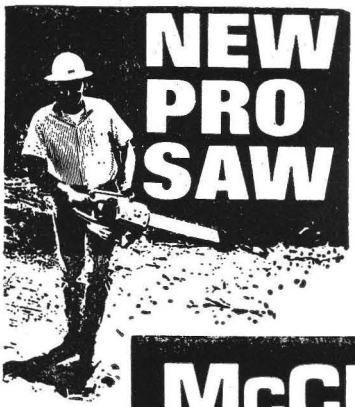

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IRISH FORESTRY

Volume XXII Spring 1965 Number 1

Public Response to Forest Recreation in Northern Ireland [1]

By C. S. KILPATRICK [2]

Summary

For one week in July 1964, 50 per cent of the people visiting Tollymore Forest Park were given a questionnaire to complete. About one third of the forms were returned. This paper is an analysis of the results.

INTRODUCTION

Tollymore Park, an area of 1,200 acres near Newcastle, Co. Down, forms the major part of Newcastle State Forest. It was opened as Northern Ireland's first Forest Park on 2nd June, 1955, and has remained the only Forest Park in the province for a period of 10 years.

During that time a steadily mounting number of visitors have been drawn to the park so that it has become one of the province's main tourists attractions. This is borne out by the figures in table 1 below.

TABLE 1

Annual Number of Visitors

Year	Number of Cars	*Calculated Number of Visitors
1955	7,000	33,600
1956	10,892	45,000
1957	12,529	60,100
1958	15,008	72,000
1959	16,800	80,600
1960	20,272	97,200
1961	23,275	111,700
1962	26,792	128,600
1963	28,324	135,900
1964	33,898	162,710

*The number of visitors has been calculated by the formula, No. of cars $\times$ 4.8 = No. of visitors. The average number of visitors per car was found to be 4 but some arrived by other means of transport.

1. Based on a paper read at a symposium on Forest Recreation at Pomeroy Forestry School, Northern Ireland, September 24th, 1964.
2. Deputy Chief Forest Officer, Forestry Division, Ministry of Agriculture, Northern Ireland.

The time seemed opportune to evaluate the success of the Forest Park and to draw conclusions for future guidance based on the opinions of the visitors themselves.

PROCEDURES

The survey was carried out in two stages:—

(a) For a period of one week at the beginning of every month from April to September a careful check was kept of the number of cars and their occupants and the numbers of those arriving by other means. The driver of every tenth car was asked two questions.

(1) Where is your home?

(2) How often have you visited the park before?

(b) A questionnaire containing 21 questions was given to the occupants of every second vehicle for a period of 7 days, (20th-26th July).

Each person over 12 years was asked to complete the form in the Park if possible and to place it in one of the boxes provided or to return it by post in the stamped addressed envelope supplied. Five thousand forms had been printed and of these 4,474 were issued. Of the forms issued, 1,145 were returned completed in the Park and 420 were returned by post during the subsequent fortnight giving a total of 1,565 forms or 35% of those issued on which to base the conclusions.

On receipt of the forms in Forestry Division Headquarters they were sorted according to the day of issue and the answers to the various questions coded, the code numbers being entered in the margin. The forms were then sent to the Ministry of Finance Central Automatic Data Processing Unit where punch cards were prepared for each form. These were machine-sorted and the response to each question tabulated. This made it possible to have a series of cross-references and to compare the answers from different groups of people.

RESULTS OF MONTHLY SAMPLE

Seasonal Variation

The number of visitors rises almost immediately to a peak in April and then drops markedly in May rising again to a new peak in July and August, though never reaching the same level as April. This appears to be due to the fact that the public wish to get out into the open air at Easter while it is as yet too cold by the sea side.

Table 2 below gives the total numbers of visitors arriving by various means during a sample of one week in every month.

TABLE 2

Number of Visitors

100% Count for a period of 1 week in each Month

Month (7 days only)	Mode of Travel Car	Pedestrians and Cyclists	Bus	Total Visitors (during sample period)
April	9,772	589	365	10,726
May	2,790	161	232	3,183
June	3,431	495	1,156	5,082
July	4,846	152	397	5,395
August	6,102	302	1,721	8,125
September	2,733	140	766	3,639
Total	29,674	1,839	4,637	36,150
Percentage of Total	82.08%	5.09%	12.78%	100%

RESULTS FROM QUESTIONNAIRE

Sex, Marital Status and Groupings in which they arrived

Sex

Those completing the forms are called "respondents" and were fairly evenly divided between the sexes with a slightly higher number of females. This is as would be expected as there are slightly more females in the whole population.

Marital Status

Married persons made up a considerably higher proportion of respondents than single persons especially among the males, there being considerably more single females than single males.

Age

All age groups with the exception of the over 65's visit the park roughly in the proportion that each forms of the whole population.

Table 3 below shows that the three main groups are:—

Children (0 - 14 yrs.)
The young adult (20 - 39 yrs.) and
The middle-aged adult (40 - 64 yrs.)

Teenagers and the over 65's do not form large groups among the visitors.

TABLE 3

Age in Years	No. of Respondents	% of Respondents	% of N.I. Population 1961
0 - 14 (Estimated)	520	31.9	28.9
15 - 19	199	12.72	8.45
20 - 39	590	37.7	25.0
40 - 64	543	34.7	27.5
65 Plus	86	5.49	10.1

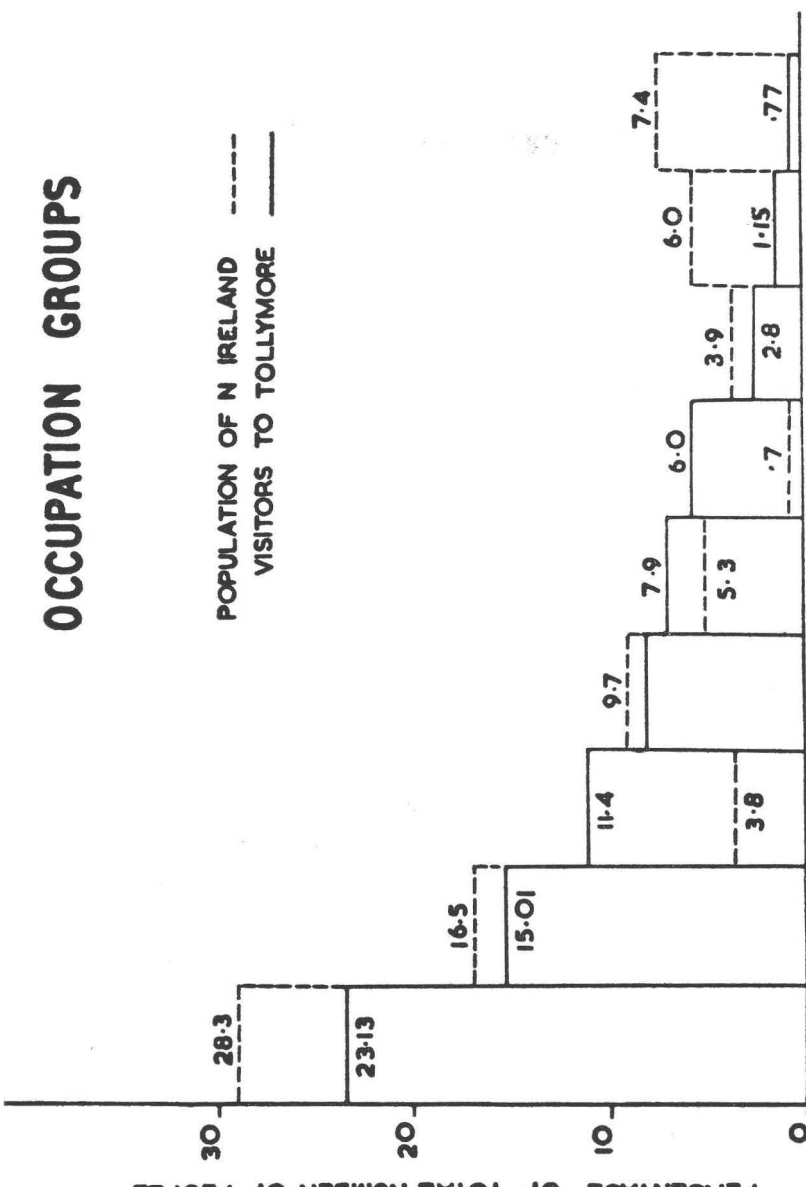

FIGURE 1. Occupation of respondents compared with occupation groups in Northern Ireland.

Middle-aged single persons are not attracted to the Park in anything like the number of middle-aged married persons probably because forest recreation is essentially a family or group activity.

Grouping in which Visitors Arrived

This point is even more clearly demonstrated by table 4 showing the groups in which people arrived. Those arriving alone form a minute proportion. It is clear that people prefer to arrive in parties either with families or friends and preferably with both.

TABLE 4

Group	Number of Persons	Percentage
Alone	14	.89
With friends	382	24.41
With family	556	35.53
With family and friends	563	35.97

Occupations

The various answers given by visitors in reply to the question, "what is your occupation?," were grouped into 11 groups to meet the full capacity of the computer. These were based on the census of population to allow comparison with the population at large. (see Fig. 1).

It may be surprising to find that skilled manual workers make so high a proportion of the visitors, but car ownership is no longer the monopoly of the privileged. It should, however, be noted that if related groups are merged that "White Collar" workers make up a higher proportion than manual workers. The almost complete absence of two major components of the population is significant.

(a) Farmers—It is an interesting fact that in a rural community a Forest Park can only draw 12 farmers, foresters and fishermen. It is perhaps understandable that for them this would be a "busman's holiday" and that they get enough of the open air and the countryside in their everyday work. They are of course also known for their dislike of form filling.

(b) Unskilled Manual Workers—The small number of visitors in this group may be due to lack of interest or transport, or to a reluctance on the part of human beings to admit of being unskilled.

Domicile and distance travelled

The domicile of visitors was approximately as follows:—

Belfast	43%
Antrim and Down	30%
Rest of Northern Ireland	10%
Outside Northern Ireland	17%

Four per cent of the visitors were from the 26 counties.

It is noticeable that people in the 11-20 mile bracket make up a smaller proportion of the total than those in the 31-40 mile range. This would appear to be because they are neither sufficiently near to be very convenient nor sufficiently far away for the visit to be a real "outing". (See figs. 2 and 3).

The surprising jump in the numbers in the 71-80 mile range is caused by C.I.E. bus parties travelling from Dublin, (Fig. 2).

Length of Stay and Frequency of Visits

It is clear that about half of the visitors are regular callers who return time and time again and that about a quarter are first time visitors.

The majority of visitors stay for more than 2 hours but less than 5 hours (see Fig. 4). It is, however, surprising that 15% stay for more than 5 hours. It is also surprising to find that the regular visitors as a group tend to stay longer than less regular visitors, or first time visitors. Teenagers, the over 65's and persons travelling from the 11-20 mile area, and farmers tend to stay for shorter periods than other groups. Skilled manual, and transport workers, and those travelling from 31-40 mile radius tend to stay for longer periods.

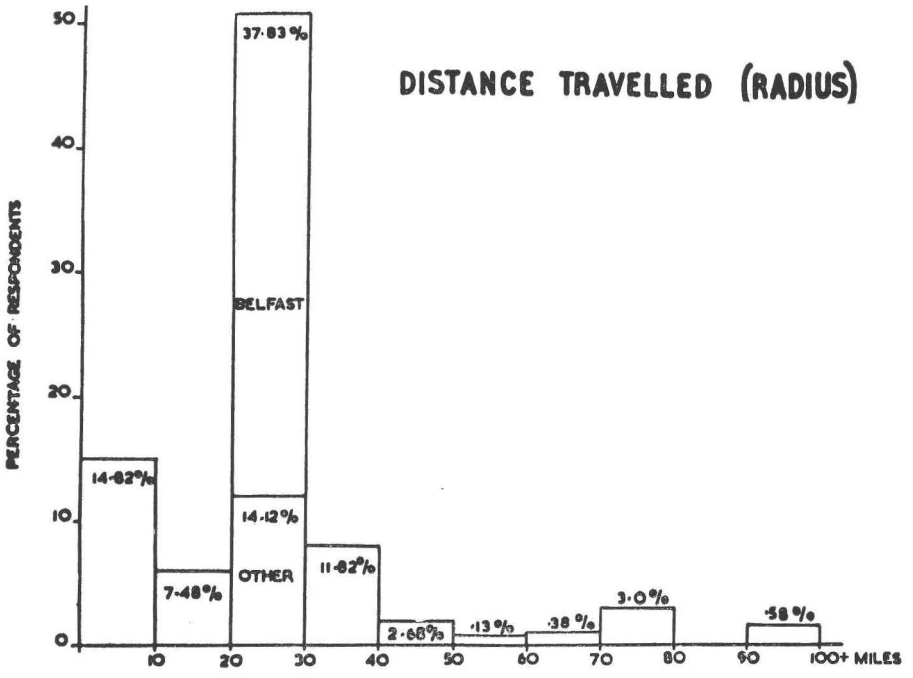

FIGURE 2. Respondents related to distance travelled to visit Tollymore Park.

Enjoyment of Visitors

The vast majority of visitors (87.6%) stated that they enjoyed their visit "very much". Only eight out of 1,565 visitors stated that they enjoyed their visit "not at all".

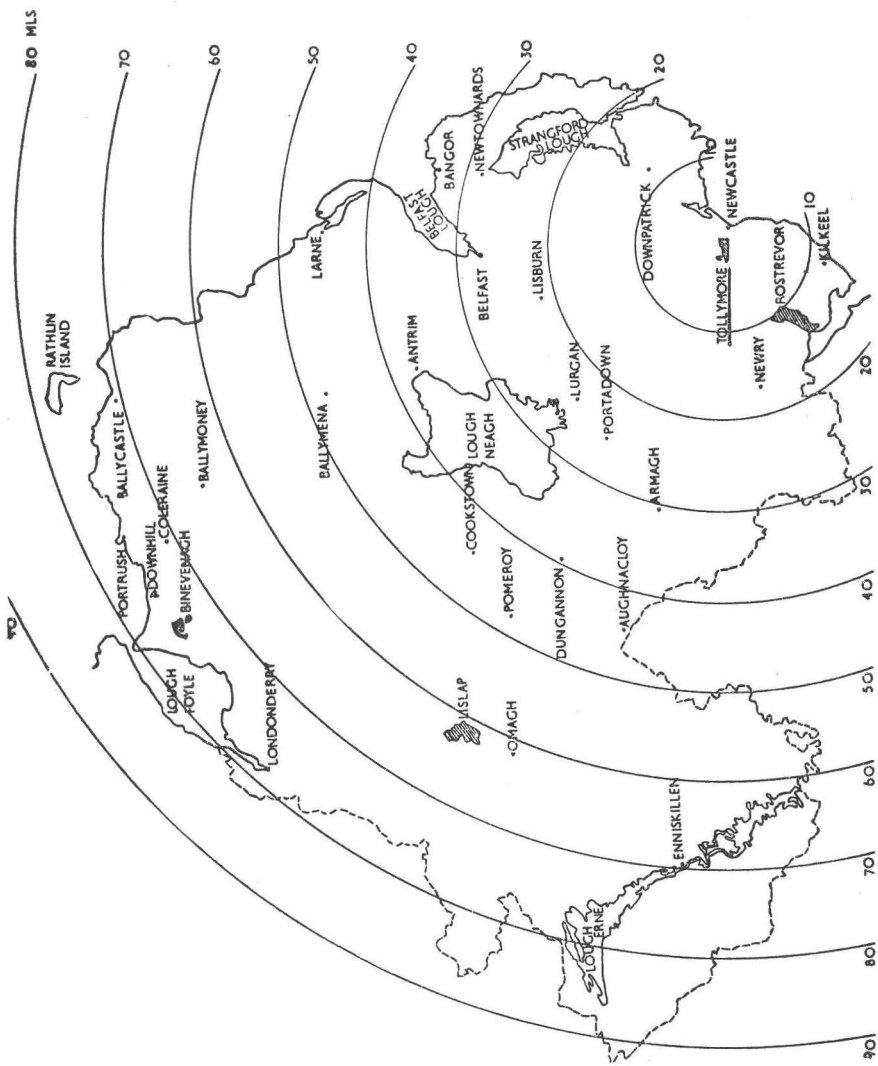

FIGURE 3. Map showing radial distances from Tollymore Park.

From an analysis of the response of different groups of visitors it can be seen that the following groups showed the greatest appreciation :

Large groups travelling together.
Visitors staying for longer periods. (See fig. 5).
Married persons.
Children and adults in the 40 - 60 age group.
Housewives and professional people.
Persons domiciled in Belfast.
Frequent visitors.

The following groups showed the least appreciation :—

Persons arriving alone.
Visitors who stayed for the 1 - 2 hour period. (See fig. 5)
Persons in the 15 - 19 year old bracket.
Persons travelling a distance of 11 - 20 miles.
Farmers and the Sales and Commercial group.

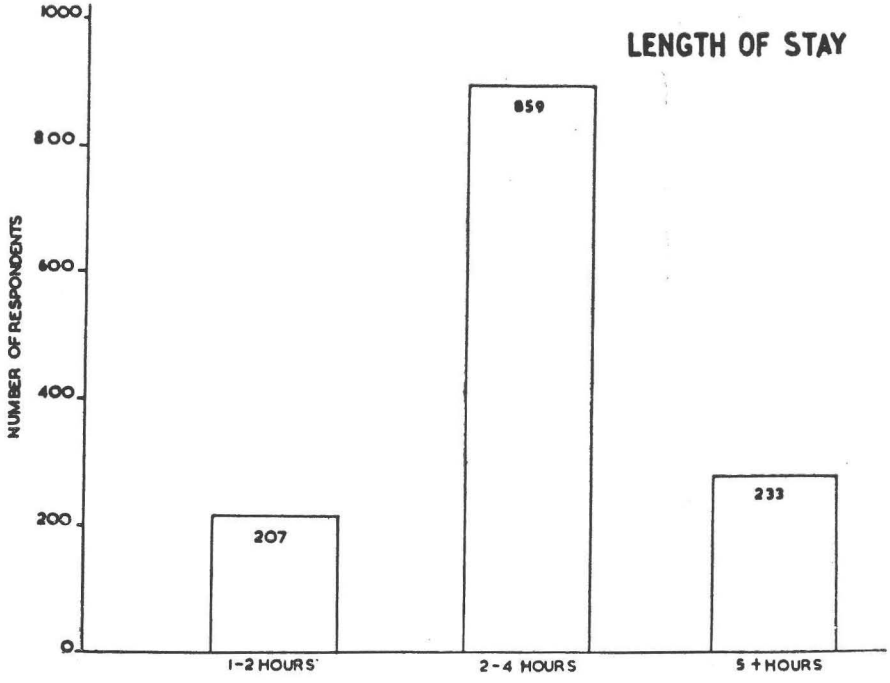

FIGURE 4. Number of respondents related to duration of visit to Tollymore Park.

Reasons for Visiting the Park

Generally the reasons given for coming were vague and seemed to portray a general urge to get out and away rather than any particular interest.

The attraction of the Mourne Mountains and the proximity of the seaside, while being important considerations, do not appear to be vital to the success of the Park.

A selection of the "off the cuff" answers are given below as they speak for themselves.

> "Peace and tranquility. Atmosphere of Forest restful and refreshing to weary spirits. Seclusion. Pure fresh air and admire God's handiwork. Ideal for children. Something about the Park which compels me to revisit it. Always something new on the walks. Fault of C.I.E.—we should have gone to Armagh! Exercise large dog—dog's paradise. Wish to be alone with my boyfriend. Heard so much about it, had to see it—100% smashing. Ideal for honeymooners. Dogs enjoy walks, plus us. The family insisted. Getting away from it all. No room for parking at Newcastle. Parents (from a teenager). Interested, as a visitor from another State, in how a forest can be developed for public enjoyment (Civil Servant—Dublin). Freedom from milling crowds. Beauty unspoilt. Picnic meal without being encrusted with

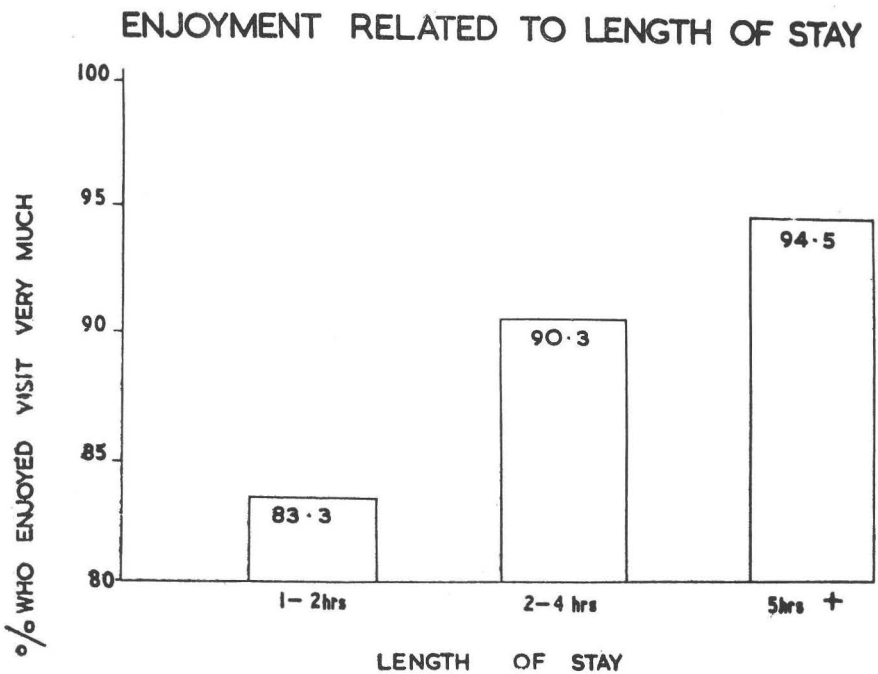

FIGURE 5. Association between enjoyment and duration of visit.

sand. We find Newcastle too busy and Tyrella beach too dangerous (so many people learning to drive on the beach). Orinthology. "Bird" watching!"

Participation in Recreation Activities

The questionaire listed 15 possible activities and asked visitors to tick those in which they had taken part. The activities listed included camping, caravaning, sitting and watching, picnicking, visiting the arboretum, forest plots museum, cafe, and the various planned walks of 1, 2, 3 and 4 miles.

The under 15 year olds have the highest percentage of any age group visiting the museum, cafe and doing the 3 and 4 mile planned walks. The teenagers have the highest percentage doing the shorter unplanned walks. The young adults have the highest percentage picnicking and doing the 2 mile walk. The middle aged adults have the highest percentage visiting the arboretum and doing the 1 mile planned walk. The 65 year olds have the highest percentage sitting and watching ; followed by the teenagers.

The percentage of persons picnicking rises with distance travelled up to the 40 mile radius and thereafter it falls regularly.

During their first visit visitors tend to sit and watch, visit the cafe and do the 1 mile walk. Visitors who have been at the Park from 2 to 5 times have a higher percentage camping, visiting the arboretum, forest plots and the long 4 mile walk. The regular visitors have a higher proportion of their number who do the 2 and 3 mile walk and who caravan.

It is possible that visitors only do the 4 mile walk once and find it too long. Probably 2 and 3 mile walks are repeated more often for pleasure and therefore rate higher among the persons making their sixth and subsequent visits.

The Sales and Commercial group have the highest proportion among the occupational groups caravaning and students have the highest proportion camping. Housewives and skilled manual workers had the highest percentage picnicking.

Some people noted additional comments about their activities in in their own words :—

"Painting and sketching"
"Photography"
"Could not get out of the car because of the rain"
"Watched fish in the river"
"Just relaxed"
"Filled in forms"
"Amused children who love following arrows in woods"
"Details confidental"
"Talked at great length to one of the rangers and found him very helpful about the history of the area"

Opinions on the level of charges

Actual charge per car for admission is 1/6. Campers pay 1/- per tent per night plus 6d. per person but youth arganisations pay only a nominal sum. Caravaners pay 4/- per caravan per night or 24/- per week.

Many people stated that the charge of 1/6 was reasonable for admission but too high for parking only. It would appear that the public would be more satisfied if the charge is known as an admission fee for entrance.

The caravaners appear to be well satisfied, 85.7% of actual caravaners stated that the charge was reasonable or surprisingly low. The campers, however, were less satisfied except for the youth organisations.

Park Booklet

29.65% of those who filled in the forms had read the park booklet and a further 10% had glanced at a copy. The vast majority of these expressed themselves well satisfied.

Criticisms and Suggestions

No less than 1,336 remarks in the form of criticisms or suggestions were made and proved to be of great practical value in improving and adding to the amenities of the Park.

One quarter of all remarks concerned the walks and picnic sites and the most numerous complaint was that the labelling and signposting was misleading and inadequate. The most numerous suggestion was for more tables and seats for picnic parties.

The next most numerous number of complaints was about the car park surface and the roads, which were rough and dusty.

Comment about the toilets was extremely varied and seemed to depend on the time of arrival. Persons arriving at slack periods probably in the morning were very complementary but those at peak periods thought otherwise. Many complained of the lack of soap and towels. The most usual suggestion about the ablutions was for the provision of hot water.

Many proposals for entertainment were made. Thirty-nine people wanted a children's playground and others wanted putting greens, boating and bathing facilities. On the other hand some complained that there were too many noisy games and wanted transistors banned.

The cafe came in for a lot of criticism as it was often closed when required and did not provide full meals. Caravan and camping visitors wanted a shop to sell general foodstuffs.

The Boy Scouts were in some cases dissatisfied with their camp sites and the wet firewood sold to them by the Forestly Division. The general campers felt that youth organisations had preferential treatment and asked for additional sites.

Twenty-six people wanted more animal and bird life but a similar number wanted fewer insects, midges and wasps.

Some caravaners thought that their site was too for away from the toilets and ablutions and wanted more sites for caravaners.

Seventeen people pleaded that nothing be done to commercialise or develop the park in an unnatural way.

CONCLUSIONS

Forest recreation is seen to be an activity mainly for family parties with all ages participating fully except the over 65's. Its greatest appeal is for the urban, industrialised or office worker and its least appeal for the farmer and rural dweller. Teenagers and over 65's enjoy their visits less than other age classes though, of course, for different reasons.

It would be accepted that the numbers of people travelling would diminish uniformly with distance but this does not prove to be the case. They travel in greater numbers from certain zones :

(a) those within a radius of 10 miles;

(b) those at a distance between 20 and 40 miles, at an average travelling time of one hour. In between these two zones there is an area, 10 - 20 miles radius from the Park, from which people travel in smaller numbers, stay for a shorter period and show less appreciation of their visit. A higher number of cross-channel and overseas visitors are attracted than might have been expected and make up a sizeable proportion of the visitors.

The effective range of a forest park appears to be only 40 miles as only 6½ per cent of visitors travelled from beyond that ring.

People tend to return very frequently and the more often they return the longer they tend to stay and the more they enjoy their visit. The dominant reason for coming for adults seems to be getting away from it all while children find adventure in exploring.

The participation pattern is obscure largely because scope is limited and the Park small, but some conclusions can be drawn. The number picnicking is closely related to distance travelled and as a typical forest park activity this is an important indicator. The proportion of persons from different zones picnicking drops away very rapidly after its peak at the 40 mile radius.

The present level of charges seems to be acceptable but those for the general camper least so.

The current park booklet appears to meet what the public require though it is not read by a very high percentage. There may be a case for a simpler cheaper forest map on the Dutch model.

A determined effort must be made to improve the labelling of the planned walks and to provide American type picnic tables and seats, to

tarmacadam the car park, extend the toilet facilities, and to supply hot water in the ablutions and showers.

It must, however, always be remembered that if the forest park is to keep its appeal as a sanctuary for the urban dweller, it must be kept natural and free from artificial attractions and noisy entertainment.

Other forest parks are urgently needed both to relieve the pressure on Tollymore Park by providing an alternative for visitors travelling from Belfast and also to provide for those areas which lie beyond the 40 mile radius from Tollymore.

Forests and Recreation in the Netherlands [1]

By Ir. W. G. van der Kloet[2]

I regard it as an honour and I feel much flattered indeed that the Forestry Service in Northern Ireland has invited me to tell you something about the recreational value of our Dutch forests. Before starting my lecture I might appeal for your consideration as you will understand that delivering a lecture in English does not belong to my daily routine.

Before talking about forests and recreation in the Netherlands, I think it might be useful to give you some figures first.

Holland is about 2½ times as large as Northern Ireland and the total forest area amounts to about 7% of this area. The Netherlands State Forestry Service owns a one-fifth part of this. Of the total area of waste land, 5% of the land surface, the Forestry Service owns nearly one-quarter. Between the years 1924 and 1940 many forests were planted on waste land: heath, moor and sand dunes, for economic purposes only as at the time recreation did not play a rôle in general. On the other hand attention was paid to nature conservancy from the beginning. A scientific advisory committee was set up in 1929. This committee gave advice with regard to the areas which, from a scientific point of view, were the most valuable. Such areas were declared nature reserves by formal decree of the Minister of Agriculture. They form a quarter part of the property of the State Forestry Service.

Before going further into the situation in Holland, I think it is important to deal with the question of what factors generally determine the recreational value of forests.

1. *Roads and paths.*

In itself a forest of thousands and thousands of acres has practically no recreational value. As it is, a human being generally prefers to follow a beaten track. As soon as roads and foot-paths have been provided people will use them and enter the forest.

The character of the roads determines what kind of visitors, pedestrians or motorists will make use of them.

2. *Structure.*

Roads and foot-paths have only a very limited effect on the recreational value if the forest is of a uniform structure. In a natural forest the surrounding factors determine its type. The more these factors differ from place to place the more variegated the picture of

1. A paper read at a Symposium on Forest Recreation at Pomeroy Forestry School, Northern Ireland, September 24th, 1964.
2. Chief of the Division of Nature Conservation and Recreation of the State Forestry Service in the Netherlands.

the forest will be. In a cultivated forest this depends on the choice of the kinds of tree and the distribution is in accordance with the age-classes.

3. *Topography.*

A forest in hilly or a mountainous country is much more attractive than a forest in the plains. One can ascertain this in a country where forests abound, like the United States of America where the most visited woods are situated in the mountains.

4. *Water.*

Water represents a very attractive environment for recreation. Brooks, rivers, fens and lakes may enhance the value of a forest considerably. In our country there remains only a few unregulated brooks which run through a forest. On the other hand the combination of woods and fens is rather frequent.

5. *Open spaces.*

Open spaces enhance the recreational value of a forest in different ways. In hilly country they may supply possibilities of unobstructed views. The borders of the open spaces are important, as experience has proved that the public strongly prefers the edges of the forest when sitting down or having a picnic. The recreational value varies with the location of the open space (for instance felling area, cultivated land, heathland, playing-field).

6. *The situation.*

When the other factors remain the same, a forest will as a rule attract more visitors when it is situated nearer to either a dwelling centre or a holiday centre.

It is not only the distance in a bee-line that is important but also the easy attainability by public transport, motorcar, motorcycle or bicycle. A recent enquiry in America has proved that, although for 70% of the people looking for recreation, pleasure driving means the principal entertainment, much value is attached to woodlands situated not too far away from the towns.

7. *The admission regulations.*

A charge for admission may largely reduce the number of visitors. In Holland people generally do not like to pay much only to be admitted to a forest. If tickets are not to be had at the entrance of the forest, but only for instance, in a nearby village or town, the number of visitors will be strongly reduced.

8. *The reputation.*

As a rule the general public knows very little about the recreation areas. Information by way of press, radio or television distinctly increases the number of visitors, visiting a certain forest.

What object have people to have in mind when visiting a forest? In the Netherlands up to now we did not enter fully into this problem.

Properly speaking, one should know the answer to it before taking steps or making provisions for recreation. The method followed in Holland is to first produce the recreation facilities and then to investigate the reactions of the public afterwards. Ever since the establishment of the State Forestry Service the forests are freely accessible to visitors.

Formerly visitors never caused any problem. They were naturalists who went their own way along the many forestry roads. This changed after World War II. People, having more leisure-time at their disposal, did not come to the woods to study nature or to look at the trees but simply to be in the open air. In 1957 a special department was established at the State Forestry Service's head office with the object of supplying information on recreational accommodation. The funds supplied yearly by our Government in order to effectuate this programme amount to £100,000.

Our first problem was the signboards. In Holland one finds thousands of signs mentioning: "Admission prohibited", especially in the private woods. We have chosen a signboard with the legend: "Free walks on roads and foot-paths". The sign mentioning the warning "Admission prohibited" suggested that the owner could take legal action against a trespasser. Our signs could not give this impression as with more and more people frequenting our forests by motorcar it would not do to exclude these vehicles from admittance.

Our second problem was what to do with these motorcars inside the forest. We determined that motorcar owners principally come for pleasure driving and looked for an attractive place to spend the whole day. We built nice asphalt roads in the hope of concentrating the visitors by motorcar in certain parts and keeping the remainder of the wood quiet. We provided car parks with picnic sites with wooden tables and benches which are rather appreciated by the public. More and more walkers came to our forests by motorcar, too. This led us to the decision to peg out walks starting from the motor roads or from the car parks. These walks are marked by poles with coloured heads.

I have mentioned already that in our forests quite a number of nature reserves have been spared. These for instance may be beautiful fens with natural bathing opportunities. Our next problem was that people used them for swimming baths, and accordingly did harm to the scientific values of the fens. Therefore when selecting plans for tourist roads and walks we try to lead the visitors away from the vulnerable nature reserves and to direct them to other places of interest. In general the public are rather keen to visit a special object of their liking in the woods. This may for instance, be a remarkable tree, a point commanding a nice view or a historical site. As swimming

water is rather attractive we decided to dig pools especially for children. This costs quite a lot of money but as in our country sand can be used in many ways, for instance at building sites and for road building, it has been proved quite possible to make such pools without much cost.

Unfortunately our forests and recreation areas are for the larger part situated in the eastern part of our country, while the large towns are all situated in the western part. Therefore, many of these recreation areas are less appropriate for one-day recreation but rather more for a week-end stay or a holiday.

Camping is very popular in Holland. There are hundreds of camping sites which are managed as private enterprises. Many people nowadays use their tent or caravan as a second home; they put them up at a camping-site in spring and let them remain there till autumn. In summer-time tourists and hikers find in consequence that the most attractive spots are already taken. We have therefore established a number of camping sites especially for tourists where the period of stay is limited to four weeks. We have also a number of small and remote camping sites for old-fashioned campers who look for quietness.

Next to creating accommodation we also pay attention to what the Americans call "Interpretation". We have learned quite a lot from Freeman Tilden's booklet; "Interpreting our heritage". Especially since many more people are coming to our forests at present who have never been there before, the want of information is increasingly felt. The oldest form of information we know in the State Forestry Service is the excursion under guidance of a forester or a warden. The excursions are organised through nature reserves, to breeding places or just anyhow through the woods to get acquainted a bit with the different kinds of trees and with forestry in general.

We earned a lot of success by publishing tourist's maps of our forest beats. Twenty of these maps have so far appeared. They give specialized touristic information.

We have also published booklets of some forest beats, with a loose-leaf road map containing more extensive information.

If you ask me how many visitors are yearly frequenting our forests, I must unfortunately fail to give you an answer. Visitor-counting is very difficult, because the forests are accessible along many roads. We know that a national park of 15,000 acres in central Holland which does not belong to the State, however, attracts half-a-million visitors yearly. In our forests the figure is certainly lower, but it rises considerably every year.

Next year we hope to start counting motorcars with an automatic numerator. As far as the conducted excursions are concerned in 1963, the number of excursionists amounts to 50,000. The number of camping nights amounts to more than half-a-million.

During the past years provisions for recreation have been established in places where the need for them was felt strongest. Often they were only experiments to gain the required experience. However, to avoid mistakes in the future a long-term scheme is required. Every forest beat produces a management-plan for a period of 10 years. Formerly these were purely sylvicultural plans, but since the forests are managed on a multiple use basis according to the American example, this has been altered. Reorientation has been accelerated not only by the advance of recreation and by the increase of the social value of the woods, but also by the economic prospects of forestry. While timber prices remain equal, wages continue to rise and, although part of it may be intercepted by rationalization or better working-methods, the profit-earning capacity of forestry in the Netherlands is quickly receding. This is also caused by the fact that the forests have been mostly planted on the worst of soils. In the State forest area about 25% of the total area yield 50% of the timber production. This makes it quite possible to avoid conflicts between recreation and forestry. The recreational provisions are principally accomplished in the poorest of forests, which are usually well suited for recreation (sandy soil).

The object of the modern management-plan is to develop the different aspects of the forest as well as possible. In the field of recreation this means that one has to try to comply as much as possible with the wishes of different groups. This may be done by putting into practice the principle of zoning. Motorists, cyclists, pedestrians and horsemen get their own roads and their own paths as far as can be done. Parts of the forest will have to be out of bounds for motorcars so that people looking for quietness may be able to find it. Often the road system is monotonous. An improvement can be obtained by revising it. The forest management is significant also: different plantations with varying species, long rotation, selective felling and natural regeneration enhance the recreational value. In the less-paying forests clearcutting and the regeneration of heather and shifting sands are even being considered. Expansion of forest area is being pursued also, but not at the cost of waste lands, dunes, heaths and moors. Our country has been cultivated so completely, that conserving the remaining natural areas as nature-reserves has become a first requirement. Our Government yearly spends £800,000 on land acquisition for nature conservancy. For the acquisition of forests moneys spent merely amount to about £300,000 a year. However, there still are large possibilities for afforestation in the new Zuiderzeepolders. The great Deltaplan, for sealing the country against inroads of the sea will also present new possibilities both for recreation and for afforestation. Our Government National Physical Planning Service contrives the schemes and is carrying out investigations into its recreational possibilities.

It is evident that on a holiday 60-70% of the public do not travel

more than 20 miles from the cities. Since there are few woodlands near the large towns in the western part of our country, eight large forest areas bordering them have been designed each of 2,500 acres. Land acquisition in western Holland is terribly expensive and this is the reason why this ambitious scheme has not been started yet.

I have told you already that a fifth part of the forest is State property. The remaining forest area is not less important for recreation. Another fifth part is owned by local authorities and foundations for general benefit. Under the Forestry Act the State Forestry Service is able to make grants to local authorities and nature protection organisations for the acquisition and maintenance of woodland which have great natural beauty and recreational value. There is also provision for granting subsidies for the execution of recreational schemes provided these are of national significance. The development of the recreational provisions in these forests have progressed to a lesser degree than in the forests owned by the State.

By far the largest part of the Dutch forests belong to private owners, and the coppices especially that give the landscape such a charm are in the hands of farmers. As a result of the introduction of farm machinery and better management the survival of these coppices is being threatened. However the Forestry Act dictates that forests of more than half an acre have to be reafforested.

The large woodlands form part of the properties of old castles or estates, which the owners have preserved through the ages. The high death duties which threatened the survival of these woods has caused the introduction of the Scenery Act. This fiscal act grants a reduction of death duties and property-tax on condition that the estate will be preserved for 25 years. If the forests and estates are accessible to the public the duties and taxes are reduced to less than half. At present 818 estates with a total area of 263,000 acres, have been submitted to the Scenery Act. Of this area 200,000 acres are accessible to the public.

Usually a small admission fee is charged. Trees are not to be felled and alterations are not to be carried out without the consent of the State Forestry Service, which holds the supervision. The agreement is voluntary. Owners are free to withdraw their estates from the act but if they do so within 25 years, they have to refund the tax facilities they have enjoyed.

Usually the estates offer an opportunity for walking only; other recreation facilities are not provided for as these are too costly for the owners. The normal management expenses are at present rising to such a degree that the owners have approached the Government for a grant amounting to £2½ per acre a year. They consider their proposal more advantageous for the Government. Otherwise the Government might eventually be put to the necessity to purchase the estates in order to meet the growing need for recreation.

The growing need for recreation will certainly require more and

more funds in future. A great problem is how to get the visitors to refund part of the money invested. This is also one of the questions that is being studied at present by the Bureau of Recreation in the U.S.A., that has been established in 1962. Unfortunately we have not come to a justified solution yet. We are however averse to charging any admission fees.

As you may have observed the problem of forests and recreation is rather complicated. However it is an interesting one.

The Uncertainties of Wind-damage in Forest Management? [1]

By A. I. FRASER [2]

INTRODUCTION

It is most undesirable to have the uncertainty of large scale wind-damage when preparing long term forest management plans. Looking ahead, I do not think that wind-damage will necessarily be inevitable within acceptable economic rotations in Britain, but there are many areas where, in the first rotation at least, wind will be the deciding factor. As a first step therefore it is necessary to be able to recognise those sites where wind-damage will occur so that account can be taken of them in forecasting production, and decisions can be taken on whether or not to try preventative measures.

The occurence of storms of sufficient strength, and with a high frequency is of course the basic requirement for wind damage, but there seems little doubt that this condition will be fulfilled in most upland parts of Britain, and probably Ireland. Wind-damage takes two forms, stem break and uprooting, so that it will occur anywhere where conditions are such that the trees are unable to develop their stems or roots fully.

There are numerous ways in which the silviculturist can affect the development of both the roots and the stem of trees, so that a better understanding of the response of trees to different treatments will help in deciding on the most effective preventative measures.

Many factors are involved in the problem of wind-damage, but studies over the past few years have indicated that the main concern is uprooting of the spruces on poorly drained soils, and stem breakage of a range of species on freely draining soils. My own investigations have therefore been directed towards these two aspects, though exceptions have been noted, when they occurred.

This division between freely draining and poorly drained soils is a convenient one, and it will, I hope, become apparent that it is most important to be able to recognise these soil types and treat them differently.

Poorly drained soils.

This category includes surface water gleys, peaty gleys (peat up to 24 inches deep) and frequently deep peats. Other soil types may be included, but these three account for the major proportion.

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1. Text of a paper delivered to the Annual General Meeting of the Society of Irish Foresters, March 20th, 1965.
2. Assistant Silviculturist, British Forestry Commission, Forest Research Station, Alice Holt Lodge, Wrecclesham, Farnham, Surrey, England.

It is not really known at what stage excess soil moisture becomes harmful to tree roots, but if the soil remains saturated for prolonged periods, at any depth, rooting will be restricted.

There is some difference between species in their ability to tolerate water-logging, but Sitka spruce seems to be as vigorous as any under these conditions.

In the most severe conditions the roots will be restricted to the familiar flat plates seen on uprooted trees, but under slightly better conditions short sinkers may develop under the lateral roots. Rooting depth may vary from as little as 10 inches on the wettest sites to about 20 - 24 inches on some of the better deep peats. Uprooting will therefore be the predominant kind of damage, and it can be expected to start with small groups of trees blowing over, any time after the crop has exceeded about 35ft. in height.

Once wind-damage has started it is likely to continue at an accelerating rate until most of the crop has been affected. Changes in soil type, crop size or species will frequently form a boundary at which the damage stops.

The onset of wind-damage in these sites may also be associated with a slowing down in height growth in the remaining crop ; probably due to a combination of damage to roots, and to increased exposure.

Here then is one situation where some uncertainty can be removed. A fairly quick reconnaissance with a spade, in a crop which has just started to show signs of wind-throw will reveal how far it is likely to extend. Observations of the rate of extension for a season or two will soon indicate the time when action should be taken to clear the crop. A number of factors can initiate the wind-throw, perhaps the most common are thinning and drain maintenance, which respectively expose the remaining trees, and result in roots being severed.

However, while delayed or heavy thinning may make matters worse, early thinning does not appear to have any advantage, and only the complete avoidance of thinning would seem to help prolong the life of the crop slightly. Where rooting is bad, however, wind-throw is inevitable.

Freely drained soils.

This category includes brown earths of a range of depths, and a complex of podzolic soils, which may or may not have a pan, or a peat layer.

Under these conditions most species, especially Sitka spruce, will develop deep sinker roots, often almost tap roots under the stem of the tree, and rooting depths from 2 to 7 ft. are common. Except where rock or an indurated layer physically restricts the rooting the predominant type of damage will be breakage of the stem. In Britain this type of damage is most often found on fertile sites where height growth is rapid and delayed thinnings depress girth growth of the stems.

The first thinning suddenly exposes the trees, and small groups can be snapped off. It may or may not then extend, depending on the growth of the remaining trees, and the nature of the soil. Uprooting may also occur on these soils where depth is physically restricted by rock or induration.

RESULTS

These then are the two main problems that the forest manager must face, but before discussing ways and means of overcoming the problems it is, I think, worth having a look at recent research results which will provide some evidence to support recommendations.

We have for the past few years been studying the root development of various species, but mainly, Sitka spruce, on a range of soil types, and have some measure of trees' resistance to break or uprooting from the tree-pulling investigation. We also have some data on the forces which will be applied to trees, as measured in wind tunnels, and although the research is nowhere near complete, the available results from the two lines of investigation have been linked up. The results, while being far from decisive are I think still worthy of close inspection because they do fit remarkably well with field observations.

If the turning moment at the base of the tree, that will be applied by any wind velocity, is calculated and the result equated with the turning moment that trees on a given site are known to resist from tree-pulling studies, it is possible to find the critical wind velocity for any size of tree. This critical velocity can then be plotted against size of tree for a range of sites, so that a family of curves as shown in Figure 1 are produced.

All that is now required to predict the size that a crop will reach before being blown over is a knowledge of the frequency of gales of any velocity. It seems from still fairly limited observations that on upland sites a mean hourly wind speed of 40 knots can be expected quite frequently: probably in 2 out of 3 years. It can be seen then that trees on peaty gleys and surface water gleys would be blown at 50 ft.; deep peat at 60 ft. and brown earths at 70 ft. by such a wind. This accords well with observations. In sheltered valley sites the maximum wind velocity may only be 30 - 35 knots allowing correspondingly taller trees.

This now gives us a base line against which we can judge the likely benefit from silvicultural treatments such as spacing, ploughing, draining and thinning. It also gives us a better idea of the relative susceptibility of different soil types, and something on which to base estimates of rotation length. It should however be made clear that the curves shown are the average of several sites in different forests, and that there is quite an amount of variation about each line. Thus some deep peats may be as poor as peaty gleys and others nearer brown earths.

As already mentioned Stika spruce and, as far as can be seen, most

other species will develop deep sinker roots, given a free draining soil. On these sites however lateral root development is very much affected by the proximity of neighbouring trees.

This is clearly illustrated by the measurements of root spread of trees pulled over in two spacing experiments, in Radnor and Clocaenog

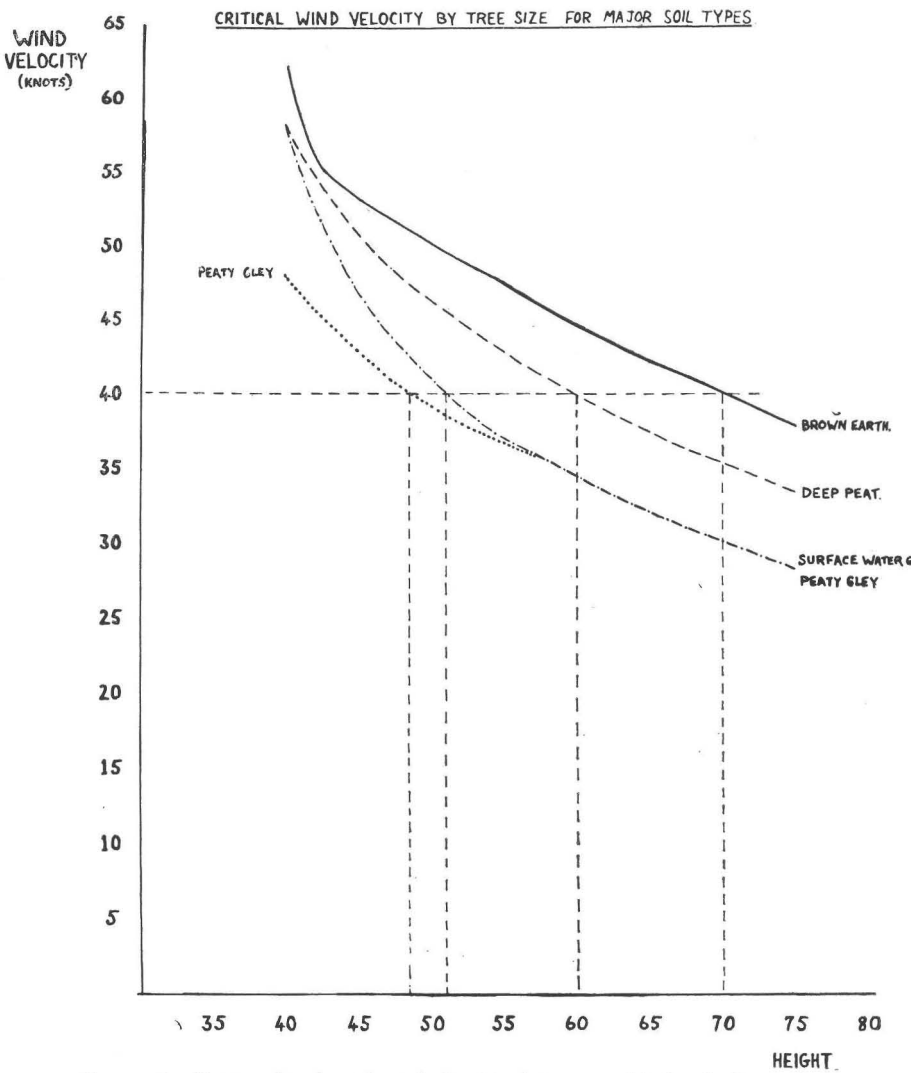


FIGURE 1. Curves showing the relationship between critical velocity and tree size, for trees on different soil types.

forests in North Wales. Both sets of plots were planted in the same year, but one which grew more rapidly had been given thinnings, while the other was still unthinned when pulled. Both plots were 28 years old when pulled over, and the thinned plots averaged 45 ft. tall, while the unthinned ones were 39 ft. tall.

TABLE 1

Root development related to spacing on thinned and unthinned Sitka spruce at Radnor and Clocaenog forests.

UNTHINNED		THINNED		Years Since First Thinning
Spacing	Root Diameter	Average Spacing	Root Diameter	
3 ft. × 3 ft.	4.2 ft.	5½ ft. × 5½ ft.	5.2 ft.	8
4½ ft. × 4½ ft.	5.0 ft.	8½ ft. × 8½ ft.	6.6 ft.	8
6 ft. × 6 ft.	6.2 ft.	11 ft. × 11 ft.	6.2 ft.	4
8 ft. × 8 ft.	7.6 ft.	13 ft. × 13 ft.	8.7 ft.	4

Rooting depth varied from 2 - 3 ft., according to the depth of soil. It can also be seen from these figures that the response after thinning is quite slow, and in the closest spaced plots, the root spread is still less than the spacing after eight years.

On poorly drained soils the situation is quite different ; directly comparable figures are not available, but two other experiments are of interest.

One of these was an experiment at Forest of Ae in South Scotland where pairs of dominant Norway spruce were selected when the crop was 11 years old, and one tree of each pair randomly chosen for isolation. These trees have been maintained as isolated dominants while the other one of the pair has been left in the unthinned crop. The trees were pulled over when 25 years old.

The second experiment was a thinning experiment at Kielder in North England in Stika spruce, where four plots were marked out in a 14 year old crop. The plots were then heavily thinned in turn (one third of the stocking removed at each thinning) on a three year cycle, so that the first thinnings were given at the age of 14, 17, 20, and 23 years respectively.

Although the plots were not replicated and one was eliminated because of a difference in soil type it is interesting to study the relationship between rooting diameter and depth for these two experiments as seen in Table 2. The trees were 30 years old when pulled over

Compared with the freely draining soils, the root systems of these trees have responded much more to opening up in terms of lateral root spread. On the other hand there has been a detrimental effect on rooting depth which was not nearly so apparent on the freely drained soils.

TABLE 2

Effect of spacing on root diameter & rooting depth in two experiments (see text).

	Species	Effective spacing	Rooting diameter		Rooting depth		Years since thinned
NS	isolated dominants	5.7 ft.	6.6 ft.	+ — 0.5	21.0 in.	+ — 1.72	—
	experiment	12.7 ft.	10.1 ft.		14.6 in.		14
SS	thinning	8.5 ft.	8.2 ft.	+ — 0.6	15.0 in.	+ — 0.7	10
		10.0 ft.	9.2 ft.		13.2 in.		13
	experiment	12.0 ft.	13.2 ft.		9.8 in.		16

The resistance to pulling over, comparing similar sized trees on the various treatments is the same, but of course the wind forces applied to the trees in the open plots will be much greater.

One possible explanation of these results is provided by considering the effect of the crop on the moisture regime of the soil. In the close spread crops, the interception of rainfall and removal by transpiration will be greater than in the widely spaced crops, because of the denser cover and the greater crown surface area. This could result in an appreciable drying out of the site and improved rooting conditions. Is this an argument in favour of no thinning on badly drained soils which are susceptible to wind-damage?

Little work has been done yet on studying the effects of initial ploughing treatment on the development of the root systems in the thinning stage. However, observations definitely indicate that on freely draining soils lateral root development takes place under the plough furrows and the tree stability is unlikely to be affected. On badly drained soils, especially if the depth of the plough furrow is almost the same as the depth of the permable top soil, lateral root development is restricted and in the absence of sinker roots the trees are quite unstable.

A much more important form of ground preparation is of course drainage which not only is the main requirement to prevent windthrow, but will also go a long way towards increasing the productivity of the site.

Unfortunately there is very little experimental evidence available at present to provide information on the response of tree crops to drainage either as improved root or shoot growth. One experiment, described in an earlier paper (Fraser 1962 a) has shown that a thicket stage crop will respond to drain deepening, but the experiment did not have drains up to present day recommendations. The prospects of major improvements in rooting are high if drainage is carried out

at planting or in the first few years of growth, but it becomes a more uncertain operation when trying to save crops which have already reached thicket stage. The response seems unlikely to be enough to postpone wind-throw sufficiently to recover the high cost of the operation.

Economic calculations tend to confirm the view that drainage at planting is in all respects the most desirable, but that up to early thicket stage (say 10 years) it is still a profitable operation.

So far we have dealt with the soil and roots, and silvicultural treatments which can improve these and hence trees ability to withstand wind forces. The silviculturist can also influence the forces which are applied to the trees, by giving attention to crop structure and layout.

Wind-tunnel tests which have been described in detail elsewhere (Fraser 1962 b and 1964) have demonstrated the adverse effects of roads and thinning on the problem. Both of these factors result in very appreciable increases in the forces applied to the trees and, as has been discussed earlier, on the most susceptible soils trees are unable to resist these by developing better roots.

These same studies and field observations on forests growing in exposed sites, strongly suggest that the most effective method of reducing the forces on the trees in a crop is to achieve a smooth surface to the canopy. By doing this, the amount of energy which can be transmitted to the trees is reduced to a minimum, and it is confined to the tip of the tree, where the cross-sectional area is least. If a rough surface is developed, either by thinning or by felling small groups, turbulent flow is created, and much greater forces are applied to the main crown lower down the trees. On well rooted soils, the trees are likely to be able to withstand these high forces, and will probably develop roots in response, but on badly drained soils this is not possible and wind-throw will occur. Any kind of thinning tends to make the surface of the canopy rougher. Experiments are now in hand to throw more light on this topic.

CONCLUSIONS

With the results discussed so far, it becomes possible to rationalise any given situation and make plans with some prospect of adhering to them.

The first obvious step is to obtain some detailed knowledge of the soils in a forest, so that the likely extent of the problem can be assessed, and also so that treatments can be adjusted accordingly. A soil map is perhaps a luxury, but notes kept in compartment records can go a long way towards indicating soil type.

The second step must be to obtain a break down by age classes of crops on the susceptible soils, so that decisions can be made on the

allocation of work. It has been found convenient in some cases to recognise three age-class groups, on susceptible soils.

1. Crops which are more than about 25 ft. tall; probably over 20 years of age. These will be in imminent danger of blowing over, and will almost certainly have passed the stage where drainage could be effective. Thinning in such crops will probably initiate some wind-throw.

   Such crops are almost certainly past saving, and consideration of anticipatory fellings seems eminently worth-while; this avoids the fluctations in work and output of produce which are inevitable if wind-throw is accepted as it comes.

2. Crops which are between 10 and 25 ft. tall; probably 10 - 20 years of age. These crops will be expensive to drain, but have a reasonable chance of responding. The resources available will decide whether drainage can be attempted, but they will be of low priority because of the uncertainty of success. On the other hand thinning and even brashing could be avoided with reasonable prospects of prolonging the life of the crop. (Avoidance of brashing reduces costs rather than increases stability).

3. Crops less than 10 ft. tall; younger than 10 years. These crops can readily be drained, and with improved techniques, at an acceptable cost. The response is likely to be large, and so wind-throw may well be eliminated or at least delayed long enough to make a decent income from the crop.

A fourth category of course are crops on non-susceptible soils, which, apart from being thinned early and regularly, need not be subject to other constraints.

Much useful information can also be obtained by studying any wind-damage that occurs in some detail. The frequency of damage, the soils on which it occurs, and the height of the trees that are blown over, are all useful guides as to how long younger crops will stand. This is invaluable if deciding on anticipatory fellings, which ideally should be the day before the trees would have blown over!

LITERATURE CITED

FRASER, A.I. 1962 (a). Roots and soil as factors in tree stability. *Forestry* XXXV (2): 117 - 127.

———— 1962 (b). Wind tunnel studies of the forces acting on the crowns of small trees. *For. Com. Ann. Res. Rep. for year ended March 1962*: 178 - 183.

———— 1964. Wind tunnel and other related studies on coniferous trees and tree crops. *Scottish For.* **18.** (2): 84 - 92.

Private Visit to the Estate of Comte du Pontavice

By M. McNAMARA

ON the night of Wednesday the 2nd September, 1964, my wife and I visited the home of Count and Countess du Pontavice at Foyges des Salles Gollavec, Cotes du Nord where they live with their two children Stephanie aged 6 and Gilles aged 4.

The original chateau which dates back to the 16th century was extended in 1924, great care being taken to match the new with the old. It is surrounded by the estate's woodlands and its terraced gardens overlook a picturesque lake. Inside, the walls are pannelled and the parquet floors are made from hardwoods grown on the estate. In the hall we saw two perfectly preserved examples of the old Breton bed, beautifully carved out of native timber. The unique feature of this type of bed is that its ends are high and one end has a double door through which the occupant enters. Since the house of the Breton peasant had only one bedroom, the bed was designed to provide a measure of privacy.

The estate consists of 3,800 ha. of which 2,800 ha. is forest. The soil is derived from Cambrian rock low in calcium with an average pH of 4. Over sections of the woodland the soil particles are rather small and water retentive. Formerly the woodlands consisted of high forest and coppice. The timber from the high forest was used for constructional work. It was not converted in the estate sawmill but was sent to a mill which specialised in sawing for hire. The estate sawmill which was water powered originally (it is now powered by a 50 H.P. deisel engine) was reserved for the pulverising of coppice for tanning. The timber from the coppice was also used for the making of charcoal. The charcoal was used for the heating of the chateau and for the smelting of iron, an industry which flourished on the estate up to 1880. The produce of the latter industry was sold at Port Larient. The sale of firewood also provided a profitable outlet for coppice.

With the closing down of the iron industry and the decline in demand for timber for tanning the coppice fell in value. The final blow to the coppice system of woodland management was the failure of firewood to command an economic price on the market. The estate still sells approximately 3,000 cubic metres of firewood annually but the price obtained does not cover the cost of felling and preparation for sale. It is now sold in order to clear ground for conifer plantations. These changes in trends called for a drastic revision in management aims and the estate embarked on a policy of planting Japanese larch *(Larix leptolepis),* Corsican pine *(Pinus nigra* var. *laricio),* western hemlock *(Tsuga heterophylla)* and Sitka spruce *(Picea sitchensis)* to replace the coppice. The outbreak of war, scarcity and cost of labour made the implimentation of this policy very

difficult and it was only since the present Count took over management that any substantial progress has been made. He had, however, a fine example of how conifers could grow on the estate. An 80 years old block of Scots pine *(Pinus sylvestris),* planted when his grandmother was owner, is now mature and for growth and stem form it compares very favourably with the best plantations of the species to be seen anywhere else.

The count has prepared well for his task. He holds the Diploma, Ecole Superieure de Paris, but he attributes much of his knowledge of forestry to the fact that from early childhood he followed his father through the woods and absorbed a fund of forest lore from him. His head keeper has been with the family for 40 years and his father before him held the same position. The tradition goes back as far as the history of the family can be traced. There are two assistant keepers.

The forest and sawmill carry a staff of 25 men in summer and 35 in winter. The extra men go to Jersey for seasonal employment during the summer months.

The Count's annual planting programme varies. Last year he planted 60 ha. and while he has not completed his plans for this season he hopes to achieve a comparable target. He said that the availability of workers, ground, plants and money are the governing factors. He meets his plants requirements from the estate nursery. His main problem is the clearing of scrub and in order to get rid of that material he sells firewood at an uneconomic price. For getting rid of light scrub (2″ diameter or less) he experimented with three different machines :—

(1) Bulldozer with angle blade.
(2) The use of an attachment to his tractor which operates a revolving blade.
(3) The Debroussailleuse.

Of the three he finds the latter the most satisfactory for the type of scrub he has to deal with. This machine weighs about a ton, consists of two rollers each with six blades fitted to a robust chassis which trails behind his tractor. The blades are not square to the line of travel but are angled inwards slightly. As the rollers travel over the scrub the blades break it down and crush it sufficiently to make planting possible without the necessity for removing the scrub. With this machine he can clear 3 ha. per day.

The plants used in planting ground cleared in this manner are larger than those in general use in Ireland. They average about 3ft. in height and, while the cost of handling such plants must be high, the advantage of having the young trees standing well above the scrub is calculated to reduce the cost of subsequent cleaning and more than offset the initial additional cost.

The problems which Count du Pontavice is dealing with confront most foresters and woodland owners in Brittany and their progress will be followed with interest by all who took part in our study tour.

Society's Activities

Day Excursion to Delgany Forest
25th April, 1964

DESPITE the poor weather, a party of some 20 to 30 members gathered at Newtownmountkennedy on April 25th, 1964, and moved on to the forester's house. There Mr. J. Doyle, Forester in Charge, welcomed us on behalf of the Minister for Lands. Mr. M. Swan, President, expressed the Society's appreciation for the facilities offered by the Minister.

The party moved on, led by Mr. G. Gallagher, leader for the day, to the first stop. Here Mr. Doyle commented on the history of Mount Kennedy Demesne, ruled by some unsavoury landlords in times gone by. Of main interest was a stand of *Pinus radiata* (P. 1951) green-pruned by Mr. Doyle in 1961. Figures for eight trees showed them to have a B.H.Q.G. averaging $5\frac{3}{4}$ inches which, at the time of pruning, stood at $3\frac{3}{4}$ inches. Although not designed as an experiment, this trial showed that *Pinus radiata* could stand green-pruning at an early age. The desirability of early green-pruning in such a coarse-branched species was discussed.

A stop made by a 13 year old ash stand brought up the frequently made comparison of growth between conifers and hardwoods. Mr. O. V. Mooney recommended that ash might be treated in a manner similar to poplar by planting at 12 × 12 feet and following up with intensive treatment. The attractive price available for hurley-quality ash should be an incentive to further thoughts on the species. In discussing the comparative values of mixed conifer-hardwoods stands and monocultures Mr. T. Mc Evoy suggested the use of a mixed group forest as a workable solution.

As Norway spruce had been mentioned in relation to the ash — both in terms of mixtures and to compare them — we made a brief stop in a nearby stand of 13 year old *Picea abies.* The ultimate value of the stand was hard to assess as $\frac{2}{3}$ of the height growth had occurred in the last six years. Some unknown factor (frost, perhaps?) had detrimentally affected growth in the first seven years of the plantation's life.

Being on the subject of hardwoods and (or verus?) softwoods we made a fourth stop where there were hardwoods in a matrix of conifers, the mixture being: *Picea abies, Thuja plicata* and *Castanea sativa.* Mr. T. Moloney commented on the difficulties of maintaining such cultures and considered this effort a loss essentially. To this Mr. G. Gallagher suggested that we could afford to lose some increment for amenity purposes. So another favourite topic was batted around

—hardwoods and amenity forests, their worth and the sweat lost to make them work.

The major stop of the day was in a further stand of *Pinus radiata* in which a permanent sample-plot, including an experiment, was laid down by the Research Branch of the Forestry Division. Mr. Mooney opened the discussion by giving us the background to the rise of *Pinus radiata* from an insignificant indigenous species covering 10,000 acres of Californian coastline to a species of considerable importance as an exotic in many lands due to its phenominal growth in moister climates. Use in this country has been limited by establishment problems and its susceptibility to cold winter winds. Doubts have also arisen as to its ultimate value due to coarseness in branching, which may be relieved by pruning but that course would also curtail growth. This was the reason for the experiment, the main object of which was to determine the depression of current diameter and height increment that varying degrees of green-pruning produce in the species.

Mr. G. Gallagher went on to give us details of the establishment of the experiment on this moderately sheltered, westerly slope. The area was planted in 1951 at 6 × 6 feet spacing. At last measurement top height was 35 feet and the average for the crop 31 feet with corresponding B.H.Q.G.'s of 6¾ and 4 inches. The plot was laid out in 1963 and consisted of 120 trees in a fully randomized experiment with 30 trees in each of four treatments, *viz.* control, 25%, 45% and 65% live crown removed. These prunings resulted in average pruning heights of 12, 18 and 25 feet respectively. Pruning intensity was obviously very high in the latter treatment and already the effects of pruning on the growth of the stand could be noted. The relationship between DBH and per cent live crown removed was curvilinear, falling sharply at the highest intensities while that between height growth and crown removed was linear with a less marked reduction in height increment due to pruning. Mr. Gallagher commented that up to 30% of live crown could be removed without suffering more than a 10% loss in diameter increment, nor would 25% crown removal occasion more than 10% loss in height increment, which means that, for the stand in question pruning could be carried up to 15 feet at 13 years of age with but a slight loss in increment which would be more than compensated for by improvement in quality.

The ensuing discussion mainly concerned the ultimate use of the species here. In enquiring whether this rapidly-grown timber would conform to specification, Mr. D. McGlynn raised the question of the effect of ring width on timber quality. The problems of establishment and maintenance of vigour in this species were considered, being probably the greatest deterrents to wider use of *Pinus radiata* in Ireland. Mr. L. Gallagher commented that the lower live branches of certain trees have been found to be parasitic, drawing off nutrients while themselves contributing nothing to the growth of the tree, and that

nutrient studies of trees in this type of experiment could yield results of value in elucidating further the nature of tree growth.

On our return to Mr. Doyle's house we had a welcome cup of tea which cheered our spirits, somewhat dampened by the weather, and the excursion broke up after Mr. Swan conveyed our thanks to the Minister and to Mr. Doyle for the facilities enjoyed by the society.

L.U.G.

Day Excursion to Abbeyleix Demesne 11th May, 1964

DESPITE heavy rain some 40 members and their friends enjoyed a Sunday afternoon in the woods of the de Vesci estate at Abbeyleix. Lord de Vesci and his forest manager, Mr. Fyffer, accompanied the party and we were deeply indebted to them for their thorough preparations as well as for a very welcome tea under shelter in Bluebell Wood.

A feature of this estate is the extensive area of very ancient pedunculate oak woodland with trees over 300 years old, believed to be one of the very few remnants of the native woodland of the Central Plain. From the commercial aspect these woods are far beyond maturity but on Bluebell Hill a block is being carefully preserved in open canopy with clean floor which, at the time of our visit, was a magnificent sea of bluebells. This wood is open to the public in May and the view was expressed that the state should be prepared to assist in a practical way in the maintenance of such a botanical and tourist attraction.

Another 30 acre block of 250 year old oak was undergoing treatment for conversion to conifers. Stage one was the clearing of one third of the area by groups for planting with beech *(Fagus sylvatica)* silver, noble and grand firs *(Abies alba, A. Procera* and *A. grandis),* Douglas fir *(Pseudotsuga taxifolia),* western red cedar *(Thuja plicata)* and western hemlock *(Tsuga heterophylla).* This work was extremely well planned, both amenity and extraction being fully considered. Estimates of the length of the regeneration cycle ranged from 10 to 30 years.

As in most Irish estates, the woodlands suffered in the past from the absence of a management plan or even of a clear definition of objects of management. Mr. Fyffer has now prepared a new Working Plan on practical lines with a detailed five year plan of operation covering 600 acres of conifers, 600 acres of broadleaves and 200 of blanks and scrubs. Forty acres have been planted in each of the last three years. Three hundred acres of conifers, aged 20 to 50 years, are receiving first or second thinning yielding some small timber for

the estate sawmill. A full-time forest staff is employed and a nursery for domestic supplies is maintained.

The red squirrel has caused considerable damage in young Scots pine (*Pinus sylvestris*) crops and as an illustration a 27 year old plantation was inspected where leader breakage followed isolation of apparently good stems. This problem creates a difficulty in management and the only solution may well be early replacement. Close by, a 29 year old, Scots pine plantation, less heavily damaged, covering 3.6 acres was reduced to 280 stems per acre and underplanted with Norway spruce *(Picea abies)*. The overcrop will be reduced gradually to 50 standards per acre to mature in, say, 60 years time with the Norway spruce. As the site should be far more productive under spruce and as spring frost is a problem this appeared to be an attractive solution. An adjoining 29 year old Norway spruce plot was of Quality Class I with a standing volume of 3,360 H. ft. High pruning to 18 feet was done two years ago on 100 stems per acre by schoolboys on holiday at the very reasonable cost of 3d. per stem. It was noted with approval that stumps of felled conifers were creosote treated against *Fomes annosus,* a dangerous fungus on afforested agricultural land.

The party was left with the impression of a private forest where problems are being tackled in a practical and scientific way which promises to be rewarding to the owner both in financial returns and in a personal sense of achievement.

T. McE.

Excursion to Castleshane

14th June, 1964

THERE was a good attendance of members at the day excursion to Castleshane on Sunday the 14th June. Mr. Breslin welcomed the party on behalf of the Minister for Lands and introduced the Forester, Mr. Dooley. In outlining the history of the estate he told us that the lands originally belonged to the Lucas family. The Department, he said, entered the scene in 1931 when it bought the estate comprising 270 acres. At present there were 80 acres of hardwood and 190 acres of conifers.

The first plot we visited consisted of oak and elm. A third species, namely Japanese larch, had been originally planted with the oak and elm but had been gradually taken out and was now all removed.

PLOT I.

COMPT. 5 — STAND I — 8 ACRES P/35.

Area of plot — 1/10 acre (circular)
Total number of final crop trees — — 140 per acre.
Total number of supporting crop trees — 270 per acre.
Species — Oak, Elm and Sycamore.

PLOT DATA

Final Crop Trees	*Number*	Timber height	Mean Q/G	Basal Area	Est. M.Q.G.	Vol. per pole	Total Vol. Plot	Vol. per acre
Oak —	8	16 ft.	5½″	1.78	5″	2.78	22.2 c.ft.	222 c.ft.
Elm —	6	12 ft.	4¾″	.98	4½″	1.69	10.0 ,,	100 c.ft.
Supporting Crop								
Oak —	12	12 ft.	4″	1.34	4″	.89	10.55 ,,	105 c.ft.
Elm —	13	8 ft.	4¼″	1.72	4¼″	1.0	13.0 ,,	130 c.ft.
Sycamore	2		3¼″	.17	3¼″	.6	1.2 ,,	12 c.ft.
TOTALS	41			5.99			56.95 ,,	569 c.ft.

Basal Area of Final Crop trees per acre — — 2.76 sq.ft.
(expressed as a percentage of total b/a) — — 46%
Total present Volume of Final Crop trees per acre — 320 c.ft.
as a percentage of total vol. per acre — — 56%

pH of soil			
	Surface	—	5.0
	3″	—	5.0
	12″	—	4.2
	18″	—	4.5
	24″	—	4.2

In reply to the question as to why plant Japanese larch at all, Mr. Breslin said that it was a good nurse tree for elm in its early years and also one got good revenue from the thinnings. Mr. Finnerty, who was the forester here for some time, said that in 1950 most of the Japanese larch had been removed and the hardwood crop looked to be in very poor shape. He carried out a weeding of the poorer stems and planted silver fir and Sitka spruce in the gaps. He added that he considered it nearly a miracle that the crop recovered to the condition it was in now. Mr. Mooney said that there was low stocking compared to what was normal, but yet basal area was high and we had now the position where the crop could put on rapid girth growth. Mr. Mulloy said that not much had been done to the crop except remove the destructive dominants. As to future treatment it was thought that the best stems should be kept on to provide veneer lengths. In this stand as the oak had the bigger quarter-girth and would likely be the better volume producer, it was considered that future treatment should favour that species.

The party then moved on to a plot in Norway spruce. This plot had the following statistics :

PLOT II.
COMPT. 4. — STAND I. — 9 ACRES — P/33
Species: Norway Spruce.

	Plot Data	*Quality Class I B.F.C. Y.T.*
Total number of stems per acre ...	480	560
Mean B.H. Q.G.	6″	6″
Average height (top height) ...	47 ft.	50 ft.
Average vol. per pole as per Gen. Vol. Tables	5.56 c. ft.	6.07 c. ft.
Total present volume	2,700 c. ft.	3,400 c. ft.
Total Basal Area	120 sq. ft.	140.00 sq. ft.
Basal area removed at last thinning	26 sq. ft.	29 sq. ft.
As a percentage of total Basal area	17.8%	17%
Average B/a removed per acre at last thinning over 11 acres ...	31.50 sq. ft.	
As percentage of total crop ...	20.8%	

pH of Soil	Surface	—	4.5
	3″	—	4.5—5.0
	12″	—	5.5
	18″	—	6.2

This plot had been heavily thinned and selected stems had been high pruned. Cost of high pruning was 6d. per stem. Discussion then centred around the length of rotation for Norway spruce. Some suggested 45-50 years. Others thought that with the cost of high pruning it would be better to keep the crop on until it was 60 years. Yet again it was said that the crop should not be kept on after it had reached 12″ quarter-girth.

The party then moved on to another plot in hardwoods. Here elm was the dominant species to sycamore and oak. Plot figures here were:

PLOT III.
COMPT. 8. P/34 SPECIES — ELM

Total number of Final Crop trees per acre — — 150
Total number of Supporting Crop trees per acre — 110 } 260

PLOT DATA

Final Crop trees

	Mean BHQG	Est. MQG	Timber height	Vol. per pole	Vol. per acre
15	5¾″	5¼″	20 ft.	3.83 c. ft.	570 c. ft.

Supporting Crop trees

	Mean BHQG	Est. MQG	Timber height	Vol. per pole	Vol. per acre
11	5¼″	5″	12 ft.	2.08 c. ft.	230 c. ft.
				TOTAL	800 c. ft.

Basal Area of Final Crop trees
34.4 sq. ft. per acre (as percentage of total 62%)
Basal Area of Supporting Crop trees
21.1 sq. ft. per acre (as percentage of total 38%)
TOTAL 55.5 sq ft. per acre
Volume of Final Crop 570 c. ft. per acre (as % of total — 71%)
Volume of Supporting Crop 230 c. ft. per acre (as % of total — 29%)

pH of Soil

Surface	—	4.5
3″	—	4.8
12″	—	5.5
18″	—	6.5
24″	—	6.8

We were told that this crop had been planted with elm pure at 5 × 5 spacing. It had always been a normally stocked stand with good straight stems. It was agreed that thinning policy here should be to remove the destructive dominants and gradually prune out the inferior trees leaving the eventual elite 50 to 60 stems for veneer.

The last plot we saw was one in a stand of Norway spruce. Figures were :

PLOT IV.
(COMPT. 6. — STAND I. — 12 ACRES — P/33)
Species : Norway Spruce

	Plot Data	*Quality Class I B.F.C. Y.T.*
Total Number of Trees per acre ...	380	560
Mean Quarter Girth	7″	6″
Average height	53 ft.	50 ft.
Average Volume per pole ...	8.58 c. ft.	
Total Volume per acre	3,260 c. ft.	3,400 c. ft.
Total Basal Area	120 sq. ft.	140 sq. ft.
Basal Area removed at last thinning	35 sq. ft.	29 sq. ft.
Average basal area removed over the stand as percenetage of total B/A	21%	17%
Volume removed per acre ...	780 c. ft.	

pH of Soil

Surface	—	4.0
3″	—	4.0—4.3
12″	—	4.8—5.0
18″	—	5.1

Argument here centred around the thining and clear-felling methods adopted in such areas. Professor Clear was against the mass methods

of clear-felling large blocks. His argument was that in an area like this one would have trouble replanting if a big area was cleared and the ground vegetation was allowed to grow rampant. He though that maybe a selection felling might be the answer. Others disagreed with this idea on the grounds that a selection felling was a luxury that could only be indulged in if one's aim was not primarily a quick cash return. It was generally felt here that when the timber reached an economic quarter-girth it should be clear felled and quickly replanted.

After tea the President, Mr. Swan, thanked Mr. Breslin and his staff and closed the meting.

M.J.S.

Day Excursion to Newport Forest 12th July, 1964

ON Sunday, 12th July, the Society visited Ballyhourigan Property of Newport Forest which is under the charge of Mr. Cawley. We had a very good attendance including members from Northern Ireland.

This is the oldest property of this forest and contains crops in all development stages from recent plantings to mature timber. The discussions before tea centred around selection of species and was prompted by the change from Sitka spruce to Japanese larch on mineral soil. The influence of economics on species selection was discussed and it was pointed out that this forest was in the fortunate position of having markets for both saw timber and pulpwood at its doorstep.

The party then moved to the higher ground where different soil conditions and exposure were discussed.

After tea the party visited spruce stands in the thinning stages. Here we saw where the establishment of the Chipboard factory at Scarriff had influenced management in their handling of spruce crops at the thinning stages. Mr. Gibbons, who led the party, explained the present objects of management and how the Department now set about achieving these objects. From the particular, the discussion then extended to thinnings in general and this in turn led to the question of pruning and quality production. The excursion closed on a lively and animated debate on the question of the future uses of timber, for lumber, for plywood, chipboard and other reconstituted forms of wood for cellulose.

M.S.

Day Excursion to Hillsborough Forest 12th September, 1964

THE finals of the various Forestry Competitions for 1964 were held on Saturday, 12th September, at Hillsborough Forest. Members of the Society had been invites and those attending joined some 300 Forest Workers, Foresters and the general public for a gala day with brilliant sunshine.

The main competition, which is the Tree Felling Competition, was won by Albert Johnston, who is the son of the Forester at Gortnamoyagh Forest. In this competition there is a finalist from each district. Each competitor must judge in which direction the tree will fall and how high the tree is. The maximum points are 20 and points are lost if the tree falls in a different direction or if the height estimated was wrong. A further 45 marks are awarded for qoality of workmanship, this being divided to give 10 marks each for laying-in by axe, felling by the saw, snedding branches, accuracy of cross-cutting and 5 marks for the angle of cross-cutting. Fifteen marks are awarded for the technique used, 5 for felling with the axe, 5 for snedding and 5 for use of the saw in felling. The President, Mr. Maurice Swan, acted as one of the judges of tool using technique. Up to 20 marks are awarded for speed of work, the man completing all the operations in the quickest time receiving full marks and others losing marks for the number of seconds that they are slower than he was. Only hand tools are allowed in this competition and the trees used this year were hemlock. The standard of work was generally very high but there were a few unfortunate lapses in accuracy of cross-cutting. The runner-up in the competition was Frank Gilliland from Knockmany Forest, who was last year's winner. The third was Herbert McAdam of Hillsborough, who had been third in 1961 and 1962.

The Axe Felling Competition, which is determined solely on time, all competitors starting together, was won by T. Bond from Cam Forest. Again, there is one finalist from each forest district. The runner-up in this competition was Andy McLean, the Forester at Randalstown Forest.

The Chain Saw Competition, which is also determined solely by time with all competitors starting simultaneously, was won by John Creene of Newcastle Forest with the runner-up J. A. Monaghan of Baronscourt. This competition starts with all motors of the chain saws stopped, the competitor must then fell the tree after cutting a 4 in. deep wedge in the direction of the tree's fall, stop his engine, jack up the tree, re-start the engine and cut three rings from the top of the tree, stopping the engine and placing the saw on the ground.

A special prize which had been awarded for the best maintained chain and guide bar was a tie between John Dobbin of Ballycastle Forest and J. A. Monaghan of Baronscourt.

In the Cross-Cutting Competition, which is open to any pair of workers using hand-saws only, the winners were J. A. and S. Monaghan of Baronscourt Forest and the runners-up E. Laird and W. Stevenson, also from Baronscourt. In this competition each team of two men must cut a disc from each of three logs, the first to complete in each heat being the winner. All five cross-cutting contests have now been won by teams from Baronscourt Forest.

Teams from each district also compete in a Fire Fighting Competition. The three teams with the least penalty marks in a qualifying round are permitted to enter the final. In the qualifying round penalty points are given for cleanliness and condition of equipment, hose running, hand signals, efficiency of drill, abuse of equipment and the time taken to carry out a drill laid down by the officer currently in charge. The three finalists then compete on a time basis alone, starting off with the crew in the fire tender and no pumps working, right through the routine of taking the pump to the water, running out hoses, laying on the water and finally knocking down tin cans. The winning team was from Baronscourt Forest, with Bunlougher runner-up and Ballypatrick third.

Suitable refreshments were provided on the spot and the day ended with the preseneation of the McGregor Cup for the Tree Felling Competition, the Macmahon Shield for Fire Fighting, the Perpetual Challenge Bowl for the best individual garden in Northern Ireland Forestry and the Perpetual Challenge Shield for the best housing site in Northern Ireland and the various prizes and certificates by His Grace the Duke of Abercorn, President of the Royal Forestry Society of England, Wales and Northern Ireland, and A. N. Macmahon, Esq., O.B.E., who recently retired from the post of Principal Officer in the Forestry Division of the Ministry of Agriculture for Northern Ireland.

W. H. JACK, RESEARCH OFFICER.

Illustrated Lecture at Galway Saturday, February 22nd, 1965

A small but enthusiastic group of Society members gathered in the Warwick Hotel, Salthill, Galway on Saturday, 22nd February, at 8 p.m. to hear Dr. Neil Murray give a learned and highly interesting lecture (illustrated with slides) on Pollen Analysis.

INVESTIGATION OF FORMER WOODLAND GROWTH AT CLONSAST BOG

This talk was based on a thesis for the degree of Ph.D. presented in 1957 at T.C.D. The investigations were carried out with a view to tracing the sequence of events leading to the overwhelming by peat of the forests or woods which once grew on the mineral soil in the Clonsast area and also any subsequent colonisation of the peat by trees.

Dr. Murray described briefly the history of Pollen analysis and the methods used in Pollen analytical research. By means of Pollen diagrams and also colour slides Dr. Murray described the process of peat formation in a section of Clonsast Bog. At the points in question, peat development had commenced about 6,000 years ago. The area is at present being intensively worked by Bord na Mona, to whom Dr. Murray expressed his thanks for their kind co-operation.

Pollen is produced in large quantities by most plants including trees, is dispersed and settles over the whole landscape but only that deposited in bogs or lakes becomes preserved well enough and in sufficient quantities to be of use to the pollen analyist.

Dr. Murray quoted Swedish research workers who have estimated that the spruce forest of Southern and middle Sweden produce about seventy five thousand tons of pollen annually when flowering freely. The usual distance of dispersal varies from thirty to sixty miles. Samples containing pollen are commonly obtained in Ireland from bogs. The number of pollen grains of trees and ground vegetation contained in these samples are counted under the microscope following laboratory treatments which concentrate the grains. The results are plotted on graphs which also show the stratigraphy and level of the bog or lake mud from which the particular sample came, and yield curves showing changes which occured in the relative percentages of the different species represented. From the movement of these curves inferences may be drawn as to the vegetational cover of the landscape at the time of formation of the different levels of the deposit. Further inferences may be drawn from the manner in which the curves alter and from the appearance or disappearance of certain species from the spectra. The graphs, or Pollen diagrams as they are called, are divided by means of these changes into different zones which have been dated. These zones, which may be traced in bogs all over the country, are based on a very large number of stratigraphical and pollen-analytical investigations. Very briefly they are described as follows :—

Zone VI is terminated and VII begins where pine values drop, alder increases and hazel is at its minimum for the late-Boreal period. Zone VII ends and VIII begins where there is a general fall in elm followed later by a rise and subsequent decline in oak. Elm later increases again. The pollen of *Plantago lanceolata* appears. This is a weed of cultivation and indicates some form of tilling of the soil on a scale wide enough for its pollen to make an appreciable contribution to the "pollen rain" as this wind-dispersed pollen is often called, due to the way in which it falls to the ground.

The VII to VIII transition occurs about B.C. 3,100. It is the transition from the Atlantic to the Pagan period.

Towards the end (B.C. 300) of Zone VIII elm values rise, while alder decreases to low values. Ash behaves similarly to elm and any factor affecting one affects both.

Zone VIII ends and IX begins where elm falls to low values, which persist until the pollen of planted elm causes an expansion of the curve in Zone X. Ash values also decrease and alder and birch increase. The Zone VIII to Zone IX transition occurs at approximately A.D. 250 and is the Pagan to Christian Period transition.

The Zone IX to X transition is indicated by the appearance of beech and spruce pollen. The curves for elm and pine expand as a result of the planting of these species. The transition is dated at A.D. 1700.

Agricultural interference with the vegetational cover is inferred from the curves where Elm values fall to a minimum, hazel, alder and birch values rise and ash, where present, decreases. These movements in the curves for tree pollen are accompanied by the appearance of or increase in value of *Plantago lanceolata, Artemisia* and *Cerealia.* The pollen of *Rumex* or Dock is sometimes used as an indication of agricultural interference with the woodland cover.

During the course of his talk Dr. Murray pointed out levels of the Pollen diagrams representing times at which early farmers were at work. He showed how the surface of the mineral soil at Clonsast had gradually been covered by peat which was at first basic or fen peat. The change over to acid conditions was reflected in both pollen and macroscopic and fossil remains such as leaves, wood and fibre.

Colour slides were shown of a trackway which had been laid down at approximately the time of Christ. It was dated to this time on the evidence of the Pollen curves and this date was subsequently confirmed by the Radio Carbon dating method. Two pieces of Ash wood from this trackway showed ends cut by metal implements. Their diameters were 6.5 centimetres and 8 centimetres and they had seventy-six and over ninety growth rings respectively, which showed how slowly they had grown. Slightly above the level of this trackway the peat was more humified and contained the roots of a widespread colonisation of the bog surface at approximately 250 A.D. This date was also obtained by the Radio Carbon method. This colonisation lasted for well over 100 years, as ring counts on many of the smaller stumps revealed over one hundred growth rings. It was suggested by A. C. Forbes that the pine at present growing in Ireland is all descended from introduced stock, in other words, that there was a break in the lineage of the pine here. Dr. Murray does not believe this to be the case as he found the pollen of pine from the bottom of the bog right up to the recent surface. He pointed out however that is was quite likely that most of the pine growing in Ireland now is in fact descended from introduced stock but he believes that the native trees survived in small numbers in inaccessible places. He said that other workers in the field of Pollen Analysis do not regard the percentages of pine pollen which he found in the upper levels of the peat to be sufficient to indicate the continued presence of the native pine, as pine pollen is often carried over very large distances and

could have come from Britain or the Continent. Dr. Murray said he did not believe that such long distance pollen could be persistantly present at all levels and in addition pointed out that pine pollen had been found by a Swiss botanist up to the present day surface in a series of peat samples from Carrantuohill. In the upper levels of his diagrams Dr. Murray showed where the pollen from introduced spruce trees made its appearance, indicating the arrival of exotic conifers in Ireland. He discussed at length the inferences to be drawn from the pollen curves in several diagrams but this material is to be published elsewhere.

At the end of the lecture Dr. Murray answered questions and he attributed the disappearance of Ulmus from the scene at certain periods to two factors *viz* the use by man of the bark of elm and the presence of Dutch Elm disease. The association of *Plntago lanceolata* with human interference is based on a number of independent factors and it may be safely used as a indication of man's use of land for agricultural purposes.

The meeting ended with the vice president Mr. Mooney thanking Dr. Murray.

E. McG.

Illustrated Lecture—Dublin
27th February, 1965

THE President of the Society, Mr. C. Kilpatrick, introduced the speaker, Dr. J. S. Jackson, Keeper of the Natural History Museum, Dublin, a man not only noted for his wide knowledge of geology but also for his deep interest in forestry.

THE GEOLOGY OF THE IRISH COUNTRYSIDE, ITS RELATION TO SOILS AND ITS EFFECTS ON FORESTRY

In introducing his subject Dr. Jackson described it as being one complimentary to soils ; although it confines itself to the basic materials, insufficient knowledge of the geological situation can lead to erroneous interpretations of soil types and formation.

A series of slides showed the development of geological thought in Ireland beginning with the Rev. John Hamilton's map in which symbols were used for the first time. Griffith's quarter-inch geological map of 1838 went into great detail and was not superceded for many years. Major General J. E. Portlock was the first man to do a soil

survey in Ireland. The very comprehensive survey undertaken by him between 1835 and 1843 proved to be such a costly affair that it was abandoned after the counties of Derry and parts of Fermanagh and Tyrone had been completed. No similar effort on such a scale was undertaken until the present soil survey of An Foras Taluntais.

Further slides showed the development of soil parent-material and the influence of two major glaciations on this, how many rocks of Scottish and English origin have been found in Ireland and how the flow of ice has moved soil masses so that in many cases the present soil cover has not been derived from the underlying rock. Examples of this development in western Ireland were clearly shown. These soil movements have been of great assistance to geologists in determining the nature of former glaciations, and have had a profound effect on agriculture and forestry.

An intriguing study of geological phenomena and landforms followed in which was described and illustrated the karp limestone of the Burren, the coalfields of Castlecomer and the lakes of the midlands, created by the underlying limestone being carried away in solution. An interesting sideline was an illustration of the movement of sand on Dollymount strand where a large number of small horse-shoe shaped dunes were being carried along by the wind at about 16 feet per hour. Dr. Jackson estimated that some 28,000 tons of sand were on the move!

We were finally shown slides illustrating the main soil forming minerals ; their composition and the elements they contribute to the soil were outlined.

Following discussion Mr. R. N. O'Carroll proposed a vote of thanks and pointed out that the complexities of soil development spread farther than the origin and nature of the parent-material and that variations in environment could give rise to many soil series from similar parent-material. After Mr. L. U. Gallagher seconded the vote of thanks the President closed the meeting.

L.U.G.

Review

Report of the Minister for Lands on Forestry for the period: 1st April, 1962 to 31st March, 1963

IN the general review which appears at the begining of this report the main features of the years work are presented. The total productive area acquired for state forestry purposes during the year was 23,446 acres which is a small drop on the previous year when the figure was 25,719 acres. For the ninth successive year the greatest area of productive land acquired was in county Cork where 4,342 acres or almost 19% of the total productive area acquired, was situated. The eight western counties—Donegal, Sligo, Leitrim, Mayo, Galway, Roscommon, Clare and Kerry—yielded 9,641 acres.

The total area planted was 24,708 acres, comprising new planting of 24,271 acres and the reforestation of 437 acres of clear-felled state plantation. This reforestation figure is of some interest, in that it is a new feature of the reports on state forestry and bring to notice a feature of forestry that must be of increasing importance in the future. The silvicultural problems of the second generation may be very different from those of the first generation. The dangers of wind blow in adjoining stands and the invasion of the cleared areas by appressive weed growth must be anticipated if great expense and troublesome losses are to be avoided. This should be an important field for research.

Sitka spruce maintained its dominant position accounting for 44% of all planting and while *Pinus contorta* was again second in order of significance it dropped back from 30.4% to 24.9%. Scots pine has tended to move up slightly in the popularity charts and now stands at 4.1%. Norway spruce is a good third in the charts with 11.3%. There was also a significant rise in broadleaved tree planting mainly due to an increased use of alder.

Fires were more destructive in the year under review and the area burnt was 692 acres as against 115 in the previous year. The severe winter and spring may have had some influence here.

The exceptionally cold weather and heavy snow delayed planting and caused havoc to fences in some mountain areas. Eucalypts were badly damaged at Tullow and Ballyduff.

Thinning operations yielded 3.1 million hoppus feet of produce ; other felling operations produced 4.7 million hoppus feet. The total area recorded as clear-felled in the year was 1,256 acres. These

latter figures again highlight the growing significance of clear felling and, in consequence, the forestation question already referred to.

While the volume of timber sold was down slightly on the previous year the range of outlets for pulpwood was increased by the commencement of production at the new chipboard factory at Waterford. The growing demand for home timber and the increasing importance of our home raw-material-based forest products industry is very heartening indeed and is eloquent vindication of the far sightedness of the afforestation policy which anticipated or indeed made possible these developments. If demand now tends temporarily to outrun supply one can only urge that a greater afforestation effort now by everyone in a position to plant should encourage a quicker flow of supplies of industrial roundwood in the immediate future.

It is interesting to note that of the material other than firewood sold in the year, 6 million hoppus feet or 89% of the total was sold standing to timber merchants.

Under the heading Private Forestry we get particulars of the progress during the year of the Private Planting Scheme. Small but significant improvement in private forestry is revealed by the figures for payments of planting grants and applications received. Private planting has now increased to 1,300 acres a year which is a very substantial improvement on the position in the recent past. A total area of 12,000 acres has been planted under the scheme since it began around 1930, so that in 1962/63 three times the average rate for private planting was achieved. However it is apparent to all in touch with private forestry that much more could be achieved and that an annual target of 5,000 acres of planting could well be aimed at and would be of valuable, perhaps even of vital significance to the future of our forest industry in general and our forest products industry in particular.

The information on expenditure and income given in the tables in the report show the inevitable upward trend in outgoings. It would be interesting to have some information on price movements in regard to timber—sawlogs, pulp and so on. This type of information would in time make the reports valuable works of reference for future generations. Perhaps also the sawmilling sector should be treated as a separate business with a separate statement on income and expenditure.

One misses a detailed report on research activities but perhaps a seperate report covering the work and results in this field is contemplated. Research workers and teaching departments everywhere have come to look on research reports as the main source of new information on and evidence of technical developments in forestry in the reporting countries and absence of reports of this nature tend to give an unfortunate and often incorrect impression of lack of technical progress.

The report is dated the 31st day of July 1964, and this seems to

be a marked improvement on the previous year. However one feels then that there is a time lag between the date of the report and the date of publication and it is the latter date that really matters to the reviewer.

T.C.

World Forestry Congress

As many members will be aware the Sixth World Forestry Congress will be held in Madrid from 6th to 18th June, 1966. The Society has been asked by the organisers to bring to the notice of all members, the dates on which it is being held.

"The Role of Forestry in the Changing World Economy" has been choosen as the theme for the Congress. Accordingly the main objective will be to examine the essential components of a modern forest policy abreast of present world trends in the consumption of wood and wood products in line with the legitimate economic expectations of developing countries. In addition 10 specialised committees will give attention to specific problems ranging from Afforstration techniques to Forest Economics and statistics. Study tours will also be arranged and there will be an Internalional Festival of Forestry films.

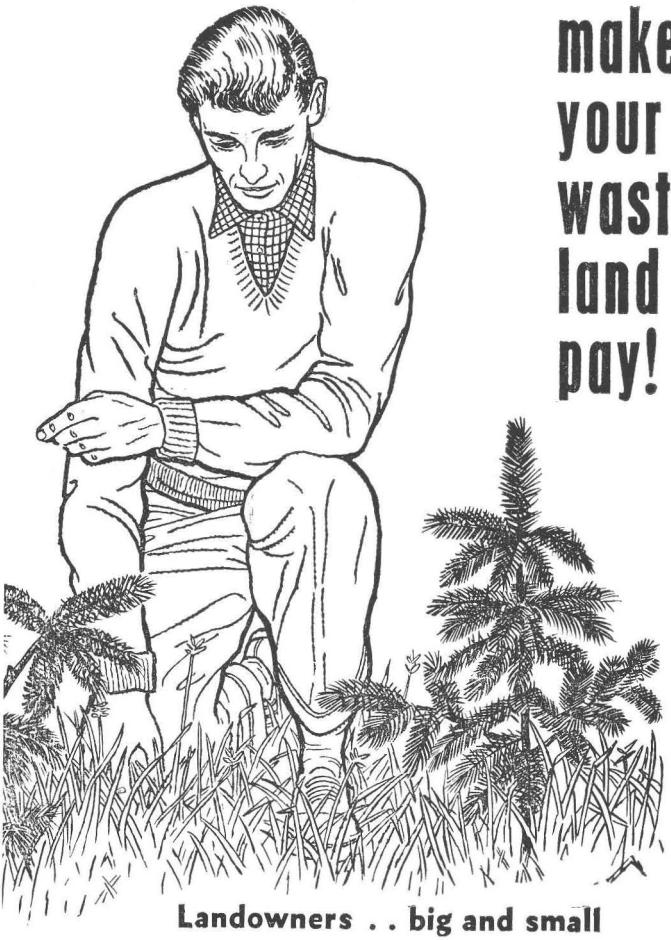
For those interested in attending, fuller details can be obtained from ;

Sr. D. M. Prats Zapirain,
Secretario General,
Sexto Congresso Forestal Mundial,
Direccion de Montes,
Ministerio de Agricultura,
Paseo de Infanta Isabel, 1,
Madrid.

or

Mr. L. Gimenez-Quintana,
Associate Secretary General,
Sixth World Forestry Congress,
Food and Agriculture Organisation
of the United Nations,
Via delle Terme di Caracalla,
Rome.

J. O'Driscoll,
Hon Secretary,
June, 1965.



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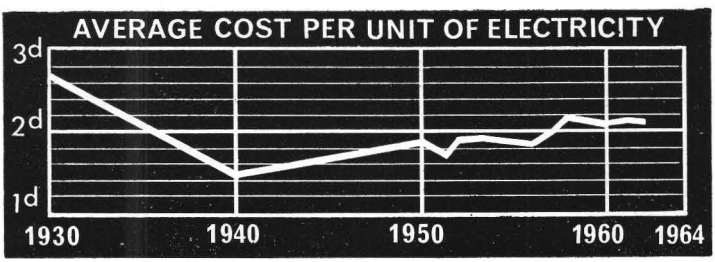

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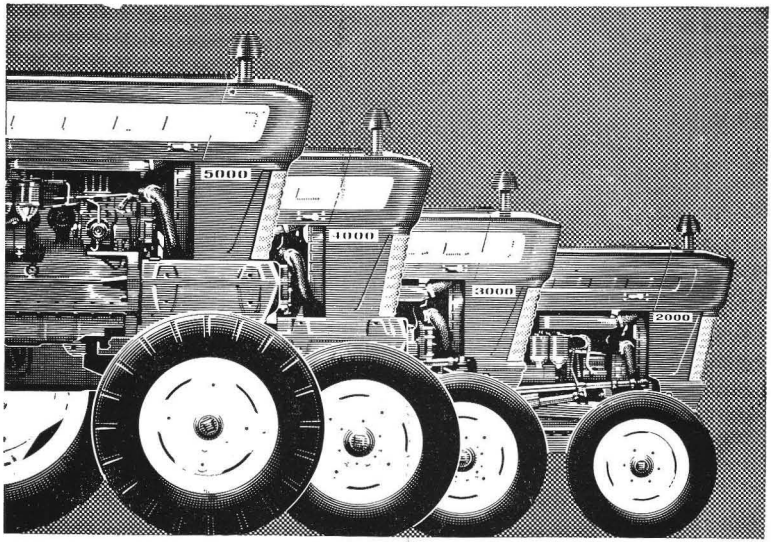

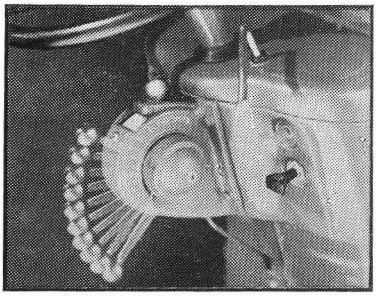

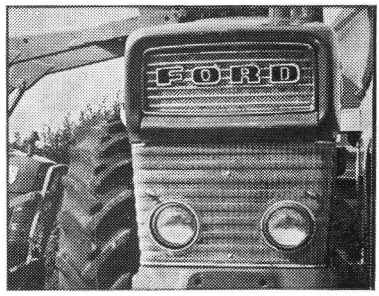

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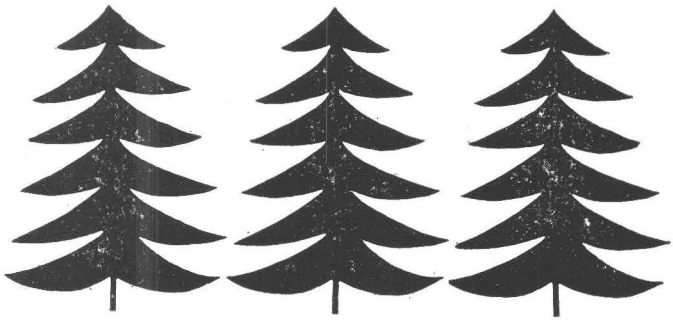

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